

**ACQUISITION OF MAJOR WEAPONS SYSTEMS BY  
THE DEPARTMENT OF DEFENSE AND S. 454,  
THE WEAPON SYSTEMS ACQUISITION REFORM  
ACT OF 2009**

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**HEARING**

BEFORE THE

**COMMITTEE ON ARMED SERVICES**

**UNITED STATES SENATE**

**ONE HUNDRED ELEVENTH CONGRESS**

**FIRST SESSION**

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**MARCH 3, 2009**  
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**ACQUISITION OF MAJOR WEAPONS SYSTEMS  
BY THE DEPARTMENT OF DEFENSE AND  
S. 454, THE WEAPON SYSTEMS ACQUISITION  
REFORM ACT OF 2009**

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**TUESDAY, MARCH 3, 2009**

U.S. SENATE,  
COMMITTEE ON ARMED SERVICES,  
*Washington, DC.*

The committee met, pursuant to notice, at 9:36 a.m. in room SH-216, Hart Senate Office Building, Senator Carl Levin (chairman) presiding.

Committee members present: Senators Levin, Lieberman, Akaka, Bill Nelson, Webb, McCaskill, Udall, Hagan, Begich, Burris, McCain, Chambliss, Thune, Martinez, Burr, and Collins.

Committee staff members present: Richard D. DeBobes, Staff Director, and Leah C. Brewer, Nominations and Hearings Clerk.

Majority staff members present: Creighton Greene, professional staff member; Peter K. Levine, general counsel; John H. Quirk V, professional staff member; Arun A. Seraphin, professional staff member; and William K. Sutey, professional staff member.

Minority staff members present: Joseph W. Bowab, Republican staff director; Daniel A. Lerner, professional staff member; David M. Morriss, minority counsel; Lucian L. Niemeyer, professional staff member; and Christopher J. Paul, professional staff member.

Staff assistants present: Jessica L. Kingston, Brian F. Sebold, and Breon N. Wells.

Committee members' assistants present: Jay Maroney, assistant to Senator Kennedy; Bonni Berge, assistant to Senator Akaka; Christopher Caple, assistant to Senator Bill Nelson; Jon Davey, assistant to Senator Bayh; Gordon I. Peterson, assistant to Senator Webb; Stephen C. Hedger, assistant to Senator McCaskill; Jennifer Barrett, assistant to Senator Udall; Michael Harney, assistant to Senator Hagan; David Ramseur, assistant to Senator Begich; Brady King, assistant to Senator Burris; Sandra Luff, assistant to Senator Sessions; Clyde A. Taylor IV, assistant to Senator Chambliss; Jason Van Beek, assistant to Senator Thune; Erskine W. Wells III, assistant to Senator Wicker; and Kevin Kane, assistant to Senator Burr.

**OPENING STATEMENT OF SENATOR CARL LEVIN, CHAIRMAN**

Chairman LEVIN. Good morning, everybody. The committee meets today to consider the performance of the Department of Defense's (DOD) acquisition programs at a time when cost growth on

these programs has reached levels that we cannot afford, including consideration of our bill, S. 454, the Weapon Systems Acquisition Reform Act of 2009, which Senator McCain and I recently introduced.

Since the beginning of 2006, nearly half of the DOD's largest acquisition programs have exceeded the so-called Nunn-McCurdy cost-growth standards established by Congress to identify seriously troubled programs.

As Secretary Gates pointed out in his testimony before our committee last month, the list of big-ticket weapon systems that have experienced contract or program performance problems spans the Services and includes the Air Force tanker, the CSAR-X, the VH-71, the Osprey, the Future Combat Systems (FCS), the Armed Reconnaissance Helicopter, the Littoral Combat Ship (LCS), the Joint Strike Fighter (JSF), and so on.

Overall, DOD's 95 defense acquisition programs, known as Major Defense Acquisition Programs (MDAPs), have exceeded their research and develop budgets by an average of 40 percent, seen their acquisition costs grow by an average of 26 percent, and experienced an average schedule delay of almost 2 years. Last summer, the Government Accountability Office (GAO) reported that cost overruns on DOD's MDAPs now total \$295 billion over the original program estimates. That's true, even though we've cut unit quantities and reduced performance expectations on many programs, in an effort to hold costs down.

These cost overruns happen because of fundamental flaws that are endemic to our acquisition system. We have a pretty good idea of what those flaws are. Major acquisition programs fail because DOD: one, continues to rely on unreasonable cost and schedule estimates; two, establishes unrealistic performance expectations; three, insists on the use of immature technologies; and four, adopts costly changes to program requirements, production quantities, and funding levels in the middle of ongoing programs.

Earlier this year, Under Secretary of Defense for Acquisition John T. Young, Jr., wrote a memo in which he sought to explain the cost growth on some of DOD's largest programs. This is what his memorandum said: "A number of programs had a poor foundation and Milestone B, the starting point for major development and manufacturing design. . . Fundamentally, these programs moved past Milestone B with inadequate foundations built on artificially low cost estimates, optimistic schedules and assumptions, immature design or technology, fluid requirements, and other issues."

Mr. Young then went on to list the flaws of each MDAP. The JSF: too little understanding of the design; the FCS: fluid program strategy; the V-22: immature technology and Congress reversed DOD termination; the C-17: development issues and underfunding; the Army's Family of Medium Tactical Vehicles: design flaws; the CH-47F: low estimates and invalid remanufacture assumptions; the advanced EHF Satellite: optimistic schedule; the LPD-17: flawed lead ship design process and knowledge base; and the F-22A: immature, exquisite technology.

Now, the first two of these programs, JSF and FCS, account for almost \$80 billion in cost overruns, with average unit costs that have already increased by roughly 40 percent each over original

program estimates, and are likely to rise further. According to GAO, both programs were initiated with insufficiently mature technologies and overly optimistic assumptions about system performance.

With regard to the JSF, GAO reports that initial estimates assumed that commonality between the three variants of the aircraft could cut development costs by about 40 percent; however, this level of commonality has proven impossible to achieve. Twelve years after the program started, three of the JSF's eight critical technologies are still not mature, its production processes are not mature, and its designs are still not fully proven and tested.

With regard to FCS, GAO reports that the estimated lines of code needed to support FCS's software and development are almost three times the original assumptions, leading to an increase in software development costs that now approaches \$8 billion. Eight years after the program started, only 3 of the FCS's 44 critical technologies are fully mature. GAO tells us that the Army has not advanced the maturity of 11 critical technologies since 2003, and that 2 other technologies, which are central to the Army's plans, are now rated less mature than when the program began.

This is the price that we have paid for our failure to complete needed systems engineering tasks, perform appropriate developmental testing, and build prototypes. Particularly at this time, when the Federal budget is under immense strain as a result of the economic crisis, we cannot continue this kind of waste and inefficiency.

That is why Senator McCain and I have introduced the Weapon Systems Acquisition Reform Act of 2009. This bill is designed to help put MDAPs on a sound footing from the outset by addressing program shortcomings in the early phases of the acquisition process.

In particular, our bill would address unreasonable performance requirements by requiring DOD to rebuild its systems engineering capability, reestablish the position of director of developmental testing, and use the Joint Requirements Oversight Council (JROC) to make early tradeoffs between cost schedule and performance requirements.

Our bill will address unreasonable cost and schedule estimates by establishing a new director of independent cost assessment to ensure that cost estimates for MDAPs are fair, reliable, and unbiased.

Our bill will reduce the use of immature technologies by requiring DOD to make greater use of prototypes, including competitive prototypes, and requiring the Director of Defense Research and Engineering to periodically review and provide independent assessments of the maturity of critical technologies on major weapon systems.

Our bill, finally, addresses costly changes in the middle of programs by ensuring, through preliminary design review, that requirements are well understood before a program receives Milestone B approval, by providing an incentive for contractors to improve performance in ongoing programs by developing mechanisms to maintain competitive pressure through the program cycle, and by tightening the so-called Nunn-McCurdy requirements for under-

performing programs by providing for the termination of any program that cannot be justified after a complete reexamination and revalidation.

Today, we will hear from two distinguished former Under Secretaries of Defense for Acquisition, Paul Kaminski and Jacques Gansler. We will also hear from Pete Adolph, a former DOD Director of Developmental Testing, and Mike Sullivan, the GAO Director of Acquisition and Sourcing Management. Each of our witnesses has great experience in the area of weapon systems acquisition; and, in the course of the last year, each has completed a major report recommending significant improvements and reforms. We all look forward to their testimony on these issues.

I now call on Senator McCain.

#### **STATEMENT OF SENATOR JOHN MCCAIN**

Senator MCCAIN. Thank you, Mr. Chairman, for today's hearing, and more importantly, your leadership on the bill that is the subject of today's hearing, the Weapons Acquisition Reform Act of 2009. I join you in welcoming our expert witnesses today.

Let me set the overall context of today's discussion, and I'll do so very simply. A train wreck is coming. Look at the President's 10-year budget and you'll see an overall decrease in defense spending. Unless difficult decisions are made and serious reform measures are undertaken, our ability to provide for our national security will be, over time, fundamentally compromised.

Clearly, the endless cycle of runaway costs, prolonged delivery schedules, and poor performance in the acquisition of major weapons has, in my view, us mired in a form of unilateral disarmament. Since scrutinizing the tanker lease scandal years ago, I'm not sure that things are any better. For example, how could DOD award a multibillion-dollar contract based on a proposal it later found was fundamentally unexecutable? That's exactly what happened on the Navy's VH-71 program, the program to replace the President's own helicopters.

Just over the last few years, the VH-71 program has doubled, with an additional cost of \$6 billion for 28 aircraft that will likely cost taxpayers well over \$400 million each. How could DOD laden a multibillion-dollar shipbuilding program with so many requirements that the program more than doubled in cost, with DOD basically asleep at the switch? That happened with the Navy's LCS program. At times, the program saw change orders averaging 75 per week.

How could a multibillion-dollar program for next-generation fighter jets produce planes that are operating below satisfactory readiness rates and could end up being too expensive to operate? That happened with the Air Force's F-22 Raptor program.

How could DOD spend billions for the Army's biggest transformational program, valued at almost \$200 billion, only for it to be, in many respects, closer to the beginning of development than it is to the end? That's the FCS program. At this point, it's not been clear when, or even if, the information network at the heart of the FCS concept can be built.

On our military satellite program, how could a design flaw recently emerge that will take at least 1 year, and up to \$1 billion



to fix? That's the Air Force's Space-Based Infrared System (SBIRS), high satellite program. More cost and schedule increases are likely there.

But, to understand the depth and breadth of our acquisition problems, one needs to go no further than to look at the status of particular programs. Across all the Services, the top 75 programs have unfunded cost overruns of at least \$295 billion. From 2000, the number of MDAPs has increased from 75 to 95, and the cost of those programs has doubled from \$790 billion to \$1.6 trillion, leaving unfunded acquisition commitments equal to more than 10 years' worth of major weapons procurement funding.

In other words, in the current fiscal environment we find ourselves, the DOD acquisition plan is unaffordable. In my view, meaningful reform is only going to happen if DOD itself decides to change, develops an overarching management philosophy, sets up clear lines of authority and accountability, brings discipline and control over the requirement process, shuts the revolving door, and restores the corps of qualified and experienced acquisition and contracting professionals. That's what this legislation helps to do.

In this bill, the chairman and I built on previous reform initiatives by focusing on costs and risk. The bill reflects that a key to managing defense procurement programs effectively is starting them right by requiring key program reviews up front to catch costly design flaws and technology risks before we actually buy them.

Probably the most aggressive feature of the bill gives DOD a big stick, bigger than anything available under current law, to wield against the very worst-performing programs. It does so by giving DOD additional tools to enforce fair, reliable, and unbiased independent cost estimates with the creation of a new director. Unlike merely promulgated DOD instructions, which apply only to new programs, that provision will capture chronically-poor performers that are in the development pipeline now.

Mr. Chairman, I don't want to go all over the features of the bill; I want to hear from our witnesses. But, for truly meaningful reform to endure, the commitment to reform must begin with the fiduciaries of the taxpayers dollars within the DOD itself.

I thank you, Mr. Chairman. I welcome the witnesses.

[The prepared statement of Senator McCain follows:]

PREPARED STATEMENT BY SENATOR JOHN MCCAIN

Thank you, Mr. Chairman, for today's hearing and, more importantly, your leadership on the bill that is the subject of today's hearing, S.454, "The Weapons Systems Acquisition Reform Act of 2009."

I appreciate the opportunity to serve as an original co-sponsor on it with you, and I too welcome our expert witnesses today.

Before I turn to the bill, let me briefly set the overall context of today's discussion, and I'll do so simply.

A train wreck is coming, and unless hard decisions are made and serious reform measures undertaken, our ability to see to our national security interests will be over time fundamentally compromised.

Let me be clear. The endless cycle of runaway costs, prolonged delivery schedules and poor performance we have seen in major weapons has us, in my view, mired in a form of unilateral disarmament.

Since we closely scrutinized the tanker lease scandal years ago, I'm not sure that things have gotten much better. For example:

- How could the DOD have awarded a multibillion contract based on a proposal it later found was "fundamentally unexecutable." That's exactly what

happened on the Navy's VH-71 program—the program to replace the President's own helicopters. Just over the last few years, the program has increased by about \$6 billion—for aircraft that will likely cost taxpayers well over \$400 million each.

How could the DOD have loaded up a multibillion shipbuilding program with so many requirements that the program doubled in cost (by about \$400 million) without the DOD really noticing until it was too late? That happened—on the Navy's Littoral Combat Ship (LCS) program. At times, that program saw change orders averaging 75 per week.

- How could a multibillion dollar program for next generation fighter jets have produced planes that may end up being too expensive to operate? That too happened—on the F-22 Raptor program. While being the Nation's most expensive fighter aircraft, those jets continue to operate below satisfactory reliability rates.
- How could the DOD have spent billions for the Army's biggest transformational program, valued at about \$200 billion, only for it to be (in many respects) closer to the beginning of development than it is to the end? That's the Future Combat Systems (FCS) program. At this point, it's not even clear when (or even if) the information network at the heart of the FCS concept can be built.
- On a military satellite program, how could a design flaw have recently emerged that will take at least 1 year and up to \$1 billion to fix? That's the Air Force's Space-Based Infrared System High satellite program. More cost and schedule increases are likely there.

We're supposed to have laws in the books that are supposed to prevent these sorts of things from happening. Why didn't they work? To the person—who is responsible?

The fact that we're asking those questions (with billions of dollars of taxpayer money at stake) and that we have no answers, lays out what we're dealing with far better than I can possibly describe using facts and figures.

So, I don't have to mention that the top 75 programs across all of the Services have unfunded cost overruns of at least \$295 billion. Or, that (since fiscal year 2000) the number of major defense acquisition programs has increased from 75 to 95. Or, that within that period the cost of those programs doubled from \$790 billion to \$1.6 trillion. Or, that this left unfunded acquisition commitments equal to more than 10 years worth of major weapons procurement funding.

I don't have to talk about how risky developing most of those programs are; or the likelihood that they too will balloon in costs; or how much other government-wide priorities will constrain defense spending going forward. I don't have to go into all that to make the point that the DOD's acquisition plan—as it currently stands—is itself likely unaffordable.

However one looks at it, the honeymoon is over.

In my view, meaningful reform is only going to happen if DOD itself decides to change. DOD has to:

- Develop an overarching management philosophy that dictates an overall approach to ensuring the timely delivery of major weapons that satisfy the needs of the joint warfighter at the most reasonable cost to the taxpayer.
- Set up clear lines of authority and accountability for managing procurement programs.
- Bring discipline and control over the requirements process and get out of the business of gold-plating programs.
- Shut the revolving door. While a leavening of experienced DOD procurement officials working for defense contractors (and vice-versa) is healthy, the lack of meaningful controls on this revolving door is creating an unhealthy tolerance of conflict-of-interest.
- Restore the corps of qualified and experienced acquisition and contracting professionals that DOD had in the 1980s before it gave its functions over to contractor/lead systems integrators, thereby letting the fox guard the hen house.

Until and unless administration and DOD leadership do these sorts of things—things that set, if you will, a “command climate” that's conducive to investing the taxpayers' money responsibly—I fear that reform efforts may amount to only rearranging the deck chairs on the Titanic. That's something that the chairman and I have no interest in doing.

At the end of the day, we in Congress can only give DOD tools that it can use to pursue truly lasting solutions that ensure desirable cost/scheduling and performance outcomes in our most complicated, most expensive weapons systems. That's what this bill helps do.

In this bill, the chairman and I build on previous reform initiatives by focusing on costs and risk. The bill reflects that a key to managing defense procurement programs effectively is starting them right—by requiring key program review upfront to catch costly design flaws and technology risk before we actually buy the system.

In so doing, we continue our efforts to move DOD closer towards fixed price-type procurement contracting by requiring that technology and integration risk can be meted out of a program early. So, by the time a program heads into procurement, if a contractor isn't ready to sign a good fixed price-type contract, the government shouldn't be signing a contract with that company to buy that system at all. There's still too much risk.

Probably the most aggressive feature of the bill gives DOD a big stick—bigger than anything available under current law—to wield against the very worst performing programs. With that provision we intend DOD to, if you will, “enforce” fair, reliable, and unbiased cost estimates verified by a new director of independent cost estimates, also created by this bill. Unlike rules that DOD recently put in place, that provision doesn't apply to just new programs. It will capture chronically poor performers that are in the development pipeline now.

Another important provision requires DOD to consider a broad range of cost-effective measures to help maximize competition throughout the life of a weapons program. The industry consolidation that occurred after the end of the Cold War went too far. Some 50 prime contractors merged into only 6. That's far too few to support a competitive base for our current and future needs. It's resulted in a serious decline in innovation.

Other provisions in the bill elaborate in the “starting programs right” theme by:

- Renewing focus on systems engineering early;
- Requiring the completion of preliminary design reviews before a program can move into the development phase; and
- Strengthening DOD's developmental testing and evaluation capability.

Other helpful provisions include those that:

- Require DOD budget, requirements, and acquisition officials to consult each other and make trade-offs between cost, schedule, and performance early in the process; and
- Crack down on the frequent changes to programs, which tend to cause many cost increases.

While this bill is not intended as a panacea to cure all that ails the defense procurement process, it is an important next step in Congress' continuing efforts to help DOD culturally reform the system.

As I said a moment ago, for meaningful reform to truly endure, the commitment to reform must begin with the fiduciaries of the taxpayers' dollars within the Department itself.

Thank you, Mr. Chairman. I look forward to hearing from our witnesses today.

Chairman LEVIN. Senator McCain, we thank you.

Now we'll call on our witnesses. First, we'll call on Michael Sullivan from the GAO.

Would you please proceed?

**STATEMENT OF MICHAEL J. SULLIVAN, DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT ACCOUNTABILITY OFFICE**

Mr. SULLIVAN. Chairman Levin, Senator McCain, members of the committee, I'm pleased to be here today to discuss DOD's acquisition outcomes and the legislation proposed by this committee to improve them. I'll make a brief oral statement and ask that my written testimony be placed in the record.

Chairman LEVIN. It will be.

Mr. SULLIVAN. We've been reporting for years on poor cost and schedule outcomes on DOD's major weapon system acquisitions. As the chairman noted, most recently we reported that 95 programs in DOD's current portfolio have grown in cost by \$295 billion and are, on average, delivered about 21 months late. We believe there

are problems at the strategic and at the program levels that cause these outcomes.

At the strategic level, DOD's three systemic processes for building its investment strategy are fragmented and broken. The requirement-setting process, known as the Joint Capabilities and Integration Development System (JCIDS) is stovepiped, it does not consider resources, and it approves nearly every proposal that it reviews. The funding process accepts programs with unrealistic cost estimates, and does not fully fund their development costs. These two processes are poorly integrated, and this poor communication leads to unhealthy competition, where too many programs are chasing too few dollars.

Finally, at the program level, the acquisition process initiates programs with unreliable cost estimates and without knowledge from proper systems engineering analysis to understand each weapon system's requirements and the resources that will be needed to achieve them. These programs move forward with too much technology, design, and manufacturing risk as a result.

DOD understands this and has recently revised its policies to address some of these problems. Its new acquisition policy, for instance, encourages more systems engineering activity earlier in programs, competitive prototyping to gain knowledge more quickly and to maintain competition, earlier milestone reviews, and steering boards to protect programs against the desire to add more requirements once they've started.

Recent decisions by DOD on some programs have been encouraging, and some of the newer programs appear to have undergone more disciplined reviews.

For many years, there's been a broad consensus that weapon system acquisition problems are serious and their resolution is overdue. With the Federal budget under increasing strain from the economic crisis facing our Nation, the time to change is now.

In testimony before this committee last month, Secretary of Defense Gates identified many of the systemic problems associated with acquisitions and indicated that efforts are underway to address them.

We believe that the legislation this committee has proposed will help address the toughest problems, and we enthusiastically support it. We believe it precisely targets key problem areas, provides much-needed oversight, and provides increased authority and independence to the critical functions of cost estimating and development testing by requiring them to report to the Secretary and to Congress.

Among other things, its provision to require a full inventory of DOD's current systems engineering skills is an excellent beginning to rebuilding that sorely-needed capability. Its addition of a termination criterion for Nunn-McCurdy breaches sends a strong signal to programs to have realistic cost estimates when they start.

It is important to state that there is also a need for changes to the overall acquisition culture and the incentives it provides. The culture should begin to change by resisting the urge to achieve the revolutionary, but unachievable, capability in one step by allowing technologies to mature in the technology base rather than forcing them on the acquisition programs too early, by ensuring that ur-

gent requirements are well-defined and quickly achievable, and by instituting shorter, more predictable development cycles.

These changes will not be easy to make. Tough decisions must be made about DOD's overall portfolio of weapon programs and about specific programs; and stakeholders from DOD, the military services industry, and Congress will have to play a constructive role in this decisionmaking. We see the proposed legislation discussed here today as a very healthy step in that direction.

Mr. Chairman, this concludes my statement. I'll wait to answer questions.

[The prepared statement of Mr. Sullivan follows:]

PREPARED STATEMENT BY MICHAEL J. SULLIVAN

Mr. Chairman and members of the committee: I am pleased to be here today to discuss the Department of Defense's (DOD) management of its major weapon system acquisitions—an area that has been on the Government Accountability Office's (GAO) high-risk list since 1990. Prior to and since that time, Congress and DOD have continually explored ways to improve acquisition outcomes without significant results. While the technological sophistication of DOD weapon systems is unparalleled, major weapon programs continue to cost more, take longer to complete, and deliver fewer quantities and capabilities than originally planned. Last year we reported that the cumulative cost growth in DOD's portfolio of 95 major defense acquisition programs was \$295 billion from first estimates and the average delay in delivering promised capabilities to the warfighter was 21 months. Clearly, some problems are to be expected in developing weapon systems given the technical risks and complexities involved. However, all too often we have found that cost and schedule problems are rooted in poor planning, execution, and oversight.

Investment in weapon systems is now at its highest level in two decades, and DOD plans to spend more than \$357 billion over the next 5 years on major defense acquisition programs. Effective management of this substantial investment is critical as competition for funding has increased dramatically within the department and across the government. DOD faces a number of fiscal pressures: the ongoing military campaigns in Afghanistan and Iraq, rising personnel costs, and the rebuilding and modernization of the force. In addition, the economic and fiscal crises now facing the Nation have required unprecedented spending by the Federal Government, and budget deficits are projected to remain high for many years to come. At a time when the Federal budget is strained by spending needs for a growing number of national priorities, it is imperative that DOD get the best value for every dollar it invests in weapon system programs. Every dollar wasted during the development and acquisition of weapon systems is money not available for other priorities within DOD and elsewhere in the government.

Today, I will discuss: (1) the systemic problems that have contributed to cost, schedule, and performance problems in DOD's acquisition of major weapon systems; (2) recent actions the department has taken to address these problems; (3) our observations on the committee's proposed acquisition reform legislation; and (4) steps that Congress and the department need to take to improve the future performance of acquisition programs. The statement includes findings from our July 2008 report on a knowledge-based funding approach and February 2009 report on potential changes to DOD's acquisition management framework.<sup>1</sup> It also draws from our extensive body of work on DOD's acquisition of weapon systems. A list of our key products is provided at the end of this statement. This work was conducted 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.

<sup>1</sup>GAO, Defense Acquisitions: A Knowledge-Based Funding Approach Could Improve Major Weapon System Program Outcomes, GAO-08-619 (Washington, DC: July 2, 2008), and Defense Acquisitions: Perspectives on Potential Changes to DOD's Acquisition Management Framework, GAO-09-295R (Washington, DC: Feb. 27, 2009).

FRAGMENTED INVESTMENT DECISIONMAKING, UNEXECUTABLE PROGRAMS, AND LACK OF ACCOUNTABILITY UNDERLIE POOR ACQUISITION OUTCOMES

Over the past several years our work has highlighted a number of underlying systemic causes for cost growth and schedule delays at both the strategic and program levels. At the strategic level, DOD's processes for identifying warfighter needs, allocating resources, and developing and procuring weapon systems—which together define DOD's overall weapon system investment strategy—are fragmented. As a result, DOD fails to effectively address joint warfighting needs and commits to more programs than it has resources for, thus creating unhealthy competition for funding. At the program level, a military Service typically establishes and DOD approves a business case containing requirements that are not fully understood and cost and schedule estimates that are based on overly optimistic assumptions rather than on sufficient knowledge. Once a program begins, it too often moves forward with inadequate technology, design, testing, and manufacturing knowledge, making it impossible to successfully execute the program within established cost, schedule, and performance targets. Furthermore, DOD officials are rarely held accountable for poor decisions or poor program outcomes.

*DOD Lacks an Integrated Approach to Balance Weapon System Investments*

At the strategic level, DOD largely continues to define warfighting needs and make investment decisions on a Service-by-Service and individual platform basis, using fragmented decisionmaking processes. This approach makes it difficult for the department to achieve a balanced mix of weapon systems that are affordable and feasible and that provide the best military value to the joint warfighter. In contrast, we have found that successful commercial enterprises use an integrated portfolio management approach to focus early investment decisions on products collectively at the enterprise level and ensure that there is a sound basis to justify the commitment of resources.<sup>2</sup> By following a disciplined, integrated process—during which the relative pros and cons of competing product proposals are assessed based on strategic objectives, customer needs, and available resources, and where tough decisions about which investments to pursue and not to pursue are made—companies minimize duplication between business units, move away from organizational stovepipes, and effectively support each new development program they commit to. To be effective, integrated portfolio management must have strong, committed leadership; empowered portfolio managers; and accountability at all levels of the organization.

DOD determines its capability needs through the Joint Capabilities and Integration Development System (JCIDS). While JCIDS provides a framework for reviewing and validating needs, it does not adequately prioritize those needs from a joint, departmentwide perspective; lacks the agility to meet changing warfighter demands; and validates almost all of the capability proposals that are submitted. We recently reviewed JCIDS documentation related to new capability proposals and found that most—almost 70 percent—were sponsored by the military Services with little involvement from the joint community, including the combatant commands, which are responsible for planning and carrying out military operations.<sup>3</sup> Because DOD also lacks an analytic approach to determining the relative importance of the capabilities needed for joint warfighting, all proposals appear to be treated as equal priorities within the JCIDS process. By continuing to rely on capability needs defined primarily by the Services, DOD may be losing opportunities for improving joint warfighting capabilities and reducing the duplication of capabilities in some areas. The JCIDS process has also proven to be lengthy and cumbersome—taking on average up to 10 months to validate a need—thus undermining the department's efforts to effectively respond to the needs of the warfighter, especially those needs that are near term. Furthermore, the vast majority of capability proposals that enter the JCIDS process are validated or approved without accounting for the resources or technologies that will be needed to acquire the desired capabilities. Ultimately, the process produces more demand for new weapon system programs than available resources can support.

The funding of proposed programs takes place through a separate process, the department's Planning, Programming, Budgeting, and Execution (PPBE) system, which is not synchronized with JCIDS. While JCIDS is a continuous, need-driven process that unfolds in response to capability proposals as they are submitted by sponsors, PPBE is a calendar-driven process comprising phases occurring over a 2-

<sup>2</sup> GAO, Best Practices: An Integrated Portfolio Management Approach to Weapon System Investments Could Improve DOD's Acquisition Outcomes, GAO-07-388 (Washington, DC: Mar. 30, 2007).

<sup>3</sup> GAO, Defense Acquisitions: DOD's Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities, GAO-08-1060 (Washington, DC: Sept. 25, 2008).

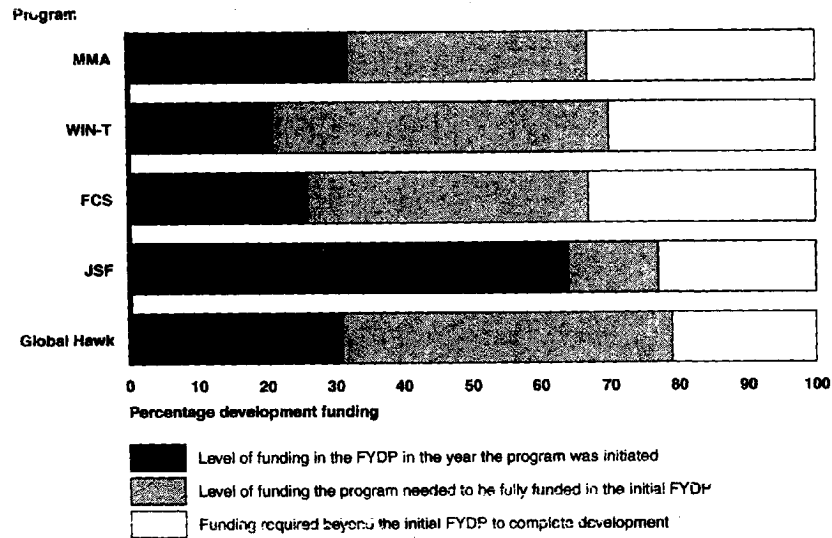
year cycle, which can lead to resource decisions for proposed programs that may occur several years later. In addition, because PPBE is structured by military Service and defense programs and not by the joint capability areas being used in JCIDS, it is difficult to link resources to capabilities. The PPBE process also largely allocates resources based on historical trends rather than on a strategic basis. Service shares of the overall budget have remained relatively static for decades, even though DOD's strategic environment and warfighting needs have changed dramatically in recent years. Because DOD's programming and budgeting reviews occur at the back end of the PPBE process—after the Services have developed their budgets—it is difficult and disruptive to make changes, such as terminating programs to pay for new, higher-priority programs.

We recently reviewed the impact of the PPBE process on major defense acquisition programs and found that the process does not produce an accurate picture of the department's resource needs for weapon system programs, in large part because it allows too many programs to go forward with unreliable cost estimates and without a commitment to fully fund them.<sup>4</sup> The cost of many of the programs we reviewed exceeded the funding levels planned for and reflected in the Future Years Defense Program (FYDP)—the department's long-term investment strategy (see fig. 1). DOD's failure to balance its needs with available resources promotes an unhealthy competition for funding that encourages sponsors of weapon system programs to pursue overly ambitious capabilities and underestimate costs to appear affordable. Rather than limit the number and size of programs or adjust requirements, DOD opts to push the real costs of programs to the future. With too many programs underway for the available resources and high cost growth occurring in many programs, the department must make up for funding shortfalls by shifting funds from one program to pay for another, reducing system capabilities, cutting procurement quantities, or in rare cases terminating programs. Such actions not only create instability in DOD's weapon system portfolio, they further obscure the true future costs of current commitments, making it difficult to make informed investment decisions.

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<sup>4</sup>GAO-08-619.

**Figure 1: Funding Shortfalls at the Start of Development for Five Major Weapon System Programs\***



Source: DOD (data); GAO (analysis and presentation).

\*Multi-Mission Maritime Aircraft (MMA), Warfighter Information Network—Tactical (WIN-T), Future Combat Systems (FCS), Joint Strike Fighter (JSF), and Global Hawk.

*Initiating Programs with Inadequate Knowledge of Requirements and Resources Often Results in Poor Outcomes*

At the program level, the key cause of poor outcomes is the approval of programs with business cases that contain inadequate knowledge about requirements and the resources—funding, time, technologies, and people—needed to execute them. Our work in best practices has found that an executable business case for a program demonstrated evidence that: (1) the identified needs are real and necessary and that they can best be met with the chosen concept; and (2) the chosen concept can be developed and produced within existing resources. Over the past several years, we have found no evidence of the widespread adoption of such an approach for major acquisition programs in the department. Our annual assessments of major weapon systems have consistently found that the vast majority of programs began system development without mature technologies and moved into system demonstration without design stability.

The chief reason for these problems is the encouragement within the acquisition environment of overly ambitious and lengthy product developments—sometimes referred to as revolutionary or big bang acquisition programs—that embody too many technical unknowns and not enough knowledge about the performance and production risks they entail. The knowledge gaps are largely the result of a lack of early and disciplined systems engineering analysis of a weapon system's requirements prior to beginning system development. Systems engineering translates customer needs into specific product requirements for which requisite technological, software, engineering, and production capabilities can be identified through requirements analysis, design, and testing. Early systems engineering provides the knowledge a product developer needs to identify and resolve performance and resource gaps before product development begins by either reducing requirements, deferring them to the future, or increasing the estimated cost for the weapon system's development. Because the government often does not perform the proper upfront requirements analysis to determine whether the program will meet its needs, significant contract cost increases can and do occur as the scope of the requirements changes or becomes



better understood by the government and contractor. Not only does DOD not conduct disciplined systems engineering prior to the beginning of system development, it has allowed new requirements to be added well into the acquisition cycle. We have reported on the negative impact that poor systems engineering practices have had on several programs, such as the Global Hawk Unmanned Aircraft System, F-22A, Expeditionary Fighting Vehicle, and Joint Air-to-Surface Standoff Missile.<sup>5</sup>

With high levels of uncertainty about requirements, technologies, and design, program cost estimates and related funding needs are often understated, effectively setting programs up for cost and schedule growth. We recently assessed the service and independent cost estimates for 20 major weapon system programs and found that while the independent estimates were somewhat higher, both estimates were too low in most cases.<sup>6</sup> In some of the programs we reviewed, cost estimates have been off by billions of dollars. For example, the initial service estimate for the development of the Marines' Expeditionary Fighting Vehicle was about \$1.1 billion. The department's Cost Analysis and Improvement Group (CAIG) estimated the development cost of the program to be \$1.4 billion, but development costs for the program are now expected to be close to \$3.6 billion. In the case of the Future Combat System (FCS), the Army's initial estimate for the development cost was about \$20 billion, while CAIG's estimate was \$27 billion. The department began the program using the program office's estimate of \$20 billion, but development costs for the FCS are now estimated to be \$28 billion and the program is still dealing with significant technical risk. Estimates this far off the mark do not provide the necessary foundation for sufficient funding commitments and realistic long-term planning.

The programs we reviewed frequently lacked the knowledge needed to develop realistic cost estimates. For example, program Cost Analysis Requirements Description documents—used to build the program cost estimate—often lack sufficient detail about planned program content for developing sound cost estimates. Without this knowledge, cost estimators must rely heavily on parametric analysis and assumptions about system requirements, technologies, design maturity, and the time and funding needed. A cost estimate is then usually presented to decisionmakers as a single, or point, estimate that is expected to represent the most likely cost of the program but provides no information about the range of risk and uncertainty or level of confidence associated with the estimate.

*Lack of Accountability for Making Weapon System Decisions Hinders Achieving Successful Outcomes*

DOD's requirements, resource allocation, and acquisition processes are led by different organizations, thus making it difficult to hold any one person or organization accountable for saying no to a proposed program or for ensuring that the department's portfolio of programs is balanced. DOD's 2006 Defense Acquisition Performance Assessment study observed that these processes are not connected organizationally at any level below the Deputy Secretary of Defense and concluded that this weak structure induces instability and inhibits accountability. Furthermore, a former Under Secretary of Defense for Acquisitions, Technology, and Logistics has stated that weapon system investment decisions are a shared responsibility in the department and, therefore, no one individual is accountable for these decisions. Frequent turnover in leadership positions in the department exacerbates the problem. The average tenure, for example, of the Under Secretary of Defense for Acquisition, Technology, and Logistics over the past 22 years has been only about 20 months.<sup>7</sup>

When DOD's strategic processes fail to balance needs with resources and allow unsound, unexecutable programs to move forward, program managers cannot be held accountable when the programs they are handed already have a low probability of success. Program managers are also not empowered to make go or no-go decisions, have little control over funding, cannot veto new requirements, and have little authority over staffing. At the same time, program managers frequently change during a program's development, making it difficult to hold them accountable for the business cases that they are entrusted to manage and deliver.

The government's lack of control over and accountability for decisionmaking is further complicated by DOD's growing reliance on technical, business, and procurement expertise supplied by contractors. This reliance may reach the point where the foundation upon which decisions are based may be largely crafted by individuals

<sup>5</sup> GAO, Best Practices: Increased Focus on Requirements and Oversight Needed to Improve DOD's Acquisition Environment and Weapon System Quality, GAO-08-294 (Washington, DC: Feb. 1, 2008).

<sup>6</sup> GAO-08-619.

<sup>7</sup> The position of Under Secretary of Defense for Acquisition was established in 1986 and the title was subsequently changed to the Under Secretary of Defense for Acquisition, Technology, and Logistics in 2000. Since 1986, there have been 11 Under Secretaries.

who are not employed by the government, who are not bound by the same rules governing their conduct, and who are not required to disclose any financial or other personal interests they may have that conflict with the responsibilities they have performing contract tasks for DOD. For example, while the total planned commitments to major acquisition programs have doubled over recent years, the size of the department's systems engineering workforce has remained relatively stable, leading program offices to rely more on contractors for systems engineering support. Further, in systems development, DOD typically uses cost-reimbursement contracts in which it generally pays the reasonable, allocable, and allowable costs incurred for the contractor's best efforts, to the extent provided by the contract. The use of these contracts may contribute to the perpetuation of an acquisition environment that lacks incentives for contractors to follow best practices and keep costs and schedules in check.

RECENT DOD POLICY CHANGES COULD IMPROVE FUTURE PERFORMANCE OF WEAPON SYSTEM PROGRAMS

The department understands many of the problems that affect acquisition programs and has recently taken steps to remedy them. It has revised its acquisition policy and introduced several initiatives based in part on direction from Congress and recommendations from GAO that could provide a foundation for establishing sound, knowledge-based business cases for individual acquisition programs. However, to improve outcomes, DOD must ensure that its policy changes are consistently implemented and reflected in decisions on individual programs—not only new program starts but also ongoing programs as well. In the past, inconsistent implementation of existing policy has hindered DOD's efforts to execute acquisition programs effectively. Moreover, while policy improvements are necessary, they may be insufficient unless the broader strategic issues associated with the department's fragmented approach to managing its portfolio of weapon system investments are also addressed.

In December 2008, DOD revised its policy governing major defense acquisition programs in ways intended to provide key department leaders with the knowledge needed to make informed decisions before a program starts and to maintain disciplined development once it begins. The revised policy recommends the completion of key systems engineering activities before the start of development, includes a requirement for early prototyping, establishes review boards to identify and mitigate technical risks and evaluate the impact of potential requirements changes on ongoing programs, and incorporates program manager agreements to increase leadership stability and management accountability. The policy also establishes early milestone reviews for programs going through the pre—systems acquisition phase. In the past, DOD's acquisition policy may have encouraged programs to rush into systems development without sufficient knowledge, in part, because no formal milestone reviews were required before system development. If implemented, these policy changes could help programs replace risk with knowledge, thereby increasing the chances of developing weapon systems within cost and schedule targets while meeting user needs. Some aspects of the policy were first pilot-tested on selected programs, such as the Joint Light Tactical Vehicle program, and indications are that these programs are in the process of acquiring the requisite knowledge before the start of systems development. Some key elements of the department's new acquisition policy include:

- a new materiel development decision as a starting point for all programs regardless of where they are intended to enter the acquisition process,
- a more robust Analysis of Alternatives (AOA) to assess potential materiel solutions that address a capability need validated through JCIDS,
- a cost estimate for the proposed solution identified by the AOA,
- early program support reviews by systems engineering teams,
- competitive prototyping of the proposed system or key system elements as part of the technology development phase,
- certifications for entry into the technology development and system development phases (as required by congressional legislation),
- preliminary design review (PDR) that may be conducted before the start of systems development, and
- configuration steering boards to review all requirements and technical changes that have potential to affect cost and schedule.

As part of its strategy for enhancing the roles of program managers in major weapon system acquisitions, the department has established a policy that requires formal agreements among program managers, their acquisition executives, and the user community setting forth common program goals. These agreements are in-

tended to be binding and to detail the progress the program is expected to make during the year and the resources the program will be provided to reach these goals. DOD also requires program managers to sign tenure agreements so that their tenure will correspond to the next major milestone review closest to 4 years. The department acknowledges that any actions taken to improve accountability must be based on a foundation whereby program managers can launch and manage programs toward successful performance, rather than focusing on maintaining support and funding for individual programs. DOD acquisition leaders have also stated that any improvements to program managers' performance depend on the department's ability to promote requirements and resource stability over weapon system investments.

Over the past few years, DOD has also been testing portfolio management approaches in selected capability areas—command and control, net-centric operations, battlespace awareness, and logistics—to facilitate more strategic choices for resource allocation across programs. The department recently formalized the concept of capability portfolio management, issuing a directive in 2008 that established policy and assigned responsibilities for portfolio management. The directive established nine joint capability area portfolios, each to be managed by civilian and military co-leads. While the portfolios have no independent decisionmaking authority over requirements determination and resource allocation, according to some DOD officials, they provided key input and recommendations in this year's budget process. However, without portfolios in which managers have authority and control over resources, the department is at risk of continuing to develop and acquire systems in a stovepiped manner and of not knowing if its systems are being developed within available resources.

#### OBSERVATIONS ON PROPOSED ACQUISITION REFORM LEGISLATION

Overall, we believe that the legislative initiatives being proposed by the committee have the potential, if implemented, to lead to significant improvements in DOD's management of weapon system programs. Several of the initiatives—including the increased emphasis on systems engineering and developmental testing, the requirement for earlier PDRs, and the strengthening of independent cost estimates and technology readiness assessments—could instill more discipline into the front end of the acquisition process when it is critical for programs to gain knowledge. Establishing a termination criterion for Nunn-McCurdy cost breaches could help prevent the acceptance of unrealistic cost estimates as a foundation for starting programs.<sup>8</sup> Having greater involvement by the combatant commands in determining requirements and requiring greater consultation between the requirements, budget, and acquisition processes could help improve the department's efforts to balance its portfolio of weapon system programs. In addition, several of the proposals as currently drafted will codify what DOD policy already calls for, but are not being implemented consistently in weapon programs.

##### *Section 101: Systems Engineering Capabilities*

Requires DOD to: (1) assess the extent to which the department has in place the systems engineering capabilities needed to ensure that key acquisition decisions are supported by a rigorous systems analysis and systems engineering process; and (2) establish organizations and develop skilled employees to fill any gaps in such capabilities.

The lack of disciplined systems engineering analysis conducted prior to starting system development has been a key factor contributing to poor acquisition outcomes. Systems engineering activities—requirements analysis, design, and testing—are needed to ensure that a weapon system program's requirements are achievable and designable given available resources, such as technologies. In recent years, DOD has taken steps to improve its systems engineering capabilities by establishing a Systems and Software Engineering Center of Excellence and publishing guidance to assist the acquisition workforce in the development of systems engineering plans, education, and training. However, as the National Research Council recently reported, DOD's systems engineering capabilities have declined over time and shifted increasingly to outside contractors.<sup>9</sup> A comprehensive assessment to determine what sys-

<sup>8</sup> 10 U.S.C. §2433(a)(5) requires the Secretary of Defense to report to Congress when a program's acquisition unit cost increases by at least 25 percent over the current baseline estimate or increases by at least 50 percent over the original baseline estimate.

<sup>9</sup> National Research Council, *Pre-Milestone A and Early-Phase Systems Engineering: A Retrospective Review and Benefits for Future Air Force Systems Acquisition* (Washington, DC: February 2008).

tems engineering capabilities are in place and what capabilities are needed, as recommended in the proposed legislation, is a critical first step in enhancing the function of systems engineering in DOD acquisitions. At the same time, it will be important for DOD to implement steps to ensure systems engineering is applied in the right way and at the right time.

*Section 102: Developmental Testing*

Requires DOD to reestablish the position of Director of Developmental Test and Evaluation and requires the Services to assess and address any shortcomings in their developmental testing organizations and personnel.

Robust developmental testing efforts are an integral part of the systems development process. They help to identify, evaluate, and reduce technical risks, and indicate whether the design solution is on track to satisfy the desired capabilities. As the Defense Science Board reported in 2008, developmental testing in weapon system programs needs to be improved.<sup>10</sup> We believe that developmental testing would be strengthened by a formal elevation of its role in the acquisition process and the reestablishment of a Director of Developmental Test and Evaluation position. Furthermore, requiring the Director to prepare an annual report for Congress summarizing DOD's developmental test and evaluation activities would provide more accountability. We also agree that the military Services should be required to assess their respective developmental testing entities and address any shortcomings. This action would help ensure that the Services have the knowledge and capacity for effective developmental test efforts.

*Section 103: Technical Maturity Assessments*

Makes it the responsibility of the Director of Defense Research and Engineering (DDR&E) to periodically review and assess the technological maturity of critical technologies used in major defense acquisition programs.

Ensuring that programs have mature technology before starting systems development is critical to avoiding cost and schedule problems, yet for many years we have reported that a majority of programs go forward with immature technologies and experience significant cost growth. Legislation enacted by Congress in 2006, requiring DOD to certify that the technology in a program has been demonstrated in a relevant environment before it receives approval to start system development, has begun to help address this problem. Since the legislation was enacted, DOD has asked the DDR&E to conduct independent reviews of technology readiness assessments for system development milestone decisions. Although DDR&E reviews are advisory in nature, we have seen reviews that have pushed programs to do more to demonstrate technology maturity. The improvements that this proposed legislation, as currently written, is intended to bring about may already be occurring in DOD. Congress, however, may wish to consider requiring the DDR&E to conduct technology readiness reviews not just periodically, but for all major defense acquisition programs, and whether or not DDR&E has the capacity and resources to effectively conduct technology assessments.

*Section 104: Independent Cost Assessment*

Establish a Director of Independent Cost Assessment to ensure that cost estimates for major defense acquisition programs are fair, reliable, and unbiased.

Within DOD, the CAIG is the organization responsible for conducting independent costs estimates for major defense acquisition programs. The CAIG reports to the department's Director of Program Analysis and Evaluation, but its principal customer is the Under Secretary of Defense for Acquisition, Technology, and Logistics. We believe that establishing an independent assessment office that reports directly to the Secretary or Deputy Secretary of Defense and to Congress—similar to the Office of the Director of Operation Test and Evaluation—would more fully integrate cost estimating with the acquisition management framework and provide an increased level of accountability. We see no reason why CAIG should not form the basis of the proposed organization. Congress may also wish to consider appointing the Director for a time-certain term and making the Director responsible for prescribing cost-estimating policy and guidance and for preparing an annual report summarizing cost estimates for major acquisition programs. Ultimately, however, improved cost estimating will only occur if there is a better foundation for planning and acquiring weapon system programs—one that promotes well-defined requirements, is knowledge-based and informed by disciplined systems engineering, requires mature technology, and adheres to shorter development cycle times.

<sup>10</sup>Defense Science Board, Report on Developmental Test & Evaluation (Washington, DC: May 2008).

*Section 105: Role of Combatant Commanders*

Requires the Joint Requirements Oversight Council (JROC) to seek and consider input from the commanders of the combatant commands in identifying joint military requirements.

Requirements determination in DOD, particularly for major weapon system programs, continues to be driven largely by the military Services. Studies by the Defense Science Board, Center for Strategic and International Studies, and others have revealed that although the combatant commands—which are responsible for planning and executing military missions—are the principal joint warfighting customer in DOD, they have played a limited role in determining requirements. Currently, the JROC is doing more to seek out and consider input from the combatant commands through regular trips and meetings to discuss capability needs and resourcing issues. However, many of the combatant commands do not believe that their needs, which are reflected through the Integrated Priority List process, are sufficiently addressed through the department’s JCIDS process. For the combatant commands to meet this proposed legislative mandate and have more influence in establishing requirements, DOD should consider providing the combatant commands with additional resources to establish robust analytical capabilities for identifying and assessing their capability needs. Ultimately, the department must better prioritize and balance the needs of the military Services, combatant commands, and other defense components, and be more agile in responding to near-term capability needs.

*Section 201: Trade-offs of Cost, Schedule, and Performance*

Requires consultation between the budget, requirements, and acquisition processes to ensure the consideration of trade-offs between cost, schedule, and performance early in the process of developing major weapon systems.

As currently structured, DOD’s budget, requirements, and acquisition processes do not operate in an integrated manner. The function and timing of the processes are not sufficiently synchronized, and the decisionmakers for each process are motivated by different incentives. These weaknesses have contributed to the development of a portfolio with more programs than available resources can support and programs that launch into system development without executable business cases. We have recommended that the department establish an enterprisewide portfolio management approach to weapon system investment decisions that integrates the determination of joint warfighting needs with the allocation of resources, and cuts across the Services by functional or capability area.<sup>11</sup> To ensure the success of such an approach, we believe that the department should establish a single point of accountability with the authority, responsibility, and tools to implement portfolio management effectively.

*Section 202: Preliminary Design Review*

Require the completion of a PDR and a formal post-PDR assessment before a major defense acquisition program receives approval to start system development.

We have found that a key deliverable in a knowledge-based acquisition process is the preliminary design of the proposed solution based on a robust systems engineering assessment prior to making a large financial commitment to system development. Early systems engineering provides the knowledge needed by a developer to identify and resolve gaps, such as overly optimistic requirements that cannot be met with current resources, before product development begins. Consequently, DOD would have more confidence that a particular system could successfully proceed into a detailed system development phase and meet stated performance requirements within cost, schedule, risk, and other relevant constraints. The recently revised DOD acquisition policy places an increased emphasis on programs planning for PDR prior to the start of system development but does not go as far as making it a requirement to do so. We support any effort to add controls to the acquisition process to ensure that timely and robust systems engineering is conducted before major investment decisions, such as the approval to start system development, are made.

*Section 203: Life-Cycle Competition*

Require DOD to adopt measures recommended by the 2008 Defense Science Board Task Force on Defense Industrial Structure for Transformation—such as competitive prototyping, dual sourcing, open architectures, periodic competitions for subsystem upgrades, and licensing of additional suppliers—to maximize competition throughout the life of a program.

<sup>11</sup> GAO-07-388.

We have reported in the past on the problem of diminishing competition and the potential benefits of more competition.<sup>12</sup> In discussing the environment that leads to poor acquisition outcomes, we have noted that changes within the defense supplier base have added pressure to this environment. We noted that in 2006, a DOD-commissioned study found that the number of fully competent prime contractors competing for programs had fallen from more than 20 in 1985 to only 6, and that this has limited DOD's ability to maximize competition in order to reduce costs and encourage innovation. However, avenues exist for reducing costs through competition. For example, we reported that although continuing an alternate engine program for the Joint Strike Fighter would cost significantly more in development costs than a sole-source program, it could, in the long run, reduce overall life-cycle costs and bring other benefits.

*Section 204: Nunn-McCurdy Breaches*

Requires that a major defense acquisition program that experiences a critical Nunn-McCurdy cost breach be terminated unless the Secretary of Defense certifies that: (1) continuing the program is essential to national security and the program can be modified to proceed in a cost-effective manner; and (2) the program receives a new milestone approval prior to the award of any new or modified contract extending the scope of the program.

In order for DOD to improve its program outcomes, realistic cost estimates must be required when programs are approved for development initiation. DOD often underestimates costs in large part because of a lack of knowledge and overly optimistic assumptions about requirements and critical technologies. This underestimation is also influenced by DOD's continuing failure to balance its needs with available resources, which promotes unhealthy competition among programs and encourages programs to overpromise on performance capabilities and underestimate cost. This false optimism is reinforced by an acquisition environment in which there are few ramifications for cost growth and delays. Only in very rare instances have programs been terminated for poor performance. When DOD consistently allows unsound, unexecutable programs to begin with few negative ramifications for poor outcomes, accountability suffers. As section 204 proposes, the strengthening of the Nunn-McCurdy provision—by including the potential termination of programs that experience critical cost growth—could facilitate a change in DOD's behavior by preventing the acceptance of unrealistic cost estimates as a foundation for program initiation and placing more accountability on senior DOD leadership for justifying program continuation. Programs may thus be forced to be more candid and upfront about potential costs, risks, and funding needs, and the likelihood of delivering a successful capability to the warfighter at the cost and in the time promised may grow.

*Section 205: Organizational Conflicts of Interest*

Prohibits systems engineering contractors from participating in the development or construction of major weapon systems on which they are advising DOD, and requires tightened oversight of organizational conflicts of interest by contractors in the acquisition of major weapon systems.

The defense industry has undergone significant consolidation in recent years which has resulted in a few large, vertically integrated prime contractors. This consolidation creates the potential for organizational conflicts of interest where, for example, one business unit of a large company may be asked to provide systems engineering work on a system being produced by another unit of the same company. As the Defense Science Board has recognized, these conflicts of interest may lead to impaired objectivity, which may not be mitigated effectively through techniques such as erecting a firewall between the employees of the two units. While the Federal Acquisition Regulation currently covers some cases of potential organizational conflicts of interest involving the systems engineering function, there may be a need for additional coverage in this area. In general, we would support efforts to enhance the oversight of potential organizational conflicts of interest, particularly in the current environment of a heavily consolidated defense industry.

*Section 206: Acquisition Excellence*

Establishes an annual awards program to recognize individuals and teams that make significant contributions to the improved cost, schedule, and performance of defense acquisition programs.

<sup>12</sup>GAO, Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment, GAO-08-782T (Washington, DC: June 3, 2008).

We support the creation of an annual awards program to recognize individuals and teams for improving the cost, schedule, and performance of defense acquisition programs. We have reported that meaningful and lasting reform will not be achieved until the right incentives are established and accountability is bolstered at all levels of the acquisition process. The need for incentives emerged as a significant issue in our recent discussions with acquisition experts examining potential changes to the acquisition processes enumerated in last year's defense authorization act. The discussions revealed that those changes may not achieve the desired improvement in acquisition outcomes unless they are accompanied by changes in the overall acquisition environment and culture, and the incentives they provide for success.

#### CONCLUDING OBSERVATIONS ON WHAT REMAINS TO BE DONE

A broad consensus exists that weapon system problems are serious and that their resolution is overdue. With the Federal budget under increasing strain from the Nation's economic crisis, the time for change is now. DOD is off to a good start with the recent revisions to its acquisition policy, which, if implemented properly, should provide a foundation for establishing sound, knowledge-based business cases before launching into development and for maintaining discipline after initiation. The new policy will not work effectively, however, without changes to the overall acquisition environment. Resisting the urge to achieve the revolutionary but unachievable capability, allowing technologies to mature in the science and technology base before bringing them onto programs, ensuring that requirements are well-defined and doable, and instituting shorter development cycles would all make it easier to estimate costs accurately, and then predict funding needs and allocate resources effectively. But these measures will succeed only if the department uses an incremental approach. Constraining development cycle times to 5 or 6 years will force more manageable commitments, make costs and schedules more predictable, and facilitate the delivery of capabilities in a timely manner.

Acquisition problems are also likely to continue until DOD's approach to managing its weapon system portfolio: (1) prioritizes needs with available resources, thus eliminating unhealthy competition for funding and the incentives for making programs look affordable when they are not; (2) facilitates better decisions about which programs to pursue and which not to pursue given existing and expected funding; and (3) balances the near-term needs of the joint warfighter with the long-term need to modernize the force. Achieving this affordable portfolio will require strong leadership and accountability. Establishing a single point of accountability could help the department align competing needs with available resources.

The department has tough decisions to make about its weapon systems and portfolio, and stakeholders, including military Services, industry, and Congress, have to play a constructive role in the process toward change. Reform will not be achieved until DOD changes its acquisition environment and the incentives that drive the behavior of its decisionmakers, the military Services, program managers, and the defense industry.

Mr. Chairman, this concludes my prepared statement. I would be happy to answer any questions you may have at this time.

#### CONTACTS AND ACKNOWLEDGEMENTS

For further information about this statement, please contact Michael J. Sullivan (202) 512-4841 or [sullivanm@gao.gov](mailto:sullivanm@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals who made key contributions to this statement include John Oppenheim, Charlie Shivers, Dayna Foster, Matt Lea, Susan Neill, Ron Schwenn, and Bruce Thomas.

Chairman LEVIN. Thank you so much, Mr. Sullivan.  
Dr. Gansler?

#### **STATEMENT OF HON. JACQUES S. GANSLER, CHAIRMAN, DEFENSE SCIENCE BOARD TASK FORCE ON INDUSTRIAL STRUCTURE FOR TRANSFORMATION**

Dr. GANSLER. Mr. Chairman, members of the committee, thank you very much for this honor of appearing before you at what I think is a critical period and on such an important topic.

I don't have to tell this committee of the incredible national security challenges that the United States is facing in the 21st century,

brought on by the rather dramatic world changes that I believe require a new, holistic view of security—DOD, Department of State, Department of Homeland Security, Director of National Intelligence, and so forth—and utilizing both hard and soft power, and addressing a very broad spectrum of the security missions with great unpredictability and covering the full spectrum, from terrorism all the way through nuclear deterrence.

I would also emphasize that we need to take full advantage of globalization of the technology of industry, not restricting or gaming the benefits from globalization through restrictive legislation.

In recognizing the long-term national security implications of the global financial crisis, the need for energy security, worldwide pandemics, the impact of climate change, growing anti-globalization backlash, and the challenging U.S. demographics. We have to do all of this, as Senator McCain emphasized, in a likely fiscally-constrained budget environment.

Now, to address these challenges, I believe four highly inter-related acquisition issues must be addressed, and they have to be addressed by both DOD and Congress. First, what goods and services to buy; that's the requirements process. Second, how to buy them; that's the acquisition reform. Third, who does the acquiring; we have major issues in the acquisition workforce. Fourth, from whom it is acquired; namely, the industrial base.

Now, I wish I could tell you that there is some silver bullet to address all of these needed changes, but it truly requires a very broad set of initiatives in each of the four areas if the Nation is to achieve the required 21st century national security posture.

In my prepared testimony, which, Mr. Chairman, I would appreciate being put into the record—

Chairman LEVIN. It will be.

Dr. GANSLER.—I listed the required actions in each of these four areas, and I'd be pleased to discuss any of these with you at any time. However, for now let me summarize.

I believe this is a very critical period, perhaps somewhat similar to the period following the launch of Sputnik or the fall of the Berlin Wall. Today, the security world is changing dramatically, especially since September 11—geopolitically, technologically, threats, missions, warfighting, commercially, et cetera—and this holistic perspective that I mentioned is required. Moreover, a decade of solid budget growth, which I believe will almost certainly change, has deferred the difficult choices—for example, between more 20th century equipment versus 21st century equipment—and the controlling acquisition policies, practices, laws, and so forth, as well as the Services' budgets and requirements priorities have not been transformed sufficiently to match the needs of this new world. In fact, there's still an emphasis on resetting versus modernization.

Now, leadership is required to achieve the needed changes. You look at the literature on culture change, which I think this clearly is, two things are required to successfully bring about the needed changes. First is the recognition of the need, a crisis. In this case, I believe it is a combination of the economic—the budget, if you will, crisis—and the changing security needs, along with the shortage of the senior acquisition experienced personnel to address these needs. Second, leadership, with a vision, a strategy, and an action



plan. I honestly believe that President Obama, Congress, and Secretary Gates support the needed changes; however, it's pretty clear that the changes can be expected to be severely resisted. Significant change always is.

I would start, as my highest priority, with the important role of the service chiefs and secretaries in recognizing and promoting senior acquisition personnel, military and civilian. Over the last decade, the DOD acquisition workforce has been greatly undervalued. DOD leadership now must demonstrate their personal recognition of the critical nature of senior experienced acquisition personnel and of the smart acquisition practices that they would bring to America's military posture in the 21st century.

As my second priority, I would emphasize the importance of weapons costs as a true military requirement, to achieve adequate numbers of weapons in a resource-constrained environment. This will require enhanced systems engineering, including cost-performance tradeoffs, throughout both the government and industry, and incentives to industry for achieving lower cost.

By the way, this has been done before; for example, with the Joint Direct Attack Munition missile, where the Air Force Chief of Staff said it should hit the target and cost under \$40,000 each. It now sells for under \$20,000 and precisely hits the targets.

Finally, as my third priority, I would emphasize the value of rapid acquisition, from both its military and its economic benefits, which will require the full use of spiral development, with each block based on proven, tested technology and continuous user and logistician feedback for the subsequent block improvements, and with the option of continuous effective competition, at the prime or at the sublevel. If they're not continuously achieving improved performance at lower costs, then they should be competed.

Achieving these required changes will take political courage and sustained, strong leadership by both the executive and legislative branches, working together. I hope, and firmly believe, that it can be achieved. The American public, and particularly our fighting men and women, deserve it, and the Nation's future security depends upon it.

Thank you.

[The prepared statement of Dr. Gansler follows:]

PREPARED STATEMENT BY HON. JACQUES S. GANSLER<sup>1</sup>

Mr. Chairman, members of the committee, thank you for the honor of appearing before you at this critical period, and on such an important topic.

I need not tell you that the U.S., in the 21st century, faces incredible national security challenges—brought on by dramatic world changes that require:

- A new, Holistic View of Security (e.g., DOD, State, DHS, DNI, etc.)—utilizing both “hard” and “soft” power
- Addressing a Broad Spectrum of Security Missions—with great unpredictability (from Terrorism to Nuclear Deterrence)
- Taking full advantage of Globalization (of Technology, Industry, etc.)
- Recognizing the long-term national security implications of:
  - The global financial crisis
  - The need for energy security
  - Worldwide pandemics

<sup>1</sup>Dr. Gansler is Professor and Roger C. Lipitz Chair, as well as Director of the Center for Public Policy and Private Enterprise at the School of Public Policy, University of Maryland. He served as Under Secretary of Defense (Acquisition, Technology, and Logistics) from 1997–2001.

- The impact of climate change
- The growing anti-globalization backlash
- The challenging U.S. demographics
- To do all of this in a likely fiscally-constrained budget environment

To address these challenges, four, highly-interrelated acquisition issues must be addressed (by the DOD and Congress):

- What goods and services to buy (the “requirements” process)
- How to buy them (“acquisition reform”)
- Who does the acquiring (the acquisition workforce)
- From whom is it acquired (the industrial base)

I wish I could tell you that there was a “silver bullet” to address the needed changes; but this truly requires a broad set of initiatives in each of the four areas—if the Nation is to achieve the required 21st century national security posture.

This need, for the four sets of broad changes, was emphasized in a recent Defense Science Board report; where they found:

- “DOD policies, processes, and management of the Defense Acquisition Enterprise (broadly defined) impede the transition to an effective, agile, and affordable overall, joint military force for the 21st century.”
- “U.S. Government policies, practices, and processes do not facilitate the development, deployment, and support of the innovative, affordable, and rapidly acquired weapons, systems, and services needed for the 21st century forces.”
- “The absence of many of the needed skills, (e.g., experienced program management, systems engineering, biotech, advanced IT) in DOD’s acquisition workforce, (particularly at the senior military and civilian levels), combined with the coming retirement and prior, large acquisition workforce reductions, significantly impedes the development, production, support, and oversight of the military capabilities needed for the 21st century.”
- “Government acquisition policies and industry trends (e.g., further horizontal and vertical consolidations) will not produce the required competitive, responsive, efficient, and innovative National Security Industrial Base.”

So let me (very briefly) summarize the changes required in each of the four, critical (and interrelated) areas: [in priority order within each category]

*What is acquired:*

To meet the wide range of challenges, within a resource-constrained environment, the Nation must focus on:

1. Lower cost systems and services
2. Optimized, net-centric systems-of-systems (vs. individual “platforms”)
3. A “reserve” of resources to rapidly respond to combat commanders’ urgent needs
4. More “balanced” allocation of resources (to address “irregular” operations): C<sup>3</sup>ISR, unmanned systems, Special Forces, “Land Warriors,” cyberdefense, etc; [and these resources must be moved from the Supplementals into the base budget]
5. Interoperability of “joint” systems; and coalition systems
6. Planning, equipping, and exercising “as we’ll fight”: with allies, multi-agencies, and “contractors on the battlefield”

*How goods and services are acquired:*

To achieve higher performance at lower costs and faster:

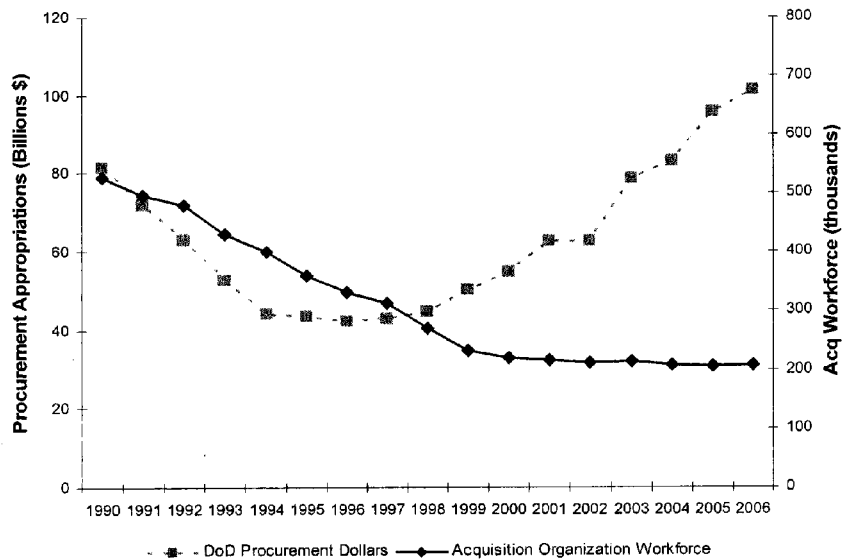
1. Require “cost” as a design/military “requirement” (because cost, in a resource-constrained environment, is numbers)
2. Provide viable, continuous “competition options” (as the incentive for higher performance at lower costs) e.g. competitive prototypes, competitive split-buys, etc.
3. Fully utilize “spiral development,” with demonstrated technologies (because it is lower cost, lower risk, faster to field; maintains the option of competition; avoids obsolescence; can respond rapidly to combat needs)
4. Make maximum use of commercial products and services (at all levels—utilizing Other Transactions Authority; especially at lower tiers)
5. Institutionalize a “Rapid acquisition,” parallel process (to respond to COCOM urgent needs)

6. Create incentives for contractors to achieve desired results (in cost, schedule, and performance)
7. Implement modern, integrated, enterprise-wide IT systems (logistics, business, personnel, etc.)—including linking Government and Industry
8. Address Conflict of Interest concerns (from LSI→Make/Buy→SETA); but don't reduce the value of relevant experience

*Who does the acquiring:*

A flexible, responsive, efficient, and effective acquisition program (for sophisticated, hi-tech goods and services) requires “smart buyers.”

This depends on both quantity and quality of senior and experienced military and civilian personnel (especially for expeditionary operations). In the last decade-plus, this “requirement” has not been met! In fact, the acquisition workforce declined on seniority and quantity even as procurement appropriations increased.



Therefore, one of the Nation's highest priorities (not just in the DOD) must be to address the acquisition workforce.

- The DOD, especially, has an acquisition workforce problem:
  - Greatly reduced senior officers and SESs
    - In 1990 the Army had five general officers with contract background; in 2007 they had zero.
    - In 1995, the Air Force had 40 General Officers in Acquisition, today 24; and in 1995, 87 SESs and today 49
    - The Defense Contract Management Agency (25,000 people in 1990 down to 10,000 today; and 4 General Officers to 0)

These reductions (due to the under valuing of the importance of the acquisition workforce) introduce “opportunities” for “waste, fraud and abuse” (e.g., 90 fraud cases under review from war zone; examples of poor acquisition process results, such as the Air Force Tanker, the Presidential Helicopter, etc.). These Government acquisition workforce issues must be addressed. I believe that President Obama, Congress, and Secretary Gates all agree on this (but it will take the priority attention of the Service Chiefs and Secretaries to make it a priority).

*From whom goods and services are acquired:*

To quote, again, from the recent Defense Science Board study (on the desired 21st century defense industry):

“The last two decades have seen a consolidation of the Defense Industry around 20th Century Needs—The next step is DOD leadership in transforming to a 21st Century National Security Industrial Structure.”

The “vision” for this 21st Century National Security Industrial Base (which appropriate government actions, i.e. acquisitions, policies, practices, and laws, must incentivize and facilitate) are:

1. Efficient, responsive, technologically advanced, highly-competitive (at all levels, including public and private sectors)
2. Globalized (utilizing “best in class”)—requires significant changes to U.S. export controls (i.e., changes to ITAR, EAR, etc.)
3. Healthy (profitable); and investing in IR&D and capital equipment (rules should separate IR&D and B&P)
4. Includes commercial firms and equipment, and maximizes dual-use facilities and workforce (barriers must be removed)
5. “Independent” systems-of-systems architecture and systems engineering firms (to support the Government—as the integrator)
6. Merger and Acquisition policy guidelines to be based on this vision
7. Strong Government-Industry Communications encouraged
8. All non-inherently-governmental work to be done competitively (public vs. private, for current government work)
9. Structural changes to eliminate appearance, or reality, of conflict of interest (regarding “vertical integration”)—but great care to assure relevant—experienced firms and people involved

In summary, I believe this is a critical period, perhaps similar to the period following the launch of Sputnik or the fall of the Berlin Wall. Today the security world is changing dramatically—especially since September 11, 2001 (geopolitically, technologically, threats, missions, warfighting, commercially, etc.)—and a holistic perspective is required (including State, DHS, and DNI, as well as coalition operations). Moreover, a decade of solid budget growth—which will almost certainly change—has deferred difficult choices (between more 20th century equipment vs. 21st century equipment). The controlling acquisition policies, practices, laws, etc. and the Services’ budgets and “requirements” priorities have not been transformed sufficiently to match the needs of this new world (in fact, there is still an emphasis on “resetting” vs. “modernization”).

Leadership is required to achieve the needed changes! All of the literature on “cultural change” (which this clearly must be) state that two things are required to successfully bring about the needed changes:

- Recognition of the need (a “crisis”)

In this case, I believe it is the combination of economic/budget “crisis,” the changing security needs, and the shortage of the senior acquisition-experienced personnel to address the needs; and

- Leadership—with a “vision,” a “strategy,” and an “action plan.” I believe that President Obama, Congress, and Secretary Gates support the needed changes. However, the changes can be expected to be severely resisted—significant change always is!

I would start with the important role of the Service Chiefs and Secretaries in recognizing, and promoting senior acquisition personnel (military and civilian) in order to demonstrate their personal recognition of the critical nature of smart acquisition practices to American’s military posture in the 21st century. As my second priority, I would emphasize the importance of weapons costs as a military requirement (to achieve adequate numbers of weapons in a resource-constrained environment)—which will require enhanced systems engineering (throughout both government and industry) and incentives to industry for achieving lower cost systems. Finally, as my third priority, I would emphasize the value of “rapid acquisition”, for both its military and economic benefits—which will require the full use of “spiral development” (with each “block” based on proven/tested technology, and continuous user and logistician feedback, for subsequent “block” improvement—and with the option of effective competition (at the prime and/or sub-level, if they are not continuously achieving improved performances at lower and lower costs).

Achieving these required changes will take political courage and sustained, strong leadership—by both the executive and legislative branches (working together). I hope, and firmly believe, it can be achieved. The American public, and particularly, our fighting men and women, deserve it—and the Nation’s future security depends upon it.

Thank you.

Chairman LEVIN. Dr. Gansler, thank you so much.  
Dr. Kaminski?

**STATEMENT OF HON. PAUL G. KAMINSKI, CHAIR, COMMITTEE  
ON PRE-MILESTONE A SYSTEMS ENGINEERING, AIR FORCE  
STUDIES BOARD, NATIONAL RESEARCH COUNCIL**

Dr. KAMINSKI. Mr. Chairman, Senator McCain, and members of the committee, first of all, I want to thank you for your leadership on these critical acquisition issues and for the invitation to testify.

Since you've asked me to testify, first, in my role as Chairman of the National Research Council's Study on Pre-Milestone A Systems Engineering, with your permission I would ask that my statement, which includes a full summary, be put in the record, and then I will proceed to provide a short verbal summary of the summary.

Chairman LEVIN. All the statements will be made part of the record. Thank you.

Dr. KAMINSKI. Thank you, sir.

Recent years have seen a serious erosion in our ability to field new weapon systems quickly in response to changing threats, as well as a large increase in the cost of these weapon systems. Our programs today for developing weapon systems take two to three times longer than they did 30 years ago. I note that time is money in this process, and time also leaves room for disruptions, uncertainty, and changes in commercial technology. In a 15- or 20-year period, we're seeing commercial technology turnover three, four, or five times. When a weapon system takes 15 to 20 years to develop, the technology that you start with isn't going to be supported when it's fielded. So, we have to vigorously attack this time issue.

Our committee also noted the importance of systems engineering in reducing this acquisition time, when combined with development planning. We further underscored the importance of an early systems engineering effort, in that, the decisions made prior to and the key Milestone A and B decisions impact somewhere between 75 percent and 85 percent of the total life-cycle cost. So, the time to address those issues is up front, before those decisions are made.

Our committee also noted that many of the conclusions that we reached have been reached in several previous studies. So, the issue isn't disagreement on what the recommendations are, the issue is implementing those recommendations. So, once again, we thank you for your leadership in creating a forum for that kind of implementation.

Let me address now the issues that you asked me to address.

First of all, just one overall comment on systems engineering. I agree with Secretary Gates, who, when asked about acquisition, said, "There is no one silver bullet that is going to correct all the problems." But, I do believe that good systems engineering, coupled with effective development planning early on, are two of the most important contributors to successful acquisition.

Our report provided some formal definitions of "systems engineering," but they tend to be arcane, so I thought I might start with a couple of examples. I'll briefly describe some examples of good systems engineering in the work we've done, and also where we have seen poor systems engineering.

One of the really good examples is the Apollo program. That program, from a dead start, put man on the moon in about 8 years. When that program was started, we didn't have mature technology. What we did was good upfront systems engineering and development planning, so we could proceed in a sequential way, step by step, with each new step building on the previous step. In building hardware, we were also building the experience of our acquisition workforce and our industry, so we could, step by step, increase our capabilities, eventually going to the moon.

Another really good example is the Air Force Intercontinental Ballistic Missile (ICBM) programs that were done in the 1970s and 1980s. What we saw there is that we would never start a full-scale development contract for a new ICBM until we had done the upfront systems engineering and development planning. The development planning produced an inertial guidance system for the ICBM, as well as critical propulsion components, and a reentry vehicle. That not only reduced the risk of the hardware development and integration in the future, it also gave domain experience to our key people in government and industry, so that when we threw the switch and started full-scale development, we could typically expect a first flight in 3 to 4 years, as a result of that experience base. That's what we need to restore.

You asked: "What were systemic contributors to acquisition problems?" I listed five.

The first of these is the lack of this early and continuing systems engineering, coupled to a development planning program early on, right upfront.

The second key impediment is the lack of alignment of responsibility, authority, and accountability of the program manager. A program manager needs to be able to exercise his or her judgment. Much of the program manager's authority has been taken away by one-size-fits-all approaches to acquisition and by the oversight process, which has some onerous elements that are nonvalue-added.

A third major impediment is the lack of stability in program funding. Many contribute to that.

A fourth is the lack of early attention to test and evaluation, with insufficient planning and investment in the tools, such as modeling and simulation, test equipment, facilities, and personnel, to provide us with the timely and meaningful results needed by program management and for continuous systems engineering to refine our performance objectives and development plans.

Finally, the root fundamental issue here is this excessive time to acquire that I had spoken about. Time is money. As this time increases from a few years in the past to 15 years today, it undermines our entire process, causing the key participants to lose what I call the "recipe" for how we move forward and also to lose a sense of accountability. When we see new capabilities that are developed and fielded in 5 years, the engineers, the managers, the testers, the cost analysts are all able to benefit and apply their experience from previous programs, and they can also be held accountable, since they can be in place managing the programs deliverables during one assignment. That all changes when we move to 15-year acquisitions and we have five rollovers of management, engineers, and cost analysts, and five rollovers of the technology in the process.

So, attacking acquisition time is fundamental. I would say, a testament to our failure today is the fact that we have to discard our current acquisition approaches to deal with our urgent needs and field systems, such as the Mine Resistant Ambush Protected vehicle and counter-improvised explosive devices (IEDs) by forming and using rapid-reaction organizations, because our existing ones don't work. They can't respond to the cycle time that we need.

So, what do we do about this? Again, I've listed in my statement five steps.

The first is to ensure that we not only restore, but enhance, this early and continuing systems engineering work, coupled with development planning. This means restoring funding upfront in the programs, and using independent estimates to ensure we have enough funding upfront. It also means attracting best and brightest to the critical systems engineering work, and providing a path to career advancement, career tracking, and leadership for the key people that we need to rebuild in cadre.

Second issue is the alignment of the responsibility, authority, and accountability of the program manager. I've listed several steps in my statement about what's needed to be done to do that.

Third issue is improving funding stability. We pay a great deal for the instability we cause by making funding adjustments to program. My experience shows that every time we make a cut in a program, for financial or other reasons unrelated to performance, we end up eventually putting in three times what we cut to restore the program later and get it back to a base.

Fourth item is giving early and serious attention to the test and evaluation issues that I noted earlier, so they can be part of a rapid process. When we wait for test and evaluation results because we haven't done a good job planning and preparing, what we have is hundreds of people sitting on their hands, waiting for results, and we're paying all those people while they wait for results.

Finally, the last item is fundamentally attacking this problem of long development times by the combination of the previous four items.

I believe action on these five issues will have a significant and demonstrable impact on our serious acquisition problems. I believe that we need to move now with the same urgency and priority that we expect in combat operations to permit the timely and effective development and fielding of new capabilities and services with what I expect will be more limited future defense dollars.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Kaminski follows:]

PREPARED STATEMENT BY DR. PAUL G. KAMINSKI

Chairman Levin, and Ranking Member McCain:

Thank you for your leadership on the Department of Defense (DOD) acquisition, and for the invitation to testify on these important acquisition issues. Since you have asked me to testify in my role as Chair, Committee on Pre-Milestone A Systems Engineering, Air Force Studies Board, National Research Council, I will begin by providing a summary of our report, which was approved by the Governing Board of the National Research Council and published in 2008. The report is available to the public at <http://www.nap.edu>. After the report summary, I will provide my personal views on systems engineering and respond to the key issues you asked that I address.

## SUMMARY

Recent years have seen serious erosion in the ability of U.S. forces to field new weapons systems quickly in response to changing threats, as well as a large increase in the cost of these weapons systems. Today the military's programs for developing weapons systems take two to three times longer to move from program initiation to system deployment than they did 30 years ago. This slowdown has occurred during a period in which threats have been changing more rapidly than ever and when technology advances and accumulated experience should have been accelerating rather than slowing the development process.

Many causes for this trend have been suggested, including the increased complexity of the tasks and the systems involved from both technological and human/organizational perspectives; funding instability; loss of "mission urgency" after the end of the Cold War; bureaucracy, which increases cost and schedule but not value; and the need to satisfy the demands of an increasingly diverse user community. The difficulty of focusing on a specific, homogeneous, post-Cold War threat made problems even worse. Yet although the suggested causal factors have merit, a common view is that better systems engineering (SE) and development planning could help shorten the time required for development, making it more like what it was 30 years ago.

Simply stated, SE is the translation of a user's needs into a definition of a system and its architecture through an iterative process that results in an effective system design. SE applies over the entire program life cycle, from concept development to final disposal.

The Committee on Pre-Milestone A Systems Engineering was tasked by the U.S. Air Force to examine the role that SE can play during the defense acquisition life cycle in addressing the root causes of program failure, especially during the pre-Milestone A and early phases of a program. Currently, few formal SE processes are applied to Air Force development programs before the Milestone A review.<sup>1</sup>

The committee devoted considerable time and space in its report to trying to define a minimum set of systems engineering processes. The most important of these processes are summarized in the checklist in Box S-1 below. A few of the things that need to be taken care of before Milestone A and just after it are the following: the consideration of alternative concepts (solutions) up front; the setting of clear, comprehensive key performance parameters (KPPs) and system requirements; and early attention to interfaces and interface complexity, to the concept of operations, and to the system verification approach. It is these early-stage processes that are covered in this report. The importance of stable requirements and funding between Milestone B and the achievement of initial operational capability (IOC) is stressed, as are processes including good configuration management and change control. The committee further stresses in the report what it regards as six of the most important process areas in its discussion of six "seeds of failure".

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<sup>1</sup>This is a result of the elimination in the 1990s of the development planning function that had existed in the Air Force Systems Command.



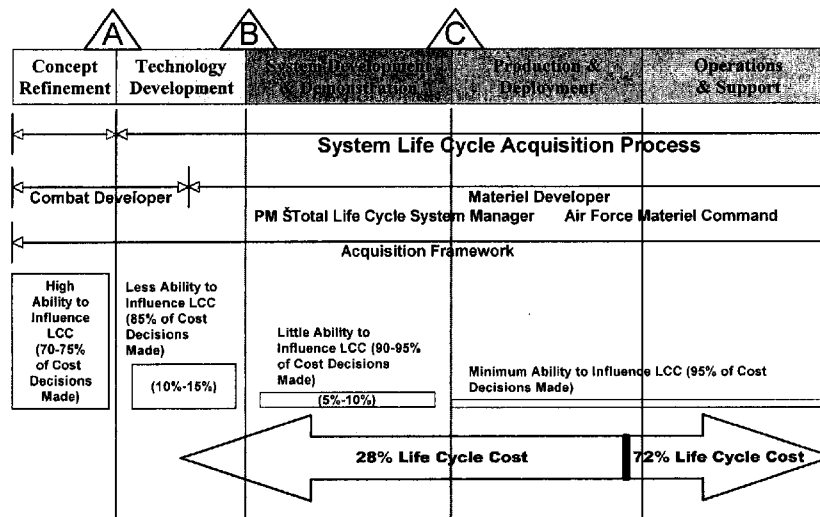


Figure S-1 DOD life-cycle acquisition process. Points A, B, and C at the top of the figure represent Milestones A, B, and C. LCC, life-cycle cost. Source: Richard Andrews, 2003, An Overview of Acquisition Logistics. Fort Belvoir, VA; Defense Acquisition University. Available at <http://www.afcea.org/events/pastevents/documents/Track4Session4AMCEmphasisonCustomerFocusedITInitiatives.ppt#364,12,Slide 12>. Last accessed on November 20, 2007.

#### SYSTEMS ENGINEERING AND THE DOD ACQUISITION LIFE CYCLE

The use of formal systems engineering practices throughout the life cycle of an acquisition program is critical to fielding the required system on time and within budget. Across the top of Figure S-1 are the points at which important management decisions are made: Milestones A, B, and C. Concept development and refinement occur before Milestone A, and further technology development, to reduce system design and development (SDD) risk, occurs before Milestone B. Only after Milestone B does a program become an enterprise with dedicated funding. Importantly, Figure S-1 shows that about three-quarters of total system life-cycle costs are influenced by decisions made before the end of the concept refinement phase at Milestone A, while about three-quarters of life-cycle funds are not actually spent until after Milestone C. This means that although high-quality SE is necessary during the entire acquisition cycle, the application of SE to decisions made in the pre-Milestone A period is critical to avoiding (or at least minimizing) cost and schedule overruns later in a program. Much of the value of early, high-quality SE will be manifested as success in fulfilling Milestone B requirements.

#### MAIN FINDINGS AND RECOMMENDATIONS

The committee's main findings and recommendations are given below.

##### *Finding*

Attention to a few critical systems engineering processes and functions particularly during preparation for Milestones A and B is essential to ensuring that Air Force acquisition programs deliver products on time and on budget.

Today's weapons systems provide unprecedented capabilities but also involve complex interfaces with external command, control, and communications systems and rely on a greater volume of software than ever before. Early decisions on the weapons system requirements and capabilities have a disproportionately large impact on program cost and schedule. The committee also recognizes that a lack of flexibility (a result of overly rigid processes or a lack of trust among program participants or stakeholders) can limit the ability of a program manager to change early decisions that warrant changing.

The committee found many gaps and inconsistencies in the way that the Air Force manages pre-Milestone A activities. The committee heard from presenters of some

cases for which required documents were completed pro forma and filed away, never to be seen again, or for which required steps were skipped completely. The current practice of initiating programs at Milestone B denies the acquisition review authority the earlier opportunity (at Milestone A) to make judgments about the maturity of the technologies on which the program is based and to decide whether technologies need to be further developed prior to making a Milestone B commitment to system development and demonstration.

*Recommendation*

The Air Force leadership should require that Milestones A and B be treated as critical milestones in every acquisition program and that a checklist such as the "Pre-Milestone A/B Checklist" suggested by the committee (see Box S-1 in this Summary) be used to judge successful completion.

A rigorous, standard checklist of systems engineering issues should be addressed by each program through both the pre-Milestone A and pre-Milestone B phases. The committee's recommended 20-item checklist is shown in Box S-1.

**Box S-1**  
**Pre-Milestone A/B Checklist**

**Concept Development**

1. Have at least two alternative concepts to meet the need been evaluated?

*The purpose of alternatives is to stimulate thinking to find the simplest, fastest, and cheapest solution.*

2. Can an initial capability be achieved within the time that the key program leaders are expected to remain engaged in their current jobs (normally less than 5 years or so after Milestone B)? If this is not possible for a complex major development program, can critical subsystems, or at least a key subset of them, be demonstrated within that time frame?

*Achieving capabilities or demonstrating critical subsystems while key programs leaders remain engaged is important to get the capability into service quickly and cost-effectively and to begin the process of incremental improvements based on operational experience.*

3. Will risky new technology have been matured before Milestone B? If not, is there an adequate risk mitigation plan?

*The development of risky new technology in parallel with a major development program can be costly in terms of both time and money.*

4. Have external interface complexities (including dependencies on other programs) been identified and minimized? Is there a plan to mitigate their risks?

*Complex, ill-defined, external requirements and interfaces can be a major source of requirements instability during the development phase. This can be of particular importance when a system must operate in a system-of-systems environment.*

#### **Key Performance Parameters and CONOPS**

5. At Milestone A, have the KPPs been identified in clear, comprehensive, concise terms that are understandable to the users of the system?

*It is important that KPPs be expressed in terms understandable to all of the stakeholders. Failure to define the system's KPPs simply and clearly at Milestone A is a first step to requirements instability and overruns later.*

6. At Milestone B, are the major system-level requirements (including all KPPs) defined sufficiently to provide a stable basis for the development through IOC?

*Beginning development without a complete list of stable requirements is one of the key "seeds of failure" described in Chapter 4 in this report. It is important to complete requirements trade-offs prior to the development phase.*

7. Has a CONOPS been developed showing that the system can be operated to handle the expected throughput and meet response time requirements?

*It can be costly to discover too late that the system as designed cannot be operated to meet its requirements.*

#### **Cost and Schedule Scoping**

8. Are the major known cost and schedule drivers and risks explicitly identified, and is there a plan to track and reduce uncertainty?

*Identifying the major cost and schedule risk areas, with particular attention to this checklist and the six seeds of failure—inexperienced leadership, external interface complexity, system complexity, incomplete requirements at Milestone B, immature technology, and high reliance on new software—can help focus management on these*

*issues early.*

9. Has the cost confidence level been accepted by the stakeholders for the program?

*It is important that stakeholders understand the degree of risk so that the stakeholders will not disrupt the program as the inevitable development program surprises unfold later on. It will generally not be possible by Milestone A or Milestone B to identify all the risk areas that might surface later in a development program, but a frank, early disclosure of known potentials for risk can help sustain stakeholder support later on.*

#### **Performance Assessment**

10. Is there a sufficient collection of models and an appropriate simulation environment to validate the selected concept and the CONOPS against the KPPs?

*In large, complex programs, the development of models early on can be very important to later management of requirements changes and performance verification.*

11. At Milestone B, do the requirements take into account likely future mission growth over the program life cycle?

*The committee advocates freezing new requirements and new technology insertion after Milestone B but also notes that making provisions in the initial requirements to facilitate later upgrades could have great long-term value.*

#### **Architecture Development**

12. Has the system been partitioned to define segments that can be independently developed and tested to the greatest degree possible?

*Effective partitioning of a complex system can greatly reduce its development cost.*

13. By Milestone A, is there a plan to have information exchange protocols established for the whole system and its segments by Milestone B?

*Such a plan developed early on can greatly reduce interface problems later in the development phase when they would be more difficult and costly to fix.*

14. At Milestone B, has the government structured the program plan to ensure that the contractor addresses the decomposition of requirements to hardware and software elements sufficiently early in the development program?

*The histories of programs with cost and schedule overruns are replete with examples of large software developments that had to be redone because requirements from the hardware side were assigned or determined late.*

#### **Risk Assessment**

15. Have the key risk drivers (not only the technology drivers) been identified?

*Identifying and managing risk early can pay large dividends; it is important to focus on the six "seeds of failure" (see item 8 above).*

#### **Program Implementation Strategy**

16. Does the government have access over the life of the program to the talent required to manage the program? Does it have a strategy over the life of the program for using the best people available in the government, the FFRDCs, and the professional service industry?

*Seasoned management is critical; the government's job is to find the best!*

17. At Milestone A, is there a plan defining how the pre-Milestone B activity will be done, and by whom?

*Identifying the program and system managers early, identifying the FFRDC or SETA support needed, thinking through the use of competitive system concept contracts—all can have a decisive impact on the government's ability to select the best concept, to define by Milestone B system requirements that can remain stable through IOC, and to select the best development contractors.*

18. Is there a top-level plan for how the total system will be integrated and tested?

*A well-thought-out strategy for verifying system performance, including optimum phasing of verification tests throughout the assembly process, and well-thought-out use of analytical models and external simulators can have a large positive impact on ultimate cost, schedule, and performance.*

19. At Milestone B, have sufficiently talented and experienced program and systems engineering managers been identified? Have they been empowered to tailor processes and to enforce requirements stability from Milestone B through IOC?

*Seasoned leaders in these areas are critical to maintaining focus and discipline through IOC.*

20. Has the government attempted to align the duration of the program manager's assignment with key deliverables and milestones in the program?

*A combination of assignment extension and time-certain milestones will help align incentives.*

NOTE: KPP, key performance parameter; CONOPS, concept of operations; IOC, initial operational capability; FFRDC, federally funded research and development center; SETA, systems engineering and technical assistance.

While the committee considers that each item on the checklist is important, it calls attention to several items that warrant further discussion. Item 2 recognizes that the world changes too fast to be friendly to long development cycles. The committee believes that the Air Force should strive to structure major development programs so that initial deployment is achieved within, say, 3 to 7 years. Thirty years ago, this was a typical accomplishment—for example, nearly 40 years ago, the Apollo program put the first man on the Moon in fewer than 8 years.

The development time issue is addressable by applying systems engineering to Items 3, 4, and 13 through 15 before Milestones A and B. The definition of clear KPPs by Milestone A and clear requirements by Milestone B that can remain stable through IOC can be essential to an efficient development phase. It is also important that critical technologies be sufficiently mature prior to starting SDD. The committee observed that although today's systems are not necessarily more complex internally than those of 30 years ago, their "external complexity" often is greater, because today's systems are more likely to try to meet many diverse and sometimes

contradictory requirements from multiple users. This kind of complexity can often lead to requirements being changed between Milestone B and IOC, and it can lead to relying on immature technology.

Item 19 of the checklist stresses the importance of placing experienced, domain-knowledgeable managers in key program positions. The committee has observed that many of the truly extraordinary development programs of the past, such as Apollo, the Manhattan Project, the early imaging satellite programs, the U-2, the fleet ballistic missile system, and nuclear submarines, were managed by relatively small (and often immature) agencies with few established processes and controls. In that environment, dedicated managers driven by urgent missions accomplished feats that often seem incredible today.

The committee believes that the accumulation of processes and controls over the years—well meant, of course—has stifled domain-based judgment that is necessary for timely success. Formal SE processes should be tailored to the application. But they cannot replace domain expertise. In connection with item 19, the committee recommends that the Air Force place great emphasis on putting seasoned, domain-knowledgeable personnel in key positions—particularly the program manager, the chief system engineer, and the person in charge of “requirements”—and then empower them to tailor standardized processes and procedures as they feel is necessary.

One key pre-Milestone A task is the analysis of alternatives (AoA), which entails evaluating alternative concepts and comparing them in terms of capabilities, costs, risks, and so on. Checklist items 1 through 4, 12, and 13 should be completed before the AoA, while items 5 through 11 and 14 through 20 may be addressed after the AoA.

#### *Finding*

The creation of a robust systems engineering process is critically dependent on having experienced systems engineers with adequate knowledge of the domain relevant to a contemplated program.

While the systems engineering process has broad use, effective application depends on having domain experts who are aware of what has gone wrong (and right) in the past, recognize the potential to repeat the successes under new circumstances, and avoid repeating the errors.

Ideally, a person or persons with domain knowledge would have had experience working on exactly the same problem, or at least a problem related to the one at hand. If that is not so (and it might not be if the problem has never been addressed before, as was the case for Apollo and nuclear submarines), the term could be taken to refer to academic training in the relevant field of engineering or science. It could also refer to the practice of critical thinking and problem solving that comes with learning to be a systems engineer and then building on that foundation to gain the experiential knowledge and understanding of engineering in the context of an entire system. Systems engineering is enabled by tools that have been developed to assist in the management of systems engineering (not to be confused with the practice of systems engineering).

Both industry and Air Force presenters told the committee that there are not enough domain-knowledgeable and experienced systems engineers to support all of the programs that need them.

#### *Recommendation*

The Air Force should assess its needs for officers and civilians in the systems engineering field and evaluate whether either its internal training programs, which include assignments on Air Force programs that provide mentoring by experienced people and hands-on experience in the application of systems engineering principles, or external organizations are able to produce the required quality and quantity of systems engineers and systems engineering skills. Based on this assessment, the Air Force first should determine how and where students should be trained, in what numbers, and at what cost, and then implement a program that meets its needs.

The Air Force needs to attract, develop, reward, and retain systems engineers across the full spectrum of relevant domains, engage them in the early (pre-Milestone A) phase of new programs (or modification programs), and sustain their participation throughout the life of the programs. One important step in this process would be to create an Air Force occupational code for systems engineering so that engineers' experience and education can be tracked and managed more effectively. The Air Force should support an internal systems engineering career track that rewards the mentoring of junior systems engineering personnel, provides engineers with broad systems engineering experience, provides appropriate financial com-

pensation to senior systems engineers, and enables an engineering career path into program management and operations.

*Finding*

The Government, federally Funded Research and Development Centers (FFRDCs), and industry all have important roles to play throughout the acquisition life cycle of modern weapons systems.

Since the need for a new or upgraded weapons system is most often first recognized by the military user, it is appropriate for the military to codify its requirements and, with support from FFRDC and independent systems engineering and technical assistance contractors, to explore materiel and nonmateriel solutions (such as doctrinal, organizational, or procedural changes) as well as to assess the potential for new technology to provide enhanced capabilities. While it is appropriate and usually desirable to engage development contractors in the pre-Milestone B process using competitive study contracts, the source selection for system development and demonstration should not be made until after the work associated with Milestones A and B is complete.

*Recommendation*

Decisions made prior to Milestone A should be supported by a rigorous systems analysis and systems engineering process involving teams of users, acquirers, and industry representatives.

Working together, government and industry can develop and explore solutions using systems engineering methodology to arrive at an optimal systems solution.

*Finding*

The Air Force used to have a development planning organization that applied pre-Milestone A systems engineering processes to a number of successful programs, but that organization was allowed to lapse.

The role of the Air Force development planning organization, which was within the Air Force Systems Command, was to provide standard evaluation tools and perform pre-Milestone A systems engineering functions across acquisition programs. The early 1990s saw an erosion of this front-end planning organization along with its funding as the Air Force Systems Command (now the Air Force Materiel Command) began to play a decreasing role in program execution. In the opinion of several speakers who met with the committee, one main reason for the erosion of funding was a lack of congressional support for the planning function.

*Recommendation*

A development planning function should be established in the military departments to coordinate the concept development and refinement phase of all acquisition programs to ensure that the capabilities required by the country as a whole are considered and that unifying strategies such as network-centric operations and interoperability are addressed.

The Air Force and the other military services should establish a development planning organization like that which existed in the early 1990s.

The roles and functions of the various organizations involved in acquiring major weapons systems need to be clearly defined. The responsibility for executing systems engineering and program management in the pre-Milestone A and B phases should be vested in the military departments that do the actual development planning functions. This should not be the responsibility of the Office of the Secretary of Defense (OSD) or of the Joint Staff. Instead, those offices need to enable the creation and functioning of military department development planning organizations with policy measures and, where appropriate, resources. The Joint Staff, under the auspices of the Joint Requirements Oversight Council, may help to define the requirements for major programs in the course of the development planning process, but it should not run the process itself.

The existence of "joint" programs or a program such as Missile Defense, which has several related systems being developed by different military services, requires clear guidance from both OSD and the Joint Staff about who is in charge. These programs need to be harmonized and integrated by the responsible integrating agency. However, development planning activities should still take place in the military departments where the expertise resides. Consequently, the development planning should be managed by that agency.

While this committee cannot predict how Congress will view the revival of a good planning process to support pre-Milestone A program efforts, it is still important for the Air Force and DOD to make the case for the critical importance of this process before Congress and others. A development planning process is important not to start new programs, but rather to ensure that any new program (or a new start of

any kind) is initiated with the foundation needed for success. Funding for this planning function needs to be determined by the military services, including both the acquisition communities and those (the warfighters) who generate the operational requirements.

#### CONCLUDING THOUGHTS

Many of the conclusions reached and recommendations made by the committee are similar to those of previous reviews. Most of the past recommendations were never implemented, so one of this committee's most critical thoughts relates to the importance of implementation. A sampling of key findings and recommendations from previous studies follows:

- Government Accountability Office (GAO)<sup>2,3</sup>
  - Separate technology development from systems acquisition. Commit to a program only if the technology is sufficiently mature. Set the minimum Technology Readiness Level (TRL).
  - Stabilize the requirements early.
  - Employ systems engineering techniques before committing to product development.
  - Employ evolutionary approaches that pursue incremental increases in capability.
  - Address shortfalls in science, engineering, and program management staff.
- National Defense Industrial Association (NDIA)<sup>4</sup>
  - Increase SE awareness and recognize SE authority in the program formulation and decision process.
  - Incentivize career SE positions within the government.
- Defense Science Board (DSB)<sup>5</sup>
  - Overhaul the requirements process.
  - Stabilize acquisition tours.
  - Establish a robust SE capability.
- Defense Acquisition Performance Assessment (DAPA)<sup>6</sup>
  - Strategic technology exploitation is a key U.S. advantage. Opportunities need to be identified early.
  - The U.S. economic and security environments have changed—for example, there are fewer prime contractors, smaller production runs, reduced plant capacity, fewer programs, and unpredictable threats.
  - The acquisition system must deal with instability of external funding.
  - The DOD management model is based on a lack of trust. Quantity of review has replaced quality. There is no clear line of responsibility, authority, or accountability.
  - Oversight is preferred to accountability.
  - Oversight is complex, not process- or program-focused (as it should be).
  - The complexity of the acquisition process increases costs and draws out the schedule.
  - Incremental improvement applied solely to the “little a” acquisition process<sup>7</sup> requires all processes to be stable—but they are not.

The committee notes that successful implementation of these recommendations requires the “zipper concept”—making connections at all levels, from the senior lead-

<sup>2</sup>GAO, 2003, Defense Acquisitions: Improvements Needed in Space Systems Acquisition Management Policy, September. Available at <http://www.gao.gov/new.items/d031073.pdf>. Last accessed April 2, 2007.

<sup>3</sup>GAO, 2005, Space Acquisitions: Stronger Development Practices and Investment Planning Needed to Address Continuing Problems, July. Available at <http://www.gao.gov/new.items/d05891t.pdf>. Last accessed April 2, 2007.

<sup>4</sup>NDIA Systems Engineering Division, 2003, Task Report: Top Five Systems Engineering Issues in Defense Industry, January, Arlington, VA: NDIA.

<sup>5</sup>DSB/Air Force Scientific Advisory Board (AFSAB) Joint Task Force, 2003, Acquisition of National Security Space Programs, May, Washington, DC.

<sup>6</sup>Ronald Kadish, Gerald Abbott, Frank Cappuccio, Richard Hawley, Paul Kern, and Donald Kozlowski. 2006. Defense Acquisition Performance Assessment. Available at <http://www.acq.osd.mil/dapaproject/documents/DAPA-Report-web/DAPA-Report-web-feb21.pdf>. Last accessed on April 2, 2007.

<sup>7</sup>The Acquisition—“Big A”—system is often believed to be a simple construct that efficiently integrates three independent processes: requirements, budgeting, and acquisition. “Little a” on the other hand, refers to the acquisition process that focuses on “how to buy” in an effort to balance cost, schedule, and performance; it does not include requirements and budgeting.



ership of the Air Force and DOD down to the working levels within key program management offices and supervisory staffs.

COMMITTEE ON PRE-MILESTONE A SYSTEMS ENGINEERING: A RETROSPECTIVE REVIEW  
AND BENEFITS FOR FUTURE AIR FORCE SYSTEMS ACQUISITION

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Having summarized the findings and recommendations of the Committee on Pre-Milestone A Systems Engineering, let me now add my personal views on systems engineering, and the two additional questions that you asked me to address: 1) the systemic issues that have contributed to cost, schedule, and performance problems in the acquisition of major weapon systems; and 2) the steps that Congress and the Department need to take to improve performance of the Department's acquisition programs.

SYSTEMS ENGINEERING

I agree with Secretary Gates who said that there is no one silver bullet that will correct all of the DOD acquisition problems. But I believe that good systems engineering coupled with effective development planning are the two most important contributors to successful acquisition. Our report provided formal definitions of systems engineering and development planning that are somewhat arcane. So rather than provide further definition, I find it easier to illustrate by choosing examples of good and bad systems engineering and development planning. Examples of good work include the Apollo Program and the U.S. Air Force intercontinental ballistic missile (ICBM) programs (e.g., Minuteman, MX) in the 1970s–1980s. Apollo succeeded in putting men on the moon in about 8 years. At the start of the program, almost all of the key technologies were immature. But good systems engineering and development planning were applied to develop a systematic approach, reducing risk by taking a series of limited steps, and applying the learning and domain experience gained from each step to the subsequent step. The U.S. Air Force ICBM programs used a similar approach, beginning with conceptual studies and technology development, and holding initiation of full scale development (FSD) contracts until key guidance system, re-entry system and propulsion technologies had been demonstrated. As a result, the time from initiation of FSD until first flight was typically 3–4 years. An example of poor systems engineering is the SBIRS program, in which a lack of domain experience and analysis led to a failure to anticipate the possibility of severe radio frequency interference between two key payloads—discovering this problem years after program initiation. Inadequate systems engineering and development are therefore the first of five items listed below as systemic contributors to acquisition problems.

## SYSTEMIC CONTRIBUTORS TO ACQUISITION PROBLEMS

1. The lack of early and continuing systems engineering and the absence of a closely-coupled development planning program are a fundamental contributor, as identified in our report. The root causes include: (a) lack of sufficient personnel (in both government and industry) with adequate education, training and domain experience (this includes personnel in requirements development as well as in acquisition); and (b) lack of sufficient front end investment necessary to understand the key tradeoffs in cost/schedule/performance, and to identify and address the key risks in a systematic manner.

2. Lack of alignment of responsibility, authority, and accountability of the program manager. In many cases the program manager's authority is diffused by many levels of oversight in both the Department and in Congress, and the financial and performance constraints imposed do not allow sufficient freedom of action to apply informed judgment in a timely manner. Flexibility is further limited by application of a "one-size-fits-all" approach imposed by the DOD 5000 system, and the oversight practiced by the DOD and Congress. A program manager needs the freedom to tailor the acquisition approach to the problem, to ensure that the program response time will fall within the response time of the threat, and to apply a variety of tools and techniques (such as the use of prototypes, competitive prototypes, modeling and simulation, critical subsystem and component demonstration). For this to work, we need program managers with the education, training, and domain experience needed to enable timely responses and excellent judgment relevant to the domain.

3. Lack of stability in program funding.

4. Lack of early attention to test and evaluation, with insufficient planning and investment in the tools (e.g., modeling and simulation, test equipment, facilities, and personnel) to provide the timely and meaningful results needed by program management and systems engineering to continually refine performance objectives and development plans.

5. Excessive (and growing) time from program initiation to fielding. As this time increases from a few years to 15 years or more, it undermines the entire acquisition process by causing key participants to "lose the recipe", and lose a sense of accountability as well as a sense of being able to make a difference. When new capabilities are developed and fielded in 5 years, engineers, managers, testers, cost analysts, etc. are able to benefit from and apply the experience gained from a previous program or program phase. They can also see the results of their decisions and be held accountable. We can also meaningfully employ past performance of the contractor as a factor in the award of future programs—an important factor in incentivizing contractor performance. This all changes dramatically when the time extends to 15 years, and we have five roll-overs of management, engineers, cost analysts, and commercial technology during this time period. This long and growing time period is a result of the inflexibility inherent in our entire system of requirements development, budgeting and acquisition, and it creates a vicious cycle in which it further exacerbates the contributors above, and they in turn further increase the time and cost growth. We see the result when we must discard our current acquisition system in order to deal with urgent needs and field systems such as MRAP and jammers to counter IED's by forming and using rapid reaction organizations. This cycle must be broken by attacking the root causes.

## STEPS THAT CONGRESS AND THE DEPARTMENT NEED TO TAKE

1. The first step is to insure that we not only restore, but enhance early and continuing systems engineering coupled with effective development planning. This will require commitment of more significant investment dollars earlier in our acquisition programs, and a commitment to build a cadre of systems engineers and development planners with the education, training and domain experience needed to be effective. Attracting "best and brightest" to this work—and keeping them—will require a personnel system that will identify and track these important human resources and establish a career path to allow those who are successful to advance to senior program management and leadership positions. Their domain experience will be enhanced by managing the building of critical subsystems during the development planning program, reducing risk and building skills and experience at the same time. Congress and the Department can assist by pro-

viding incentives for attracting and keeping key personnel (not only financial incentives, but educational, training, recognition, and most important—the opportunity to take on challenging developments and see that they can make a difference). We will need metrics to assess how well we are doing in building and applying this cadre, and we must recognize that this will not be accomplished in 4, or even 8 years. But we must begin in earnest and begin now. Finally, we need a means to insure that we have adequate funding upfront for new programs; one approach would require a report at program initiation from an independent cost analyst working with system engineers and development planners who have developed their skills on previous programs.

2. Alignment of the responsibility, authority, and accountability of the program manager requires that a degree of trust be established between the program manager and those responsible for our oversight mechanisms. We must be prepared to delegate authority to the program manager, and provide him or her with some flexibility to manage—to adjust levels and allocation of funding, to adjust the allocation of performance parameters, to adjust schedule, and to tailor the acquisition approach to be responsive to the need. Clearly, there must be bounds established beyond which the program manager must seek approval from oversight authorities. But I believe these bounds are too narrow and inflexible today. One size does not fit all programs. Congress and the Department should be willing to consider and tailor many of the restrictions which unnecessarily limit and delay program managers today. I have seen many of our successful classified special programs benefit from greater management flexibility than that afforded to their in conventional program counterparts. The good managers of these special programs have used that flexibility to the benefit of the program and the Department by operating with transparency and maintaining trust. I realize that it seems counterintuitive to recommend greater flexibility and trust in an environment rife with acquisition problems, but I believe we need to break the current cycle. One way to begin is with a limited number of pilot programs, with first priority to those programs addressing urgent needs, and assignment of our most experienced program managers to meet those urgent needs. Since these programs will be moving with dispatch, they offer the best opportunity to produce early indications of whether this is a sound approach which should be extended to other programs.

3. Improving funding stability will require that the Department and Congress be willing to give up some of their flexibility in making annual (or more frequent) adjustments in funding. Doing so will require tradeoffs of the costs and benefits, and I believe it is time to make explicit consideration of these tradeoffs. I have seen the projected benefits of stable funding by looking at theoretical Monte-Carlo simulations (which show efficiency improvements of perhaps 8–10 percent as a result of holding a small capital Reserve of less than 10 percent). We can also see the benefits of multiyear procurements saving similar or greater amounts. I have also seen many examples in which funding cuts of  $x$  dollars today result in later additions of  $3x$  dollars to catch up.

4. Giving early and serious attention to test and evaluation will require strengthening our test and evaluation organizations and personnel. Test and evaluation is often an afterthought, and contracts are often written without any mention of how we will test the product. We spend large amounts of money when a large development team waits for test results. The alternative is to spend less money and time by considering testing and investment in test resources as part of our systems engineering and development planning efforts. The actions recommended in paragraph 1 above are the same actions required to address these critical test and evaluation needs.

5. Reducing the time from program initiation to fielding will require the combination of all actions suggested above. Further benefits will be derived by placing more emphasis on time-certain acquisition. This will be helped by better development planning and alignment of incentives. With good development planning, we can assign managers to develop prototypes, critical systems or components needed to better understand cost/performance trades and reduce risk. It is reasonable to expect that many of these developments can be completed in 2–4 years, so one manager will be in place from start to delivery. This will help align authority and accountability in both government and industry. As these critical subsystems are delivered and tested, the risk reduction and domain experience gained in both gov-

ernment and industry will allow us to reduce the time required to develop, integrate and test the full system. We can also apply meaningful incentive programs to link profits to demonstrated performance, and use that performance as a factor in making future competitive awards. We can rely on the experience gained during development planning to apply informed judgment to adjust requirements to improve value, reduce time, and better estimate and manage costs. The Department and Congress can assist by placing more emphasis on time-certain acquisition, with the opportunity for milestone reviews at the completion of major development planning activities.

I believe action on these five issues will have a significant and demonstrable impact on our serious acquisition problems. We need to move now with the same urgency and priority that we expect in combat operations to permit the timely and effective development and fielding of new capabilities and services with what I expect will be more limited future defense dollars.

Chairman LEVIN. Thank you so much, Dr. Kaminski.  
Mr. Adolph?

**STATEMENT OF CHARLES E. (PETE) ADOLPH, CHAIRMAN, DEFENSE SCIENCE BOARD TASK FORCE ON DEVELOPMENTAL TEST AND EVALUATION**

Mr. ADOLPH. Chairman Levin, Senator McCain, members of the committee, I'd like to thank you for inviting me today.

I chaired a recent Defense Science Board (DSB) study of developmental test and evaluation, and during my opening remarks, I'll summarize the key points from the study. I ask that my written testimony, which addresses the major findings and recommendations in more detail, be put into the record.

Chairman LEVIN. It will be.

Mr. ADOLPH. The task force was originally convened in 2007 to investigate the causal factors for the high percentage of programs completing initial operational test and evaluation in recent years, which have been evaluated as not operationally effective and/or suitable.

The task force was asked to assess roles and responsibilities for test and evaluation oversight in the Office of the Secretary of Defense (OSD). We were also tasked to recommend changes to facilitate the discovery of suitability problems earlier, and thus, improve the likelihood of operational suitability during initial operational test and evaluation.

Very early in the study, it became obvious that the high suitability failure rates were the result of systemic changes that had been made to the acquisition process, and that changes in test and evaluation alone could not remedy poor program formulation and execution.

A number of major changes in the last 15 years have had a significant impact on the acquisition process. First, congressional direction from 1996 through 1999 reduced the acquisition workforce, which, of course, includes developmental test and evaluation. In many instances, services acquisition organizations went well beyond the mandated cuts, some making up to 60 percent reductions in organizations providing acquisition support.

Concurrent with acquisition reform, the general practice of reliability growth during development was deemphasized and, in most cases, eliminated. This departure from the widely recognized best practice may not have been a direct result of acquisition reform,

but may instead be related to the loss of key personnel and experience, as well as shortsighted attempts to save acquisition funds at the expense of increased sustainment and life-cycle costs. Numerous studies have conclusively demonstrated that investing in system reliability during development will yield a substantial reduction in support costs.

Our study reached the conclusion that the single most important step necessary to correct high suitability failure rates is to ensure that programs are formulated to execute a viable systems engineering strategy, including a robust reliability, availability, and maintainability program, as an integral part of design and development.

Moving on to government test organizations, in the last 15 years, with some exceptions, there's been a significant decrease in government involvement in test planning, conduct, and execution. One of our task force members observed that, in many instances, the government has gone from oversight to insight to out-of-sight. Our task force recommends that government test organizations reconstitute and retain a cadre of experienced test and evaluation personnel to perform the test oversight function.

Regarding OSD roles and responsibilities for test oversight, the study team found that the developmental test office, which had existed for decades, was disestablished in the late 1990s. Currently there is no OSD organization with comprehensive developmental test oversight, responsibility, authority, or staff. We recommend that the office be reestablished as a direct report to the Deputy Under Secretary for Acquisition and Technology, as outlined in the proposed legislation.

I'd like to make a few additional observations about the systemic issues that have contributed to the current problems.

First, during a time of increased programmatic and technical complexity, there has been a loss of a large number of the most experienced management and technical personnel without an adequate replacement pipeline. Solutions to acquisition problems must begin with reconstituting a trained and experienced government acquisition workforce, which includes program managers, subject-matter experts, as well as systems engineers, contracts personnel, testers, and evaluators.

Second, more attention must be paid to technology readiness, to include prototyping and testing crucial technologies.

Finally, I believe that the major recommendations in the recent study chaired by Dr. Kaminski on pre-Milestone A systems engineer would, if implemented and combined with a revitalized acquisition workforce, go a long way towards correcting many of the current acquisition problems.

Thank you.

[The prepared statement of Mr. Adolph follows:]

PREPARED STATEMENT BY CHARLES "PETE" ADOLPH

Mr. Chairman, members of the committee, I am Pete Adolph, the chairman of a recent Defense Science Board (DSB) Task Force study of Developmental Test and Evaluation (DT&E). I am pleased to present a summary of the study results. The findings and recommendations I will discuss represent a consensus of the Task Force members and do not reflect an official position of the Department of Defense (DOD).

A DSB Task Force on DT&E was convened in the summer of 2007 to investigate the causal factors for the high percentage of programs entering Initial Operational

Test and Evaluation (IOT&E) in recent years which have been evaluated as both not operationally effective and not operationally suitable. The following are the specific issues which the Task Force was asked to assess:

- Office of the Secretary of Defense (OSD) organization, roles, and responsibilities for Test and Evaluation (T&E) oversight. Compare organization, roles, and responsibilities in both DT&E and OT&E. Recommend changes that may contribute to improved DT&E oversight, and facilitate integrated T&E.
- Changes required to establish statutory authority for OSD DT&E oversight. Title 10, U.S.C. has an OT&E focus, and does not address OSD authority in oversight of DT&E. Recommend changes to title 10 or other U.S. statutes that may improve OSD authority in DT&E oversight.
- Many IOT&E failures have been due to lack of operational suitability. Specific problems have been in the materiel readiness sustainment areas of reliability, maintainability, and availability. Recommend improvements in DT&E process to discover suitability problems earlier, and thus improve likelihood of operational suitability in IOT&E.

#### PROBLEM DEFINITION

In recent years, there has been a dramatic increase in the number of systems not meeting suitability requirements during IOT&E. Reliability, Availability and Maintainability (RAM) deficiencies comprise the primary shortfall areas. DOD IOT&E results from 2001 to 2006 are summarized in Figures 1 through 3. These charts graphically depict the high suitability failure rates during IOT&E resulting from RAM deficiencies.

Program	Service	ACAT	ICR/IGM	Reason
<b>FY 2001</b>				
F-15 TEWS	USAF	II	Effective	Reliability, Maintainability, Availability
V-22 Osprey	Navy	1D	Effective	Reliability, Availability, Maintainability (RAM), Human Factors, BIT
Joint Direct Attack Munitions (JDAM)	USAF	1C	Effective only with legacy fuses	Integration with delivery platforms
M2A3 Bradley Fighting Vehicle	Army	1D	Effective	Suitable
<b>FY 2002</b>				
Joint Primary Aircraft Training System (JPATS)	USAF	1C	Effective with deficiencies	RAM, Safety, Human Factors
Cooperative Engagement Capability (CEC)	Navy	1D	Effective	Suitable
Multiple Rocket Launcher System (MLRS)	Army	1C	Effective	Suitable
MH-60S	Navy	1C	Effective	RAM, excessive administrative and logistic repair time impacted RAM
<b>FY 2003</b>				
B-1B Block E Mission Upgrade Program	USAF	1D	Effective	16% decrease in weapons release rate, reduction in accuracy of Mark 82 low drag weapons, 14% hit rate on moving targets
Sea Wolf Nuclear Attack Submarine	Navy	1D	Effective	Suitable Several requirement thresholds were not met but overall system effective and suitable

Figure 1. DoD IOT&E Results FY 2001-2003.

Program	Service	ACAT	ICR/IGM	Reason
<b>FY 2004</b>				
Evolved Sea Sparrow Missile	Navy	II	Effectiveness unresolved	Suitable Testing was not adequate to determine effectiveness.
Stryker	Army	1D	Effective	Suitable
Advanced SEAL Delivery System (ASDS)	Navy	1D	Effective with restrictions	Effective for short duration missions; not effective for all missions and profiles. Not suitable due to RAM.
Tactical Tomahawk	Navy	1C	Effective	Suitable
Stryker Mortar Carrier-B (MC-B)	Army	1D	Effective	RAM and safety concerns.
<b>FY 2005</b>				
CH-47F Block I	Army	1C	Effective	RAM; communications system less suitable than CH-47D; did not meet Information Exchange Requirements for Block I.
F/A-22	USAF	1D	Effective	RAM; needed more maintenance resources and spare parts; BIT
Joint Stand-Off Weapon-C	Navy	1C		Not effective against moderately hardened targets; mission planning time was excessive.
Guided-MLRS	Army	1C	Effective	Suitable
High Mobility Attack Rocket System (HMARS)	Army	1C	Effective	Suitable
V-22 Osprey	Navy	1D	Effective	Suitable
EA-6B (ICAP III)	Navy	II	Effective	Suitable

Figure 2: DoD IOT&E Results FY 2004-2005.

CY 2006					
Common Missile Warning System (CMWS)	Army	1C	Effective	Suitable	Effective and suitable in the C/F/O/E/F environment but needs further testing outside of the C/F/O/E/F environment
Deployable Joint Command and Control (DJC2)	Navy	1AM	Effective		Operational Test Agency (OTA) reported effective, not suitable. BRLMP not complete
Integrated Defensive Electronic Countermeasures	Navy	II			Test suspended due to reliability problems
Surface Electronic Warfare Improvement Program (SEWIP) Block 1A	Navy	II			Block 1A Upgrade does not make the AN/SLQ-32 EWS operationally effective and suitable but does enhance ability to protect ships
C-130J	USAF	1C	Effective single ship, Not effective in formation	Suitable with shortfalls	Effective single ship, not effective in formation air land / air drop, not effective in non-permissive threat environment. Shortfalls in suitability due to maintainability issues
Small Diameter Bomb (SDB) Increment 1	USAF	1D	Effective with limitations	Suitable with limitations	Limited effectiveness and suitability due to bomb rack reliability and deficiencies in software used to predict optimum fuzing solutions. Oct 2006 flight operations suspended

Figure 3: DoD IOT&E Results for 2006.

Early in the DSB study, it became obvious that the high suitability failure rates were the result of systemic changes that had been made to the acquisition process; and that changes in DT&E could not remedy poor program formulation and execution. Accordingly, the Task Force study was expanded to address the broader programmatic issues, as well as the issues previously identified.

A number of major changes in the last 15 years have had a significant impact on the acquisition process. First, congressional direction in National Defense Authorization Acts for Fiscal Year 1996, 1997, 1998, and 1999 reduced the acquisition workforce (which includes DT&E). Several changes resulted from the implementation of Acquisition Reform in the late 1990s. The use of commercial specifications and standards was encouraged, unless there was justification for the use of military specifications. Industry was encouraged to use commercial practices. Numerous military specifications and standards were eliminated in some Service acquisition organizations. The requirement for a reliability growth program during development was also deemphasized, and in most cases, eliminated. At the same time, systems became more complex, and systems-of-systems integration became more common. Finally, there was a loss of a large number of the most experienced management and technical personnel in government and industry without an adequate replacement pipeline because of the personnel cuts. The loss of personnel was compounded in many cases by the lack of up-to-date standards and handbooks, which had been allowed to atrophy, or in some cases, eliminated. It should be noted that Acquisition Reform included numerous beneficial initiatives. There have been many programs involving application of poor judgment in the last 15 years that can be attributed to acquisition/test workforce inexperience and funding reductions. It is probable that these problems would have occurred independently of most Acquisition Reform initiatives.

All Service acquisition and test organizations experienced significant personnel cuts, the magnitude varying from organization to organization. Over time, in-house DOD offices of subject matter experts (who specialized in multiple areas, such as promoting the use of proven reliability development methods) were drastically reduced, and in some cases, disestablished. A summary of reductions in developmental test personnel follows. The Army essentially eliminated their military Developmental Testing (DT) component and declared the conduct of DT by the government to be discretionary in each program. The Navy reduced their DT workforce by 10 percent but no shift of "hands-on" government DT to industry DT occurred. The trend within the Air Force gave DT conduct and control to the contractor. Air Force test personnel have been reduced by approximately 15 percent and engineering personnel supporting program offices have been reduced by as much as 60 percent in some organizations. The reduction of Acquisition Program Office and Test personnel



in the Services occurred during a time when programs have become increasingly complex (e.g., significant increases in software lines of code, off-board sensor data integration, and systems of systems testing).

#### PRINCIPAL FINDINGS AND RECOMMENDATIONS

##### *Reliability, Availability, and Maintainability*

As a result of industry recommendations in the early 1970s, the Services began a concerted effort to implement reliability growth testing as an integral part of the development process. This implementation consisted of a reliability growth process wherein a system is continually tested from the beginning of development, reliability problems are uncovered, and corrective actions are taken as soon as possible. The Services captured this practice in their reliability regulations, and DOD issued a new military standard on reliability, which included reliability growth and development testing as a best practice task. The goal of this process from 1980 until the mid-1990s was to achieve good reliability by focusing on reliability fundamentals during design and manufacturing rather than merely setting numerical requirements and testing for compliance towards the end of development.

The general practice of reliability growth was discontinued in the mid- to late 1990s. This discontinuance may not be a direct result of Acquisition Reform, but may be related instead to the loss of key personnel and experience, as well as short-sighted attempts to save acquisition funds at the expense of increased life-cycle costs. With the current DOD policy, most development contracts do not include a robust reliability growth program. The lack of failure prevention during design, and the resulting low initial Mean Time Between Failure and low growth potential are the most significant reasons that systems are failing to meet their operational reliability requirements.

According to Army studies, almost 90 percent of the sustainment costs are directly correlated with the reliability of the system. Given the amount of resources consumed during sustainment, investments in reliability enhancements can provide a very large return on that investment. A case study conducted by the Logistics Management Institute, provided data that indicated an investment in total program reliability would yield a substantial reduction in support costs.

##### *Findings*

- Acquisition personnel reductions combined with acquisition system changes in the last 15 years had a detrimental impact on RAM practices
  - With some exceptions, the practice of reliability growth methodologies was discontinued during System Design and Development
  - Relevant military specifications, standards, and other guidance were not used
  - Suitability criteria, including RAM, were de-emphasized
- Improved RAM decreases life-cycle costs and reduces demand on the logistics system
- The Deficiency Report can be a valuable tool for early identification of RAM-related suitability problems, when used in conjunction with an adequately resourced deficiency correction system

##### *Recommendations*

The single most important step necessary to correct high suitability failure rates is to ensure programs are formulated to execute a viable systems engineering strategy from the beginning, including a robust RAM program, as an integral part of design and development. No amount of testing will compensate for deficiencies in RAM program formulation. To this end, the following RAM-related actions are required as a minimum:

- Identify and define RAM requirements during the Joint Capabilities Integration Development System, and incorporate them in the Request for Proposal (RFP) as a mandatory contractual requirement
- During source selection, evaluate the bidders' approaches to satisfying RAM requirements
- Ensure flow-down of RAM requirements to subcontractors
- Require development of leading indicators to ensure RAM requirements are met
- Make RAM, to include a robust reliability growth program, a mandatory contractual requirement and document progress as part of every major program review

- Ensure that a credible reliability assessment is conducted during the various stages of the technical review process and that reliability criteria are achievable in an operational environment
- Strengthen program manager accountability for RAM-related achievements
- Develop a military standard for RAM development and testing that can be readily referenced in future DOD contracts
- Ensure a adequate cadre of experienced RAM personnel are part of the Service acquisition and engineering office staffs

#### *Roles and Responsibilities of Government Test and Evaluation Organizations*

The role of the government in the DT process has evolved over the past 50 years. With some exceptions, there has been a significant decrease in government involvement in test planning, conduct and execution, in the last 15 years.

The traditional role of the government during the DT planning phase included the identification of the test resource requirements and government test facilities, the development of the test strategy and detailed T&E plans, as well as the actual conduct of T&E. When a program moved from the planning phase to the test execution phase, the government traditionally participated in test conduct and analysis; performing an evaluation of the test results for the program office. With some exceptions, this is no longer the case. Until recently, it was recognized that there should be some level of government involvement and oversight even when the contractor has the primary responsibility regarding planning and execution of the DT program.

In addition to the reduction in the number of government acquisition and test personnel, the experience level of both government and industry personnel has steadily diminished in recent years. A significant percentage of the workforce became eligible to retire since 2000, and due to prior downsizing, there has not been a steady pipeline of younger technical personnel to replace them.

#### *Findings*

The changes in the last 15 years, when aggregated, have had a significant negative impact on DOD's ability to successfully execute increasingly complex acquisition programs. Major contributors include massive workforce reductions in acquisition and test personnel, a lack of up-to-date process guidance in some acquisition organizations, acquisition process changes, as well as the high retirement rate of the most experienced technical and managerial personnel in government and industry without an adequate replacement pipeline.

- Major personnel reductions have strained the pool of experienced government test personnel
- A significant amount of DT is currently performed without a needed degree of government involvement or oversight and in some cases, with limited government access to contractor data

#### *Recommendations*

- As a minimum, government test organizations should develop and retain a cadre of experienced T&E personnel to perform the following functions:
  - Participate in the translation of operational requirements into contract specifications, and in the source selection process, including RFP preparation
  - Participate in DT&E planning including Test and Evaluation Master Plan (TEMP) preparation and approval
  - Participate in technical review processes
  - Participate in test conduct, data analysis, and evaluation and reporting; with emphasis on analysis and reporting
- Utilize red teams, where appropriate, to compensate for shortages in skilled, experienced T&E domain and process experts
- Develop programs to attract and retain government personnel in T&E career fields so that the government can properly perform its role as a contract administrator and as a "smart buyer"

#### *Integrated Test and Evaluation*

Integrated testing is not a new concept within the DOD, but its importance in recent years has been highlighted, due in part to the growth of asymmetric threats and the adoption of net-centric warfare. A December 2007 OSD Test and Evaluation Policy Revisions memorandum reinforces the need for integrated testing. Implementation of integrated test concepts has been allowed to evolve on an ad-hoc basis. The time has come to pursue more consistency in integrated test planning and execution.

Collaboration between developmental and operational testers to build a robust integrated test program will increase the amount of operationally relevant data that can be used by both communities. DT and Operational Test (OT) planning is separate and this inhibits efforts by the Services to streamline test schedules, thereby increasing the acquisition timeline and program test costs.

Additionally, there is a widely held assumption by many in the OT community that only data from independent OT is acceptable for operational evaluation purposes. While not all information from DT may be useable by the Operational Test Agency to support IOT&E, a significant amount of developmental test data can be used to partially satisfy OT requirements. More importantly, an operational perspective earlier in the developmental process has often proven to be a catalyst to early identification and correction of problems.

DOD policy should mandate integrated test planning and execution on all programs to the extent possible. To accomplish this, programs must establish a team made up of all relevant organizations (including contractors, developmental and OT&E communities) to create and manage the approach to incorporate integrated testing into the T&E Strategy and the TEMP.

#### *Findings*

- Service acquisition programs are incorporating integrated testing to a limited degree through varying approaches
- Additional emphasis on integrated testing will result in greater T&E process efficiency and program cost reductions

#### *Recommendations*

- Implement OSD and Service policy mandating integrated DT&E/OT&E planning and execution throughout the program
  - Require sharing and access to all appropriate system-level and selected component-level test and model data by government DT and OT organizations, as well as the prime contractor, where appropriate
  - Integrate test events, where practical, to satisfy OT and DT requirements

#### *Operational Test Readiness Review*

Each Service has an Operational Test Readiness Review (OTRR) process. Although it varies from Service to Service, the process generally results in in-depth reviews of readiness to undergo an IOT&E event.

#### *Findings*

- A DOD Instruction requires that “the Service Acquisition Executive shall evaluate and determine materiel system readiness for IOT&E”
  - Decision authority is frequently delegated to the appropriate Program Executive Officer
  - Materiel developer is also required to furnish DT&E report to the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) and Director, OT&E
- Shortcomings in system performance, suitability, and RAM are usually identified during the OTRR
- In most cases, the operational test readiness certifying authority is well aware of the risk of not meeting OT criteria when major shortcomings exist
- Because of funding constraints, the low priority given to sustainment, as well as the urgency in recent years to get new capabilities to the Warfighter, major suitability shortcomings have rarely delayed the commencement of dedicated IOT&E

#### *Recommendations*

- Conduct periodic operational assessments to evaluate progress and the potential for achieving pre-determined entrance criteria for operational test events
- Conduct an independent Assessment of Operational Test Readiness prior to the OTRR
- Include a detailed RAM template in preparation for the OTRR
- Require the Command Acquisition Executive to submit a report to OSD that provides the rationale for the readiness decision

#### *OSD Test and Evaluation Organization*

The Task Force was asked to assess OSD roles and responsibilities for T&E oversight. T&E has been a visible part of OSD since the early 1970s, reporting to the Research and Engineering command section when it was in charge of acquisition oversight and subsequently to the Under Secretary of Defense for Acquisition (now

AT&L). The early T&E office was responsible for all T&E, ranges, resources oversight, and policy. In 1983, Congress established an independent Director, OT&E organization, reporting directly to the Secretary of Defense (SECDEF), responsible for OT&E policy, budget review, and assessments of operational effectiveness and suitability. The Live Fire Test (LFT) oversight function was created and added to the DT&E office responsibilities in the mid-1980s. Later, the LFT oversight function was moved to the DOT&E organization.

In 1999, the DT&E organization was disestablished. Many functions were moved to DOT&E, including test ranges and resources, and joint T&E oversight. Some of the remaining T&E personnel billets were eliminated to comply with a congressionally mandated (AT&L) acquisition staff reduction. The residual DT&E policy and oversight functions were separated and moved lower in the AT&L organization.

A 2000 DSB Task Force Study on Test and Evaluation Capabilities recommended that DOD create a T&E resource enterprise within the office of the DOT&E to provide more centralized management of T&E facilities. This recommendation ultimately led to removing the test ranges and resources oversight from DOT&E, abandoning the notion of centralized management, and the establishment of the Test Resource Management Center (TRMC) in AT&L (as directed by the National Defense Authorization Act for Fiscal Year 2003).

#### *Findings*

Current policy as of December 2007 mandates that developmental and operational test activities be integrated and seamless throughout the system life cycle. There must be enough experts in OSD with the ability to understand and articulate lessons learned in early testing and the ability to execute the new T&E policy. That policy is to “take into account all available and relevant data and information from contractors and government sources” in order to “maximize the efficiency of the T&E process and effectively integrate developmental and operational T&E.”

- Currently there is not an OSD organization with comprehensive DT oversight responsibility, authority or staff to coordinate with the operational test office
  - The historic DT organization has been broken up and residual DT functions were moved lower in organization in 1999, and lower yet in 2002
  - Programmatic DT oversight is limited by staff size and often performed by generalists vice T&E experts
  - Recruitment of senior field test personnel is hampered by DT’s organizational status
  - Existing residual organizations are fragmented and lack clout to provide DT guidance
  - System performance information and DT lessons learned across DOD has been lost
  - DT is not viewed as a key element in AT&L system acquisition oversight
  - Documentation of DT results by OSD is minimal
- Access to models, data, and analysis results is restricted by current practice in acquisition contracting, and the lack of expertise in the DT organization
- TRMC has minimal input to program-specific questions or interaction with oversight organizations on specific programs
  - Organizational separation is an impediment

#### *Recommendations*

- Implementation of integrated and seamless DT and OT will require, at a minimum, greater coordination and cooperation between all testing organizations
- Consolidate DT-related functions in AT&L to help reestablish a focused, integrated, and robust organization
  - Program oversight and policy, and Foreign Comparative Test (FCT)
  - Have Director, DT&E directly report to Deputy Under Secretary of Defense, Acquisition and Technology (DUSD[A&T])
  - Restore TEMP approval authority to Director, DT&E
- Integrate TRMC activities early into DT program planning
  - Make TRMC responsible for reviewing the resources portion of the TEMP
- If such an organization is established and proves itself effective, consider as part of a future consolidation moving LFT back to its original DT location (this would require congressional action and DOT&E concurrence)

Most of the organizational changes recommended above are within the purview of AT&L. The LFT change requires the concurrence of DOT&E and a legislative change to Title 10 because of the change in reporting official. All the other recommendations can be implemented within current DOD authority.

Chairman LEVIN. Thank you so much.

I think we'll try a 7-minute round. I'm not sure there will be time for a second round; I think we have a vote scheduled around 11:30 a.m., if I'm not mistaken.

Let me start with this question. Mr. Sullivan, you commented on the reform bill, the Weapon Systems Acquisition Reform Act of 2009, which I've introduced with Senator McCain. Each of you, in a way, has commented on it. Let me start with you, Dr. Gansler. Would you comment on the bill, any parts you like, any parts you don't like, any additions you might be able to recommend at this time?

Dr. GANSLER. Overall, Mr. Chairman, I thought it was in the right direction and important. I think that we have to recognize that simply writing a memo, passing a law, doesn't change the system. Each of the areas that you highlighted, I think are in the right direction. What we have to be careful of is not going too far in one direction. For example, in the conflict of interest, clearly we have to avoid conflict of interest, but we don't have to go so far that we have only people who have no experience in those positions. That's the danger of going too far, in terms of the legislation of it.

In each of the areas, I think that there's some clarity that could be added, but, in general, I think you've gone in the right direction. For example, you emphasize systems engineering. I think you need to define that as including costs so that there's no ambiguity as to whether that's a pure engineering problem or a cost issue, from a design perspective.

I think the importance of test and evaluation that you highlight is clearly something that's very important. It could be emphasized without really changing the title of the office. But, nonetheless, when I was Under Secretary, I felt it was a very critical piece. But, it's important, when you talk about test and evaluation, that it be viewed as a part of a development process. We learn from that testing. We do it early, as Mr. Adolph indicated, but we also don't view it as a pass-fail final exam because we're doing spiral development, and we're continuing to learn from the testing as it goes along, and some people have tended to think of the test process as a final exam.

In the area of independent cost analysis, it is absolutely essential. On the other hand, we have the Cost Analysis Improvement Group (CAIG) office, which I used all the time, and I felt it was critically important. The problem is, people don't want to use their numbers. If they say it's realistically going to cost more, and government and industry want to put in the low bid in order to get a program into the overall budget, that's a management question; it's not a matter of what organization you set up. But, it's a very important function, as you highlighted.

In terms of getting the combatant commanders involved in the requirements process, that was exactly what we intended with the Packard Commission and Goldwater-Nichols intended with the establishment of the Vice Chairman of the Joint Chiefs. That was the purpose of that statement. Somehow that hasn't gotten the intended strength, it has been much more the suppliers than the users, if you will, the warfighters. I think it is important to get the

combatant commanders much more into the loop on the requirements process, and I think you've gotten that properly emphasized.

I think, in the acquisition area I would emphasize that projected unit costs are a military requirement because that's one of the things we've lost in some of the programs. Global Hawk started out that way, got off track. You mentioned the JSF. That started off as a unit cost being one of the requirements for globalization of that program. It got out off track because it lost sight of that unit cost as being one of its principal considerations in design.

As I mentioned, in terms of competition, I think it's really important that we view competition as an option throughout the programs, at the prime and at the lower tiers, but not as a law. You don't compete for its own sake; you compete when the current contractors, prime or sub, aren't getting better performance at lower cost. That's their incentive for doing it. If you tell them we're going to compete it anyhow, they have no incentive. If you tell them that if they can get higher performance and lower cost, then, in fact, they will try to achieve that so that they don't have to compete in the next round, and it's doing exactly what the government wants them to do.

In the same way, if they achieve the objectives, we ought to use, in effect, the same way that the commercial world does: through price elasticity. If you get a lower cost, we'll buy more of them. We don't take the money away and put it in the general treasury, so there will be a need to create incentives for industry, as well as government, for doing a better job of achieving higher performance at lower cost, continuously.

In terms of conflict of interest, I think we need to focus on some structural ways to address conflict of interest. We do this, in terms of foreign ownership, through limited liability corporations, in effect, the special boards are set up. Maybe there's some ways we can do that in order to address conflict of interest without the sort of blanket requirement that someone in an engineering job shouldn't know anything about that job. That's wrong.

Those are the suggestions that I would have. But, overall, I think you are definitely going in the right direction with the bill.

Chairman LEVIN. Thank you. We would welcome any specific language changes you would recommend.

Now, Mr. Sullivan, you already commented. Do you have any additional comments?

Mr. SULLIVAN. Yes, just briefly. I would say that, given the package that we've looked at, we support everything in it. We thought it was very well-targeted to the key problems on acquisition programs, and that the idea to give more authority to the combatant commanders, in terms of getting urgent needs met, was a good provision.

I think the most important thing on an acquisition program is, at the outset—we've all discussed it here—to have more knowledge about the requirements that you're going to build to, before you begin, than they have now.

So, the two provisions that we think are most important—first is the cost-estimating provision. We wrote that we don't see any reason why the CAIG actually couldn't fulfill that position. The important thing there is to probably provide the CAIG with more re-

sources so they can do their jobs on a more regular basis and rather than just periodically, at every milestone. The other critical thing there is that if the director was moved up, out of the bureaucracy a little bit more, the estimates that the CAIG make might be looked at as less personality-driven, if you will, depending upon who's in office.

As Under Secretary of Defense, Dr. Gansler used the CAIG, others may not use it as much. If they're reporting to a higher level, and they owe Congress a report, I think that'll really improve their authority and their visibility and their independence. But, the key is always going to go back to the requirement-setting process, and jelling that with cost estimates. If you begin with not enough information about what it is you're going to, what you want to build, you are not going to get a good cost estimate. So, it really has to be based on knowledge.

So, the cost-estimating provision, I think, is very good. The systems-engineering provisions that you have in there go a long way to providing the knowledge that the cost estimators would need up front.

Chairman LEVIN. Thank you.

Dr. Kaminski, do you have any comment?

Dr. KAMINSKI. Yes, sir, I do. I made some specific comments in my statement, but let me make a couple of big-picture comments, if I may.

If there's a direction in which I would try to move language in the proposed legislation, it would be to focus, not only on process, on oversight mechanisms, but a focus on people; people that make this system work. I don't care how good a process you put in place, if you don't have people who are experienced and know what they're doing, I think you're going to end up with problems.

When I say "people," I am referring very broadly to our acquisition workforce. Think about this for a minute. These people and requirements development skills are also key for those who are doing development of requirements. They have to participate in this tradeoff process to consider the cost of what they're asking for and how those tradeoff with the performance capabilities that are desired.

Testing is a critical piece of this process. If you think about it—I know my experience is, there isn't any program I've ever worked on in which I didn't know a heck of a lot more about the program 6 months or a year into it than I did when I started. So this is a continuing learning process as we find out things from testing—what's hard to do, what's easier to do. We need to have a continuing dialogue in this requirements tradeoff loop.

So, requirements developers and acquisition personnel have to have training and experience in these systems engineering tools and techniques. We would never let a fighter pilot get into an aircraft without a very extensive training program to prepare him or her for that operation. It's one of the reasons we do so well with our forces. When I compare our requirements for operational requirements with the training and education requirements of people going into acquisition requirements generation, they pale in comparison. We have to be able to develop the training, education, and the domain experience that go with this to make it work.

I also believe it is worth it for us to look very hard at: How can we systematically reduce this long development time? That's just killing us. There are programs in which we can do time-certain acquisition. Time is money, here. By doing good development planning to be able to reduce the risk, following the example of Apollo, following the example of our ICBM programs, I believe we can compress that time. But, we need some targets, and some incentives to do that.

We also need to make better and more extensive use of prototypes, in a sensible way. Competitive prototypes for some programs, perhaps single-thread programs for others. We also need to realize that one size does not fit all, here. For example, in dealing with IEDs, we find that we need to have an acquisition system whose cycle time is measured in weeks. That's a different acquisition system than you need for a strategic bomber. The acquisition system has to fit the cycle of the threat that we're dealing with, so we have to tailor it in that way.

The last comment I would make is that, with respect to implementation, what better place could we find to start to implement some of these processes, procedures, and people development than in these urgent programs that are doing rapid acquisition. Why start there? One, it's urgent. Two, we'll be able to see the impact of changes that we make more quickly in programs that are operating in cycle times of weeks or months, and see what's benefiting us and what is not. I'd like to see that commitment to implementation because it'll happen much more quickly than if we simply write new processes or new 5000 series in the DOD.

Chairman LEVIN. Thank you.

My time's way up, but, Mr. Adolph, do you have a brief comment on the bill? Any changes?

Mr. ADOLPH. Very brief comment. In general, I believe that the proposed legislation will go a long way toward alleviating the major acquisition problems which have occurred in recent years.

I also have a quick comment regarding the legislation pertaining to the director of the developmental test function. I would add one responsibility, that the director participate in the acquisition program reviews conducted by the Under Secretary for Acquisition and submit a status of the developmental testing for the programs under review. That was the norm in the past, for many years, and I think that's important.

Chairman LEVIN. Thank you so much.

Senator McCain.

Senator MCCAIN. Thank you, Mr. Chairman. Again, thanks, to the witnesses.

I think there's general agreement on the part of the witnesses that there's been a dramatic erosion in acquisition workforce and test and evaluation personnel. Maybe I could ask you, Dr. Kaminski, what happened?

Dr. KAMINSKI. I think a number of things happened. Just as there's no one silver bullet, there's no single entity or action to blame. But, let me list some of the things that happened. I think, as we looked at major programs of acquisition reform, we tried to do more with less. We also had some pretty strong direction from some portions of Congress on this. I can recall the chairman of a



key committee who publicly made statements that said we had too many “shoppers” in the Department, and we really needed to reduce this acquisition workforce. So, over a period of 3 or 4 years, nearly 50 percent of the acquisition workforce was taken out. Now, the Department was a partner in that, agreeing to those reductions.

Senator MCCAIN. We removed incentives for people to remain in the acquisition workforce, in the form of lack of promotion or career enhancement?

Dr. KAMINSKI. Exactly. If we are able to attract and train the right system engineers—if that system engineer doesn’t see some path for advancement in the DOD, he or she is going to go find a place where they can make a difference and have an opportunity for advancement.

Senator MCCAIN. Which means a revolving door evolves?

Dr. KAMINSKI. Yes, sir. But, that revolving door actually may be the commercial industry. Again, I return to the comment I was making about the importance of cycle time in the acquisition system. If you have someone who’s really worth their salt and able to make contributions, and they get into a DOD acquisition system which is going to produce something in 15 or 20 years, it won’t take them long to realize that their knowledge base is going to erode so that they will no longer be valuable to commercial industry, which is producing things in 2- or 3-year timeframes.

So, to be able to have some revolving door from commercial industry back to DOD will benefit from getting these cycle times down.

Senator MCCAIN. Dr. Gansler?

Dr. GANSLER. Yes, Senator McCain. In my prepared testimony, I actually showed a graph that came out of the commission that I ran. I was shocked at how much the acquisition workforce has been allowed to deteriorate. In fact, as we came out of the Cold War, the procurement budgets dropped, the number of acquisition people came out with it. Then, as Dr. Kaminski said, there was a legislative mandate in 1996 to take another 25 percent out. So we’ve ended up, now, dramatically, where we had about 500,000 people in 1990, we now have about 200,000 people. But, the acquisition dollars have gone up dramatically, so you have this huge gap between the dollars and the people.

But, much more important is the point that you just made about the officers and the senior people. In 1990, the Army had five general officers; in 2007, when we did the study, there were zero general officers with a contracting background. In the contract management organization, the Defense Contract Management Agency (DCMA), they had 25,000 people in 1990, they have 10,000 today. There’s basically an undervaluing. They used to have four general officers; they have zero. So, as you suggest, if you’re a young major, you’re not getting into that career field, and, as a result, it’s been just totally undervalued. Without those experienced senior people, both civilian and military, they don’t know what questions to ask, and they are not going to be able to make the right judgments.

Senator MCCAIN. Obviously, we need to have some personnel policy changes, as well. Mr. Sullivan, the issue of Nunn-McCurdy—when it was first passed, we thought it was really important and

effective. For a while, it was. I think a breach of Nunn-McCurdy was a big deal. Now it seems to be a routine kind of event that the notification comes over, we see it, and ho-hum. Are we in danger of experiencing the same thing with this measure?

Mr. SULLIVAN. We have noticed that the Nunn-McCurdy breaches we see take a lot longer to resolve and come out with a new program, and the funding is continuing on that program as they do that.

As I read the proposal that the committee has now, I think it's really good to have a termination criteria like that. I think GAO thinks that's a good thing. In other words, a program termination would not just have someone do a review, but also probably look at what happens, what the triggers are for that. I think, right now, it states that the program cannot change the scope of work, cannot start new contracts, and there might be one other thing that the program can do. I don't know if legislation can basically say that that program can no longer obligate money, but that would, to me, be a much more direct way to get the point across. If a program is automatically terminated when it passes a threshold, and cannot obligate money, that might get people's attention.

Senator MCCAIN. I can imagine the blowback when some vital program is shut down because of our failure to act, but I think we're in agreement that there has to be a more robust oversight and ability to exercise that oversight as we see these costs spiral completely out of control.

Mr. SULLIVAN. Yes, sir.

Senator MCCAIN. Mr. Adolph, on the issue of Nunn-McCurdy, do you think it's sufficient measure to impose more discipline on the cost overruns?

Mr. ADOLPH. I believe it's sufficient. But, the issue that concerns me, and the remedy has already been discussed, is to get the technology readiness right, at the outset; and second, to get a realistic cost estimate. There's too much concurrency, there are actions that are taken in the program to kick the can down the road on Nunn-McCurdy, which, in the long run, in my opinion, adversely impact the program. The example from the F-35 is getting rid of two of the test articles.

Again, I believe Nunn-McCurdy is fundamentally sound. The problems in recent years are a combination of issues which I believe the proposed legislation, if it's really implemented in the Services—and, again, back to Dr. Kaminski and Dr. Gansler's point—in order to implement it, we have to reconstitute the acquisition workforce. That's the first step.

Senator MCCAIN. Also I think it would be important for us to have the combatant commanders more involved in the requirements process, as well. I think sometimes we have neglected that aspect of the equation.

I thank you, Mr. Chairman. I thank the witnesses.

Chairman LEVIN. Thank you, Senator McCain.

Senator Akaka.

Senator AKAKA. Thank you very much, Mr. Chairman.

I want to add my welcome to the witnesses before us today, and to point out that I'm glad that, Mr. Chairman, you are holding this hearing on acquisition. For me over the years, I'm beginning to feel

that we need to change, or try to change, the heart and soul of DOD, and, really, the culture of DOD, and to get to acquisition.

Gentlemen, as you well know, the reform of DOD acquisition process is an extraordinarily complex undertaking involving many, many moving parts. However, I believe the first step to tackling any problem is to prioritize. So, let me ask this question to each of you. In order to most effectively reform the DOD acquisition process, what do we need to focus on first?

First, Dr. Gansler.

Dr. GANSLER. I believe it's the people. I think if we've undervalued the importance of this area, in terms of promotion, in terms of experience, in terms of numbers, all across the board, both civilians and military, that we're not going to get there, even if we pass all the laws in the world. We need the people who are going to be driving this process. That is my number-one priority. We have neglected it and, of course, in the last 8 years we've been living in a rich man's world, so money doesn't matter, and if people overrun or they don't perform, "Let's spend more money." Now, that's not going to be the case, and we need people who are smart, experienced, and competent to run their programs—with flexibility, though. They have to make tradeoffs of cost and performance, systems engineering kinds of work, test and evaluation, so forth. That requires management judgment, and you can't just legislate that, and therefore, you need people with experience to be able to make those management judgments. That's my number one priority.

Senator AKAKA. Dr. Gansler, would you also say that another part of that would be inadequate staffing?

Dr. GANSLER. Yes.

Senator AKAKA. From what I gathered, there were positions that were not filled.

Dr. GANSLER. Absolutely. I was shocked to find that, in Iraq and Afghanistan, only 35 percent of the people that were in their jobs were qualified for those jobs, even with the minimal qualifications that Dr. Kaminski mentioned. Besides that, most of the positions weren't even filled, and they were almost all volunteer civilians in the warzone. We need to be able to get some senior military there, as well. So, there's a great lack of people, numbers, but you don't want just numbers, you also want qualified people. Numbers won't do it. It has to be qualified, experienced people. Some of those by the way, can come from industry. You can rotate people from industry, without conflict of interest, very easily. That's what we've had with many of the people with past experience. We do that in DARPA, we bring them in and out, and we've done it in other parts of the government. I think that people are out there with experience; we just have to make sure that we make it attractive to get them in these government acquisition positions.

Senator AKAKA. Mr. Sullivan.

Mr. SULLIVAN. I think, at a strategic level, one of the biggest problems the DOD faces is that it is unable to prioritize what weapon system capabilities should be put into programs. They have 95 weapon system acquisition programs, major acquisitions, that are underway right now. That's up from about 75 or so in 2000.

There is a tendency to have too many programs vying for the acquisition dollars that are available to DOD on an annual basis.

When that happens, you get a very unhealthy competition, where many programs and few dollars drive the requirements-setting process, which is stovepiped in many ways by the Services.

So, the Services are all vying for a solution, they want requirements that are very, very tough to make, so that their weapon system can do the most. They, as a result of that, tend to put in optimistic cost estimates. The funders, of course, are looking at those very optimistic cost estimates that are very heavy on assumption and very light on facts, data, and actual costs. The acquisition process begins with the lack of the systems engineering that we've talked about here today.

So, you have too many programs chasing too few dollars, with business cases that are unexecutable. The whole system is segregated in such a way with process owners and stakeholders that, in a way, it works for everyone. That's the culture. It's a performance-driven culture, and we all understand that and accept that, but there's also a lot of players involved in the culture that create this kind of unhealthy competition at the outset. I think that's the culture change that has to take place in this DOD, and that is almost intractable, when you think about it: the difficulty of changing that. I think legislation can go a long way to requiring people to do certain things, but, in the end, I agree with Dr. Gansler, it falls on the people to have the right principles, if you will, to change what this system is really supposed to create.

Senator AKAKA. Dr. Kaminski, with your research and study background, do you care to comment?

Dr. KAMINSKI. Yes. Let me not repeat because I agree with everything that's been said. Let me put another dimension on the people. I, too, would answer: most important is people. But, what you have to do is recognize the dynamics that involve people. If we're going to attract our very best and brightest people to an activity, I've found that the principal incentive usually isn't money. With the salaries we pay military officers and civilians in DOD, we are still able to attract very capable people to key jobs.

What attracts them? What usually attracts them is the ability to make a difference, to see that they can have a personal impact on a major program, on the security of this Nation.

So, I want to come back again to my issue about time. When programs are taking 15 or 20 years, many of those best and brightest people say, "What's the difference? If I'm not going to see something happen for 15 or 20 years, why don't I go someplace where I can make something happen sooner?" If they don't have any freedom to make decisions and influence things because of excessive oversight processes and complexity of the process, they'll go find another place to work.

I want to share with you a perspective that I got from a different position. Rather than a perspective of a previous Under Secretary of Defense, I want to share the perspective that I gained when I served on Active Duty in the Air Force. I'd say I spent two-thirds of my career there working on special access programs, part of that career, in the early days of the National Reconnaissance Office, where I was a program manager for one of our National Reconnaissance spacecraft that's up and flying today, and for several years in the stealth program. Let me just pick one example there, the

F-117 program. I was heavily involved in that program. When we initiated that program, our plan was, from the beginning of full-scale development to field the aircraft in 3 years. We missed that, sir. We missed it by a year. We fielded the aircraft in 4 years. Everybody who worked on that program could see that they were making a difference. They could see that capability coming along to be fielded. There was excellent interaction and tradeoffs in that process, between the testers and the program managers and the users who were going to use that aircraft. We made continual adjustments. So, that motivation of people and reduced time go together. To attract the right kind of people, we have to work on this time issue.

Senator AKAKA. Mr. Adolph?

Mr. ADOLPH. As I mentioned in my earlier remarks, people are certainly the highest priority, and that's been reiterated here by the previous comments.

Another area for improvement is certainly overly ambitious requirements. We need to continue to push technology, without a doubt. But, at the same time, we need to ensure that the technology is sufficiently matured to incorporate in a weapon system. That means prototyping and testing, and testing the prototype item in an environment in which it's going to be placed in a combat environment. So, again, first, people. Second, getting the requirements right and making sure that they're not overly ambitious. Again, Dr. Kaminski's study really addresses the latter issue quite well.

Senator AKAKA. Thank you very much, Mr. Chairman.

Chairman LEVIN. Thank you, Senator Akaka.

Senator COLLINS.

Senator COLLINS. Thank you. Thank you, Mr. Chairman.

Mr. Chairman, I first want to salute you and Senator McCain for your initiative. I think you've brought forth a bill that will really make a difference. I also want to point out that I'm very pleased to hear the witnesses today all stress the importance of the acquisition workforce. This is an area that Senator Lieberman, Senator Akaka, and many of us, have said is the number-one problem, over and over again. When I brought this up at the White House Conference last week, however, some of my colleagues felt that it was a lesser problem. So, I was very pleased to see the panel of experts before us list this as perhaps the greatest problem that we're facing.

Dr. Gansler, you and I also worked together, many, many years ago, on how to increase competition in Federal contracting, and it's very good to see you here again, as well.

I want to ask the panel about some of the specific provisions in the Levin-McCain bill. In particular, this bill would require that costs be considered right up front, when the requirements are set. That is a pretty dramatic change from how military requirements are set now, when they're done in an environment that does not consider costs, but, rather, an idealized world, where costs would not be a factor.

Dr. Gansler, you endorsed including cost as a design military requirement right up front, so I'm going to skip over you for this question and go to the rest of the panel and ask all of you: Should

costs be considered up front when military requirements are first established?

Mr. Sullivan?

Mr. SULLIVAN. I think that is a good idea. Dr. Gansler said that should be one of the key performance parameters on any major weapon systems, in their business case, and I think we would agree with that.

When you're trying to set requirements, and you're doing the requirements analysis that's needed, I think you begin, at first, in an unconstrained manner, and try to get from the user what the user would like, in an unconstrained environment. But then it's critical, at some point, to start bonding that with the realities of the time it's going to take to get that to the user, the amount of money, and the technologies you have available to do it. So, I don't think you could do that without precluding the ability to think, unconstrained. But the exit criteria would be something that is constrained, at least in a cost range. Then once it exits the requirements process, there is a stage before it would become a set business case and begin as an acquisition program, where that cost range could be further reduced to more of a point estimate by continuing to make trades.

Senator COLLINS. Dr. Kaminski?

Dr. KAMINSKI. Senator Collins, I also agree that cost should be an upfront factor. I'd add another factor to go with it, though.

Senator COLLINS. Yes?

Dr. KAMINSKI. Back to my comment about time. Time and money go together. When we're doing requirements tradeoffs, if we're going to have an acquisition cycle time that operates within the threat cycle time, those developing requirements have to look at the time they want something fielded, as well. So, that needs to be an important consideration in this process, and we need to manage the time.

The one other comment I wanted to make with respect to cost estimates: we talked earlier about breaches in Nunn-McCurdy. The surveillance system that finds the breaches, I think, is fine. But, one of the things we want to do is look at root causes. What's causing us to get into Nunn-McCurdy? One of the constructive uses for the independent cost estimate that was in the bill might be to add another consideration. We've talked about the importance of the upfront work in systems engineering and development planning. One of the things that would be useful for us all to ensure is that there is adequate funding at the beginning of a program, between Milestone A and B, for us to apply our systems engineering and development planning capabilities to get a good handle on what those cost estimates are, and do a thorough job involving stakeholders, the requirements part of the equation, and the program manager in that process, along with the CAIG.

I, like Dr. Gansler, used the CAIG very heavily. In fact, I advocated that we fund programs to the CAIG estimate, but we hold the program manager and the contractor to the estimates they developed, so we had some finance reserve between the two estimates.

Senator COLLINS. Thank you.

Mr. Adolph?

Mr. ADOLPH. Senator Collins, certainly we need to consider the cost issue upfront. Another very important driver early on is technology readiness. In program after program after program, we're into full-scale development and discover that some of the critical technologies simply aren't mature enough. So the program is delayed, and that drives the schedule, and these slippages occur.

A key to getting the costs right is to ensure that the technology is really sufficiently mature.

Senator COLLINS. Thank you.

Dr. Gansler, an issue that hasn't been discussed today is the impact of a lack of stability and predictability on a program's cost growth. That obviously can drive up the unit cost. When the military starts out with one plan for acquiring a weapon system, and then switches direction or reduces the number of units, doesn't that also drive up the cost?

The reason I bring this up is, we talk a lot about the errors made by contractors, we talk about weapon systems that get gold-plated because additional requirements are added, but there's also an important issue, as far as the stability of funding and the lack of predictability driving up the unit cost. Could you address that issue?

Dr. GANSLER. Yes. But, let me just briefly comment on your first question, though, because frequently the military doesn't think that cost is a military requirement. What they neglect is the fact that numbers are a military requirement. If you're resource-constrained, the total dollars that you have divided by the unit cost gives you the numbers. Numbers really matter in military operations, whether it's by Lancaster's law of N-squared or by numbers. Either way, numbers really matter, and therefore, cost really matters. That's why it's so important to have the unit cost as part of the requirements.

Now you get to your changes, and unless we estimate the cost of those changes and their impact on the ultimate cost of the equipment, we let things get out of hand. So, if cost is a requirement, then every time a change comes in, and as Senator McCain said earlier, it was 75 a week on the LCS, you have to price those each out to make sure it is not having a big cost impact on the program.

Then, when programs, in general, become relatively stable, you don't get this ripple effect through the budget, which is the point that you're really making, Senator. If I want to pay for program A, I take it out of program B, not recognizing that program B now is in really bad shape because they don't have the stability of the funding. That stability of funding is a critical issue.

Senator COLLINS. Thank you.

Chairman LEVIN. Thank you, Senator Collins.

Senator Burris.

Senator BURRIS. Thank you, Mr. Chairman.

This is an interesting experience for me, to hear the distinguished testimony, Mr. Chairman. I would rather listen than to talk. I yield my time.

Chairman LEVIN. Thank you.

Senator Burr is next on this side; he's not there.

Senator Chambliss.

Senator CHAMBLISS. Thank you, Mr. Chairman.

Gentlemen, it's good to see all of you, and thanks for your service over the years, and thanks for your being here on what I think is, if not the most important issue at the Pentagon today, certainly it ranks up pretty high. With these budget times that we're in, trying to figure out a way to buy the weapon systems that we need within the timeframe we need is virtually impossible. That's why your testimony is so critical.

I want to go back to what Senator Collins was talking about there, and what all of you have alluded to in some part, and that's this issue of instability, whether it's requirements, whether it's personnel, whether it's funding, or whether, as you say, Mr. Adolph, it's the technology aspect of it, where we, too many times, tend to come up with a great idea, and by the time we get into the production phase, we've wasted, not only time, we've wasted money, but oftentimes, there's a new idea that has been developed in the meantime.

I'm amazed, Dr. Kaminski, that you say, on the F-117, that we were in production in 4 years. Gosh, if we had done that with the F-22, we wouldn't be having the arguments we're having today, and we'd have a great airplane, and we'd be worrying about other issues.

But, it doesn't make any difference whether you're talking about an aircraft carrier, whether you're talking about FCS or a tactical fighter, we come up with this idea, and we get into the R&D phase, and there is, all of a sudden, a great idea, but instability in all four of those areas runs that cost up tremendously. Then, you throw in what Senator Collins alluded to, about the number of these units that we're going to buy, and all of a sudden it explodes again and it becomes such a negative at the Pentagon, rather than the positive that it started out to be.

My question for a comment from each of you is: How do we get back to this? How do we get back to the point to where we come up with this idea? If it's a tactical fighter, it's supposed to be air-to-air, or supposed to be air-to-ground, whatever it may be, how do we develop that and get it into production right away, without technology intervening and all of a sudden having to add this and add that? How do we get our arms around that issue?

Jack, let's start with you.

Dr. GANSLER. I think one of the main opportunities we have is to accept the concept of spiral development, that for the block 1 system, we have a fixed set of requirements, we have a fixed price that we're trying to get a fixed schedule, as Dr. Kaminski said, and we go ahead with block 1 under the assumption that if we can then demonstrate new technology, if we find that the user needs something different, if we find that even the logistician has a problem with maintenance of that equipment or the reliability as we deploy it, that becomes block 2, block 3, block 4. But, block 1 has to use proven technology and get out there quickly, all with a set of constraints. So, it's a stable program, as you point out.

The most successful acquisition that, in fact, Congressman Aspin used to always highlight, was the Navy's Polaris, Poseidon, Trident. When I was in industry, I always knew how much money I was going to get next year for that program. I could hire, I could plan my workforce, and so forth. That stability is very important



for efficiency. I think, if we go to a spiral development model, whereby block 1 is stable, and block 2 is being developed while block 1 is being deployed, you have the concept of stability built in, and evolutionary systems are still stable. That's the way the real world, the commercial world, works. You constantly are upgrading the software, the hardware of computers, but you're constantly getting higher performance at lower cost. That has to be the objective of each of the blocks as we're going along in spiral development.

Senator CHAMBLISS. Mike?

Mr. SULLIVAN. Goldwater-Nichols legislation, from years ago, tried to bring jointness into the DOD. I think it succeeded on the operations side. We now have the combatant command's matrix, the military forces that fight wars jointly very well. The same thing did not occur on the acquisition side. I think if you look at what's going on now, there's a kind of a stovepipe system for how you get programs started, and that creates this kind of competition for big requirements and cost estimates that are heavy on assumption.

I would agree with everything that Dr. Gansler just said. If you can work on that and get a more joint requirement setting and funding system, and try to get the proper balance of weapon systems started, try to get rid of the stovepipes, you'd have an environment that could do what Dr. Gansler, I think, is describing, a little more easily.

Another program I would throw out is the F-16 program. Back in the 1970s, it was a block program. It was the capabilities that the Air Force wanted for the F-16. They knew that they needed an aircraft faster than they could develop the technologies to get those capabilities, so they had blocks. If you look at the F-16s, and, for that matter, the F-15s, performance over the last 30 years, it's pretty impressive. They basically upgraded those aircraft pretty efficiently as they went because they started without that big revolutionary leap, that one-step, big-bang kind of a thing.

So, we've done this before, and I think it's possible to get back to it, but this is where the culture comes in. I think there's some culture change that needs to take place.

Dr. Gansler has other things that I read in his report that would help this significantly. Open systems, for example, on these weapon systems, when, if you can make interfaces on the weapon systems uniform, you can keep proprietary data that subcontractors have that supply subsystems to them, and all they have to do is have the proper interface. Then you can open up competition.

One more point I would make is the difference between technology development and product development probably needs to be better understood. Technology is the kind of thing you should think of when you think of scientists and lab coats and trial and error, and it's done in a smaller-dollar environment, where you can test, use trial and error, and make mistakes. You have to keep that off of these acquisition programs. I think someone up here, I don't know if it was Dr. Kaminski or Mr. Adolph, said that when you have a technology that's not mature, and it's on an acquisition program that's driving towards production, you have an entire workforce—an entire supply chain, for that matter—that's waiting for that technology to mature. The burn rate is pretty big on that workforce that you have.

Dr. KAMINSKI. I'd emphasize that point. While everybody's waiting, we're paying, and so what you want to do is decouple those two.

In terms of approaches to do this, I agree completely with the spiral development approach. One problem I see is in the application of spiral. In the few spirals I've seen that we actually implemented, we had everything but the kitchen sink in the first spiral, rather than stretching this out over a period of time, like we did in Apollo. So, we need development planning. You have to have a plan with stability to do this. The program manager has to have the discipline and the experience to reject things that aren't in the plan or that aren't mature enough to be harvested.

I have found that one of the characteristics of a good program manager is a big lower right-hand drawer in their desk, and what went into that drawer were all the ideas for improvement. The drawer was kept closed until such time as we fielded the first system; that is the time open the drawer and look to see what development plans we need to deal with shortfalls or upgrades for that system.

This time-certain development is important because, as time goes by, the technology gets old, and new ideas are introduced that end up being disruptive to the process. So, time is a key factor here.

This stability issue is really key. If I look back through my whole career, there is only one program I ever worked on where we actually produced the system at the rate we planned. That was the F-117. We built one a month. Every other program I can think of, by the time we were done with development, we couldn't afford the build rate that we planned.

Senator CHAMBLISS. Anything to add, Mr. Adolph?

Mr. ADOLPH. Just one thing, since I certainly agree with the other panel members, but with my background in tests, I'll add that issue. In the case of the F-15 and F-16, which were mentioned earlier, I worked on both programs, and I was out in the field, test business, working for the Air Force.

Chairman LEVIN. Please talk a little bit louder, if you would.

Mr. ADOLPH. Yes. In the case of the F-15 and F-16, I was working for the Air Force in the field at the time, and the F-15 test program was structured well; we had 19 test articles and sufficient articles in the case of the F-16 as well. In the latter F-16 case, the propulsion system had been matured. In order to move a program along, you need an adequate number of test articles, and you need to be able to do as much testing as you can. Avionics is a good example, where considerable testing can be accomplished on a test bed platform, rather than the developmental platform.

So, that's, I think, one key component of keeping a program moving. When a program stagnates, when you only have one or two test articles, and you have a 'standing army' of test personnel waiting, and the fixed cost of those people is almost as great as the incremental cost of doing additional testing, particularly when you recover the article. That's not the case in a missile program, where the test article is destroyed on each test.

Chairman LEVIN. Thank you, Senator Chambliss.

Senator McCaskill.

Senator MCCASKILL. Thank you, Mr. Chairman.

Let me start with Mr. Sullivan, and there have been several references that sometimes we have excessive oversight with no value added. That's a frustrating comment to me, in that I have watched the Defense Contracting Audit Agency basically get taken to task by their peers for failure to even follow basic auditing standards. I've read, I can't tell how many of your reports that have, in fact, identified weapons acquisition as high risk, since 1990. It is not as though the oversight's not occurring, it's just that it's being ignored. It's not adding value because nobody's paying any attention to it.

Let me ask you, in that regard, about JCIDS, Planning, Programming, Budgeting, and Execution (PPBE), and Future Years Defense Program (FYDP). Now, first of all, I think we ought to pass a law that they quit talking in initials because you all know what those things are I just said, but I guarantee you, nobody that I work for in Missouri has any idea what JCIDS is, PPBE is, or FYDP. What they are is: one, is all the Services getting together and basically giving each other what they want; two, is a 2-year calendar-driven process, where they're supposed to be figuring how they're going to spend the money; and three, it is the Secretary of Defense trying to low-ball what it's going to cost, long-term, in order to make sure that the other two go along with it. Is that an accurate summary of what those three are?

Mr. SULLIVAN. The—that— [Laughter.]

I would say, number one, that the JCIDS is a requirement-setting process; it's where all of the Services tend to get together and figure out what it is that they require.

Senator MCCASKILL. But, in your testimony, Mr. Sullivan, you pointed out, they never say no.

Mr. SULLIVAN. That's true.

Senator MCCASKILL. Have they ever said no that you're aware of since you've been looking at this?

Mr. SULLIVAN. We issued a report for this committee, I think, about a year ago, where we looked at that, and it was—I think the JCIDS process then, if I'm not mistaken—this may not be exact, but I can get it for you—about 90 percent of the proposals that went in were granted.

[Excerpt of GAO-08-1060 follows:]

United States Government Accountability Office

GAO

Report to the Committee on Armed  
Services, U.S. Senate

September 2008

DEFENSE  
ACQUISITIONS

DOD's Requirements  
Determination  
Process Has Not Been  
Effective in  
Prioritizing Joint  
Capabilities



GAO-08-1060

September 2008

## DEFENSE ACQUISITIONS

**DOD's Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities**

Highlights of GAO-08-1060, a report to the Committee on Armed Services, U.S. Senate

**Why GAO Did This Study**

Increasing combat demands and fiscal constraints make it critical for the Department of Defense (DOD) to ensure that its weapon system investments not only meet the needs of the warfighter, but make the most efficient use of available resources. GAO's past work has shown that achieving this balance has been a challenge and weapon programs have often experienced cost growth and delayed delivery to the warfighter.

In 2003, DOD implemented the Joint Capabilities Integration and Development System (JCIDS) to prioritize and ensure that the warfighter's most essential needs are met. In response to Senate Report 109-69, GAO reported in March 2007 that DOD lacks an effective approach to balance its weapon system investments with available resources.

This follow-on report focuses on (1) whether the JCIDS process has achieved its objective to prioritize joint warfighting needs and (2) factors that have affected DOD's ability to effectively implement JCIDS. To conduct its work, GAO reviewed JCIDS guidance and capability documents and budgetary and programming data on major weapon systems, and interviewed DOD officials.

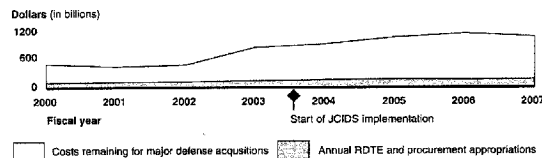
**What GAO Recommends**

GAO is recommending actions aimed at improving DOD's ability to prioritize joint capability needs. DOD generally concurred, but believes that current processes and resources in the department are sufficient for doing this. To view the full product, including the scope and methodology, click on GAO-08-1060. For more information, contact Michael J. Sullivan at (202) 512-4841 or [sullivanm@gao.gov](mailto:sullivanm@gao.gov).

**What GAO Found**

The JCIDS process has not yet been effective in identifying and prioritizing warfighting needs from a joint, departmentwide perspective. GAO reviewed JCIDS documentation related to proposals for new capabilities and found that most—almost 70 percent—were sponsored by the military services, with little involvement from the joint community—including the combatant commands (COCOMs), which are largely responsible for planning and carrying out military operations. By continuing to rely on capability proposals that lack a joint perspective, DOD may be losing opportunities to improve joint warfighting capabilities and reduce the duplication of capabilities in some areas. In addition, virtually all capability proposals that have gone through the JCIDS process since 2003 have been validated—or approved. DOD continues to have a portfolio with more programs than available resources can support. For example, the remaining costs for major weapon system programs in DOD's portfolio went from being about four times greater to almost six times greater than annual funding available during fiscal year 2000 through 2007. The JCIDS process has also proven to be lengthy—taking on average up to 10 months to validate a need—which further undermines efforts to effectively respond to the needs of the warfighter, especially those that are near-term.

Major Defense Acquisition Program Costs Remaining versus Annual Appropriations, from Fiscal Year 2000 through Fiscal Year 2007



Source: DOD (data); GAO (analysis and presentation).

DOD lacks an analytical approach to prioritize joint capability needs and determine the relative importance of capability proposals submitted to the JCIDS process. Further, the functional capabilities boards, which were established to manage the JCIDS process and facilitate the prioritization of needs, have not been staffed or resourced to effectively carry out these duties. Instead, the military services retain most of DOD's analytical capacity and resources for requirements development. The Joint Staff recently initiated a project to capture the near-, mid-, and long-term needs of the services and other defense components, and to synthesize them with the needs of the COCOMs. However, DOD officials told us that determining how best to integrate COCOM and service capability perspectives will be challenging because of differences in roles, missions, and time frames. Efforts have also begun to streamline the process and reduce the time it takes to validate proposals.

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Senator McCASKILL. Explain to me, so I understand, what is the makeup of the three groups of people. These three are really the stovepipes that cause a lot of the problem because you have, "Here's what we want, here's how we pay for it, and here's how we figure out how much it's going to cost in the long run."

Mr. SULLIVAN. Yes, ma'am.

Senator McCASKILL. What I don't understand is: what is keeping them from making that one thing, so they all have to do all of that at once?

Mr. SULLIVAN. The requirement-setting process, the JCIDS, is run by the JROC, and the JROC is made up of the military service chiefs, more or less. It's run by the Vice Chief of Staff. So, it, in a sense, is a matrix organization, but it receives most of the proposals for needs to be validated as weapon systems from the three Services, as stovepipes.

Now, the JCIDS was established to have something called "functional capability boards," which were supposed to be a matrixed organization based on looking at things like battlespace awareness or force protection or force projection, looking at it functionally instead of across the Services. What we found when we did that study was that the DOD has not staffed those functional capability boards properly, it hasn't resourced them properly, so they don't really do a lot of joint decisionmaking to send proposals forward to the JROC. So, mostly what they are receiving is proposals for capabilities that are coming from the Air Force, the Navy, and the Army, and they compete with each other.

Senator MCCASKILL. The sense is, at JCIDS, that if you say no to what they want, then they're going to say no to what you want. Isn't that part of the problem, in terms of the way this is actually supposed to be oversight with no value added.

Mr. SULLIVAN. I would say that the oversight is far from perfect. There's not a lot of value to it.

Senator MCCASKILL. The idea of the Joint Staff is that they're supposed to be picking winners and losers. What is your sense of how effective the organization of the Joint Chiefs office has been, in terms of weapon acquisition and picking winners and losers?

Mr. SULLIVAN. In terms of that organization that does that picking of the winners and losers, the JROC, there are a lot of redundancies right now in the weapon system portfolio because they can't make proper decisions, it seems to us.

I'll give you an example. Right now, there are some unmanned aerial systems that are in development that we believe, and I think the Department actually believes, should have been joint programs, but the Services had unique-enough requirements and missions to be separate. Right now, there is the Predator, which has been very valuable in Iraq and Afghanistan and is an Air Force program. Air Force is currently making a bigger, more powerful Predator, called the Reaper. Another one of the Services, I believe it's the Army, has started what they call the Sky Warrior. Both drones are done by the same contractor and both with very similar requirements, but the Services have determined that they're different enough that they each have to have their own acquisition program. That's the sort of thing that the JROC is contending with; it's a very parochial kind of an attitude.

Senator MCCASKILL. So, is this not fixable?

Mr. SULLIVAN. This is the cultural aspects of this, I think, that we've all been addressing, where you can write legislation, you can have policies.

Senator MCCASKILL. It doesn't do any good.

Mr. SULLIVAN. But, unless you change the culture, and I guess that is the number one question: How do you change that culture, that has been in existence for so long, to try to turn it a little bit, to do things a little more efficiently? It's very much a culture issue.

Senator MCCASKILL. I also think, Mr. Chairman, one of the things we have to do, in some instances, is take out a mirror because I think there are times that, when the military has tried, either by the way they've done the budget or by actually being so bold as to say we need to wind down a program, that Congress decides, because of our parochial interests, that it's important that we go to bat to augment the budget to take care of the weapon system that we think is important in our part of the world. So we contribute to this problem, and I think we shouldn't complete this hearing without at least acknowledging that sometimes Congress has their hand in this stew.

Mr. SULLIVAN. Yes, ma'am. I would say, sometimes we should think of this as a system that is in equilibrium because there are very many stakeholders in this system that are getting specific things, even the GAO. It's a pretty good employment program for us. We report on cost schedule and performance problems, and we have been doing it 30 years. So, culturally speaking, if you examine it as a system that, maybe, is in equilibrium, in a sense—it's not necessarily broken for the people that are involved in it.

Senator MCCASKILL. Thank you.

Thank you, Mr. Chairman.

Chairman LEVIN. Thank you very much.

Just one quick comment on that. We do, in this bill, attempt to make the JROC system cover some of the issues that Senator McCaskill talked about by requiring it to make these early trade-offs, by looking at cost and at schedule, by the way, as well as the requirements and the performance requirements.

Mr. SULLIVAN. Yes, sir.

Chairman LEVIN. There is an effort in this bill, Senator McCaskill. I just want to give you assurance that at least this bill attempts to do what we can, legislatively, to put those elements into the JROC process, which would, hopefully, cut down the parochialism by forcing consideration of cost and schedule, not just requirements. So, I'd just get that on the record.

Thank you, Senator McCaskill.

Senator Martinez is next.

Senator MARTINEZ. Mr. Chairman, thank you very much.

Dr. Gansler, I wonder if I could ask of you to define for me a little more broadly what you mention as a "holistic approach" to defense needs.

Dr. GANSLER. Yes. In fact, when I even looked at the situation in Iraq and Afghanistan, I was surprised to find that the State Department, United States Agency for International Development, and DOD were all there, but not integrated, in terms of the buying, the contracting, and planning purposes. But, much more at a higher level than that, it seems to me that the world of the 21st century is going to require us to combine hard and soft power in the kinds of operations involving expeditionary operations or insurgent operations that we get involved with around the world. So, we're going to need a much closer tie between, in that case, State and Defense. But, I would go further and say, Homeland Security and Defense. It shocked me, in fact, that Saddam Hussein didn't try and pull some terrorist actions at the same time as we attacked him. I would expect that's going to happen in the future. So, it is an inte-

grated, holistic perspective that is the meaning of “national security” in the 21st century, that will involve Homeland Security, that will involve State, will involve the intelligence community, will involve the DOD.

I think that’s basically what National Security Advisor General Jim Jones is now trying to do, some of the restructuring that’s taking place at the national security level within the President’s office. I think this combination of soft and hard power is going to be required, very clearly. That’s what I was thinking of, in terms of the “holistic perspective.” But, also the types of threats. Think about it, the energy case, the pathogen spreading worldwide, the economic crisis that we’re in, these are all national security issues for the 21st century that we have to start to incorporate into our thinking of national security. That’s what I had in mind.

Senator MARTINEZ. Thank you. I think it is an intriguing future that we all are stepping into. I think, by the way, Saddam would have if he could have.

But, the LCS program is one that I’m very much fond of, and one that I think is essential to the national security interests of our country. I wonder how you believe the Navy got so far off track on that particular program? Was it too many requirements being put on the platform by the Navy? Was it the length it’s taken to develop it? We now have two hulls being developed. So, to the extent that any of you could speak to the LCS program and what you see, going forward, it would be helpful to me.

Dr. GANSLER. I just actually published, I think last week, a DSB report which looks specifically at the LCS and the presidential helicopter, a couple of programs of that sort, where the initial concept was: get something relatively fast, take something “off-the-shelf” that could be used, and addressing Dr. Kaminski’s point about rapid acquisition—then maybe block 2, 3, and 4 would add some of the additional things.

What happened on the LCS: the first thing they said was, “Has to go through Sea State 8.” Well, that’s like going through a hurricane and it wasn’t initially designed for that. Then the next thing they said was, “Well, it has to have a new Navy sprinkler system.” The sprinkler that was in the system in those two ships that you talked about, it wasn’t going to be adequate, for some reason or other. So, each of these special requirements ended up basically changing the original block 1 system and introduced the instability, cost growth, and schedule impact that we’ve talked about in all these other programs.

Yes, we badly needed the LCS, but is it going to have to be a battleship? Does it have to do everything that a battleship does? How it’s going to be used by the Navy was resisted, in terms of the nontraditional solutions. So, this is the culture change that we’ve been talking about, as well. If you kept the cost and the schedule, and got a block 1 system out there much faster—I like the idea that we did it competitively. I think that was a very important step. So, I would encourage that to be done in these earlier demonstration systems.

Senator MARTINEZ. Dr. Kaminski?

Dr. KAMINSKI. Yes, sir. I think the concept initially was a good concept. What was missing was the upfront systems engineering



and development planning that I spoke about. I can remember back to the time I was serving in the acquisition executive's job in DOD; I was a big proponent of commercial practice, and also in buying commercial systems where that made sense. But, if somebody came to me and said we were going to buy a commercial ship for this mission, my first question to him was, "What are we going to change in the mission to be able to do it with a commercial ship?" If the answer is "nothing," then I have to ask a second question, "Wait a minute, this commercial ship doesn't have the kind of military requirements you would have for fire-safe cables, for a fire sprinkler system, or a whole variety of things. What are you going to do about those?" I don't think we started asking those questions about the LCS program until we were well into the program, so we missed this upfront set of tradeoffs. Those are tradeoffs that you have to make. They can be made sensibly if you approach them, understand them, look at the costs, the performance, and the schedule to make those tradeoffs. I don't believe we made those tradeoffs upfront. That, for me, does not necessarily damn the LCS program. There may still be value derived from looking at these tradeoffs and now making sensible decisions to go forward. I agree with Dr. Gansler about the advantage of having a competitive environment to be able to do that.

Senator MARTINEZ. Mr. Adolph?

Mr. ADOLPH. I'm not really familiar with the LCS. I've had no involvement with the program.

Senator MARTINEZ. Okay, and you, Mr. Sullivan? I don't know whether you've had any experience.

Mr. SULLIVAN. I don't have any specific experience with that, but we do have a team that looks at all of our Navy ships, and I'm sure we've had a report on that recently, which I could submit for the record.

Senator MARTINEZ. That would be great. I'd appreciate that.

Mr. SULLIVAN. Okay.

[Excerpt of GAO-05-255 follows:]

March 2005

# DEFENSE ACQUISITIONS

## Plans Need to Allow Enough Time to Demonstrate Capability of First Littoral Combat Ships



March 2005



Highlights of GAO-05-255, a report to congressional committees

## DEFENSE ACQUISITIONS

### Plans Need to Allow Enough Time to Demonstrate Capability of First Littoral Combat Ships

#### Why GAO Did This Study

To conduct operations in littorals—shallow coastal waters—the Navy plans to build a new class of surface warship: the Littoral Combat Ship (LCS). LCS is being designed to accomplish its missions through systems operating at a distance from the ship, such as helicopters and unmanned vehicles, and that will be contained in interchangeable mission packages. The Navy is using an accelerated approach to buy the LCS, building the ships in “flights.” Flight 0, consisting of four ships, will provide limited capability and test the LCS concept. The schedule allows 12 months between the delivery of the first Flight 0 ship and the start of detailed design and construction for Flight 1 ships. Estimated procurement cost of the Flight 0 ships is \$1.5 billion.

The Congress directed GAO to review the LCS program. This report assesses the analytical basis of LCS requirements; the Navy’s progress in defining the concept of operations; the technical maturity of the mission packages; and the basis of recurring costs for LCS.

#### What GAO Recommends

GAO recommends that the Navy analyze the effect of larger surface threats on LCS operations, incorporate the impact of LCS into helicopter force structure, and sufficiently experiment with Flight 0 ships before selecting a Flight 1 design. The Department of Defense partially concurred with GAO’s recommendations.

[www.gao.gov/cgi-bin/getrpt?GAO-05-255](http://www.gao.gov/cgi-bin/getrpt?GAO-05-255).

To view the full product, including the scope and methodology, click on the link above. For more information, contact Paul Francis at (202) 512-2811 or [francis@gao.gov](mailto:francis@gao.gov).

#### What GAO Found

The formal analysis of requirements for U.S. littoral combat operations—conducted after the Navy established the LCS program—examined a number of options, such as the extent to which existing fleet assets or joint capabilities could be used. While the Navy concluded that the LCS remained the best option, it focused on LCS requirements for combating small boats. The Navy did not conduct an analysis of the impact of larger surface threats LCS may face. Such threats may increase the risk to LCS operations when no other nearby U.S. forces are available to help.

The Navy has developed both a broad concept and more detailed plans on how the LCS will be employed. It has also identified a number of challenges that could put the LCS concept at risk, such as manning, logistics, and communications. For example, reduced manning—a key goal of the LCS program—may not be achievable because maintaining and operating the ship’s mission packages, such as the MH-60 helicopter, may require more sailors than the current design allows. Further, the Navy has not yet incorporated the numbers of helicopters that will be needed to fulfill LCS’ s concept of operation into its force structure and procurement plans. If the Navy’s efforts to meet these challenges are not successful, the Navy may not have sufficient time to experiment with the Flight 0 ships and integrate lessons learned into planning and designing for follow-on ships.

While the Navy designed the first LCS to rely on proven technologies and systems, a number of technologies to be used in LCS’s mission packages have yet to be sufficiently matured—that is, they have not been demonstrated in an operational environment—increasing the risk of cost and schedule increases if the technologies do not work as intended. Technologies must also be demonstrated for systems on the LCS seaframe. Other factors may affect the availability of mature technologies and subsystems, such as making the modifications necessary for adaptation to the LCS and transitioning projects from the laboratory to production. Collectively, these technology issues pose an additional challenge to the Navy’s ability to sufficiently experiment with Flight 0 ships in time to inform the design efforts for follow-on ships.

Procurement costs for the Flight 0 ships remain uncertain. The basis for the seaframe cost target—\$220 million—appears to be more defined than for the mission packages, as the Navy has performed various cost analyses that consider the challenges in detailed design and construction. The Navy seeks to meet the cost target by trading between capability and cost. Cost data for the Flight 0 mission packages are not as firm in part because of the uncertainties associated with immature technologies.

United States Government Accountability Office

Senator MARTINEZ. I’m sure going to try to look up your article, as well, Dr. Gansler.

You haven’t written on DGD–1000 and the DGD–51 to date, have you?

Dr. GANSLER. Not lately.

Senator MARTINEZ. Okay. Do any of you share an opinion on the needs of the Navy as it relates to these two programs?

Mr. SULLIVAN. I would just say that we’re going to come out with our annual assessment of programs, and I think both the DGD–1000 and LCS are going to be programs that are covered in that,

so you will get our take on them, probably in the next couple of weeks. I'll follow up, as well.

Senator MARTINEZ. Very good. Thank you.

[Excerpts of GAO-09-326SP follows:]

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**GAO**

United States Government Accountability Office  
Report to Congressional Committees

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March 2009

**DEFENSE  
ACQUISITIONS**

**Assessments of  
Selected Weapon  
Programs**





Highlights of GAO-09-326SP, a report to congressional committees

### Why GAO Did This Study

This is GAO's seventh annual assessment of selected Department of Defense (DOD) weapon programs. The report examines how well DOD is planning and executing its weapon acquisition programs, an area that has been on GAO's high-risk list since 1990.

This year's report is in response to the mandate in the joint explanatory statement to the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act, 2009. The report includes (1) an analysis of the overall performance of DOD's 2008 portfolio of 96 major defense acquisition programs and a comparison to the portfolio performance at two other points in time—5 years ago and 1 year ago; (2) an analysis of current cost and schedule outcomes and knowledge attained by key junctures in the acquisition process for a subset of 47 weapon programs—primarily in development—from the 2008 portfolio; (3) data on other factors that could impact program stability; and (4) an update on changes in DOD's acquisition policies. To conduct our assessment, GAO analyzed cost, schedule, and quantity data from DOD's Selected Acquisition Reports for the programs in DOD's 2003, 2007, and 2008 portfolios. GAO also collected data from program offices on technology, design, and manufacturing knowledge, as well as on other factors that might affect program stability. GAO analyzed this data and compiled one- or two-page assessments of 67 weapon programs.

To view the full product, including the scope and methodology, click on GAO-09-326SP. For more information, contact Michael J. Sullivan at (202) 512-4841 or [sullivanm@gao.gov](mailto:sullivanm@gao.gov).

March 2009

## DEFENSE ACQUISITIONS

### Assessments of Selected Weapon Programs

### What GAO Found

Since 2003, DOD's portfolio of major defense acquisition programs has grown from 77 to 96 programs; and its investment in those programs has grown from \$1.2 trillion to \$1.6 trillion (fiscal year 2009 dollars). The cumulative cost growth for DOD's programs is higher than it was 5 years ago, but at \$296 billion, it is less than last year when adjusted for inflation. For 2008 programs, research and development costs are now 42 percent higher than originally estimated and the average delay in delivering initial capabilities has increased to 22 months. DOD's performance in some of these areas is driven by older programs, as newer programs, on average, have not shown the same degree of cost and schedule growth.

Portfolio status	Fiscal year 2003 portfolio	Fiscal year 2007 portfolio	Fiscal year 2008 portfolio
Number of programs	77	95	96
Total planned commitments	\$1.2 trillion	\$1.6 trillion	\$1.6 trillion
Commitments outstanding	\$724 billion	\$875 billion	\$786 billion
Change to total research and development costs from first estimate	37 percent	40 percent	42 percent
Change in total acquisition cost from first estimate	19 percent	26 percent	25 percent
Estimated total acquisition cost growth	\$183 billion	\$301 billion*	\$296 billion
Share of programs with 25 percent or more increase in program acquisition unit cost	41 percent	44 percent	42 percent
Average delay in delivering initial capabilities	18 months	21 months	22 months

Source: GAO analysis of DOD data.

\*Last year, GAO reported total acquisition cost growth for the fiscal year 2007 portfolio was \$295 billion in fiscal year 2008 dollars. This figure is now expressed in fiscal year 2009 dollars.

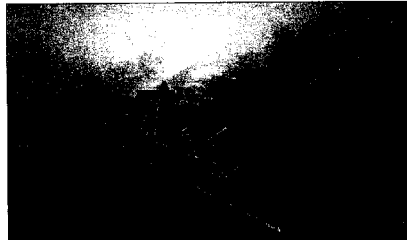
For 47 programs GAO assessed in-depth, the amount of knowledge that programs attained by key decision points has increased in recent years; but most programs still proceed with far less technology, design, and manufacturing knowledge than best practices suggest and face a higher risk of cost increases and schedule delays. Early system engineering, stable requirements, and disciplined software management were also important as programs that exhibited these characteristics experienced less cost growth and shorter schedule delays on average. Program execution could be hindered by workforce challenges. A majority of the programs GAO assessed were unable to fill all authorized program office positions, resulting in increased workloads, a reliance on support contractors, and less personnel to conduct oversight.

In December 2008, DOD revised its policy for major defense acquisition programs to place more emphasis on acquiring knowledge about requirements, technology, and design before programs start and maintaining discipline once they begin. The policy recommends holding early systems engineering reviews; includes a requirement for early prototyping; and establishes review boards to monitor requirements changes—all positive steps. Some programs we assessed have begun implementing these changes.

United States Government Accountability Office

**DDG 1000 Destroyer**

The Navy's DDG 1000 destroyer (formerly known as DD(X)) is a multimission surface ship designed to provide advanced land attack capability in support of forces ashore and contribute to U.S. military dominance in littoral operations. The program awarded contracts for detail design in August 2006 and negotiated contract modifications for construction of two lead ships in February 2008. The program will continue to mature its technologies and design as it approaches construction start, currently planned for February 2009.



Source: PEO Ships (PMS 500).

Concept	System development		Production				
▲ Program start (1/06)	▲ Development start (3/04)	▲ Design review (9/05)	▲ Production decision—1st ships (11/05)	▲ GAO review (1/09)	▲ Construction start—1st ship (2/09)	▲ Construction start—2nd ship (11/09)	▲ Initial capability (9/15)

**Program Essentials**

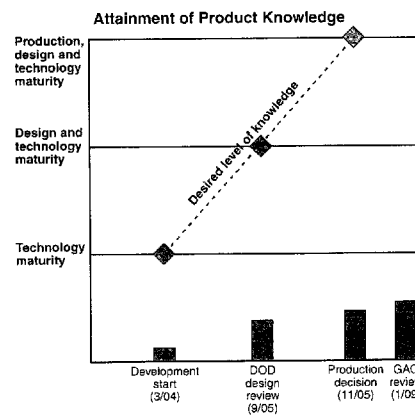
Prime contractor: BAE Systems, Bath Iron Works, Northrop Grumman Shipbuilding, Raytheon  
 Program office: Washington, DC  
 Funding needed to complete:  
 R&D: \$1,942.7 million  
 Procurement: \$11,896.4 million  
 Total funding: \$13,839.1 million  
 Procurement quantity: 5

**Program Performance (fiscal year 2009 dollars in millions)**

	As of 01/1998	Latest 08/2008	Percent change
Research and development cost	\$2,196.9	\$9,526.9	333.7
Procurement cost	\$81,412.4	\$18,084.4	-42.4
Total program cost	\$33,609.3	\$27,611.3	-17.8
Program unit cost	\$1,050,292	\$3,944,473	275.6
Total quantities	32	7	-78.1
Acquisition cycle time (months)	128	212	65.6

Quantities based on the approved program estimate. Current Navy estimates plan a total quantity of three ships.

Four of 12 DDG 1000 critical technologies are fully mature, having been demonstrated in a sea environment. Six other technologies are approaching maturity, but 5 of them will not demonstrate full maturity until after installation on the ship. Two technologies remain at a lower level of maturity—the volume search radar (one of two radars that constitute the dual band radar system) and total ship computing environment. Land-based tests of the volume search radar prototype originally planned for before ship construction will not be completed until June 2009—over 2 years later. Software development for the total ship computing environment has proved challenging; the Navy certified the most recent software release before it met about half of its requirements. The Navy plans on completing 89 percent of product modeling of the ship's design prior to the start of construction.



Common Name: DDG 1000

## DDG 1000 Program

### Technology Maturity

Four of DDG 1000's 12 critical technologies are fully mature. Six others are approaching maturity. Practical limitations prevent the Navy from fully demonstrating all critical technologies prior to installation. The Navy does expect to demonstrate the maturity of the integrated deckhouse prior to the start of ship construction. The Navy conducted the deckhouse production readiness review in October 2008; with completion of a large-scale deckhouse test unit in November 2008. Testing of other technologies continues through ship construction start. The integrated power system will not be tested with the control system until 2011—nearly 3 years later than planned. The Navy will buy a power system intended for the third ship and use it in land-based tests. As a result, the power system will not be demonstrated until a year after production and installation on the two lead ships.

The volume search radar remains at a lower level of maturity. Land-based tests of the volume search radar prototype will not be completed until June 2009—over 2 years later than planned. Upcoming land-based tests will be conducted at a lower voltage than needed to meet requirements—and without the radome. The Navy will not demonstrate a fully capable radar at its required power output until testing of the first production unit in 2011. Partly due to delays, the volume search radar will not be installed during deckhouse construction as initially planned. Instead, installation will occur in April 2013—after the Navy has taken custody of the ship.

The Navy initially planned to develop and demonstrate all software functionality of the total ship computing environment (phased over six releases and one spiral) over 1 year before ship light-off. As a result of changes in the software development schedule, the Navy eliminated this margin. Until recently, the Navy was able to keep pace with its development schedule. However, the contractor delivered release 4 without incorporating all software system requirements and deferred work to release 5, primarily due to issues with the command and control component. Problems discovered in this release, coupled with the deferred work, may be a sign of larger issues that could

disrupt the development of later releases and prevent the timely delivery of software to meet the ship's schedule.

### Design Stability

The Navy aims to complete 89 percent of product modeling for the ship's 94 design zones prior to the start of construction. At the program's production readiness reviews in October 2008, the shipbuilders had completed less than 35 percent of the product model and faced challenges maintaining its design schedule. The Navy has now delayed the start of ship construction by 4 months to February 2009 in order to mature the ship's design. According to the Navy, as of January 2009, 88 percent of the zones are complete.

### Other Program Issues

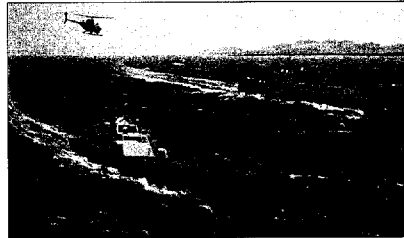
The Navy recently decided to reduce its quantities from seven ships to a total of three. Rather than DDG 1000, the Navy now wants to restart the procurement of the Arleigh Burke-class destroyer. According to the Navy, this is primarily because of a change in its assessment of likely future threats and in the requirements for destroyers needed to meet those threats. While eliminating follow-on ships will reduce program procurement costs by at least \$10.4 billion, the costs of the three ships will likely increase. Further, the Navy still intends to spend \$1.6 billion to complete research and development of DDG 1000's critical systems.

### Program Office Comments

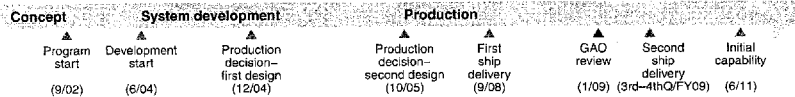
The Navy stated that the program successfully completed production readiness reviews in October 2008 and that almost 90 percent of the final Navy zone design reviews have been completed, emphasizing that no zone will start construction until the design for that zone is done. According to the Navy, DDG 1000 has a design that is much more complete, developed to a greater level of detail, and has undergone a more rigorous review than any previous ship class. Due to the long timeline required to design, develop, and deliver a Navy ship, the Navy stated that some concurrency is unavoidable to prevent obsolescence and preclude the additional cost that would be associated with stretching the timeline to allow all technologies to reach readiness levels meeting GAO best practice recommendations prior to construction. The Navy concluded that DDG-1000 has achieved the proper balance of developmental risk, schedule impact, and cost.

**Littoral Combat Ship (LCS)**

The Navy's LCS is designed to perform mine countermeasures, anti-submarine warfare, and surface warfare missions. It consists of the ship itself—the seaframe—and the mission package it deploys. The Navy plans to construct the first seven LCS seaframes in two unique designs. The first seaframe (LCS 1) was delivered in September 2008, and the Navy expects the second seaframe (LCS 2) to be delivered by September 2009. We assessed the first two seaframes (known as Flight 0). See pages 107-108 for an assessment of LCS mission packages.



Source: Alton Science.



**Program Essentials**

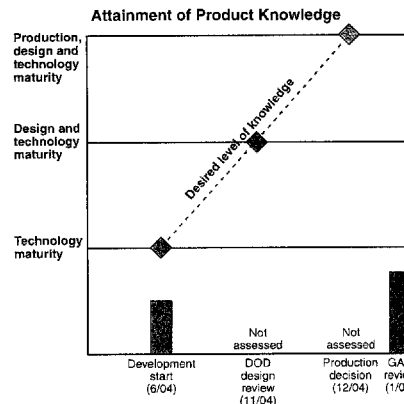
- Prime contractor: General Dynamics, Lockheed Martin
- Program office: Washington, DC
- Funding needed to complete:
  - R&D: \$354.6 million
  - Procurement: \$946.7 million
  - Total funding: \$1,301.2 million
- Procurement quantity: 2

**Program Performance (fiscal year 2009 dollars in millions)**

	As of 05/2004	Latest 07/2008	Percent change
Research and development cost	\$856.7	\$2,147.9	150.7
Procurement cost	\$455.5	\$1,774.0	289.5
Total program cost	\$1,312.1	\$3,921.9	198.9
Program unit cost	\$328.035	\$560.275	70.8
Total quantities	4	7	75.0
Acquisition cycle time (months)	41	85	107.3

Baseline estimates above are for seaframe-related costs only. Research and development funding includes detail design and construction of two ships.

Fifteen of 19 critical technologies for the two seaframe designs are fully mature, and 2 technologies are approaching maturity. The overhead launch and retrieval system in the LCS 1 design and the aluminum structure in the LCS 2 design are immature. The Navy also identified watercraft launch and recovery as a major risk affecting both designs. Final integration of mission package vehicles will not begin until 2010 with the LCS 1 seaframe. Acceptance trials for LCS 1 uncovered several deficiencies. Most notably, the Navy found that LCS 1 may not meet stability requirements in the event of critical damage. In response, the Navy is taking steps to reduce the weight and increase the buoyancy of the design. The Navy plans to award contracts for the next two seaframes absent validated earned value management systems—needed to ensure reliable cost and schedule data—in both LCS shipyards.





Common Name: LCS

## LCS Program

### Technology Maturity

Fifteen of 19 critical technologies for the two seaframe designs are fully mature, and 2 technologies are approaching maturity. The overhead launch and retrieval system in the LCS 1 design and the aluminum structure in the LCS 2 design are immature. The Navy identified the watercraft launch and recovery concept as a major risk to both seaframe designs. This capability is essential to complete the LCS anti-submarine warfare and mine countermeasures missions. According to the Navy, industry watercraft launch and recovery designs are unproven. To mitigate risk, the Navy is conducting launch and recovery modeling and simulation, model basin testing, and experimentation and is encouraging the seaframe industry teams to adopt similar approaches. Final integration of mission package vehicles with each seaframe will not occur until post-delivery test and trials—planned first for LCS 1 in 2010 using the mine countermeasures mission package. Any problems detected could require redesign and costly rework, which could delay the introduction of LCS to the fleet.

### Design and Production Maturity

The Navy assesses LCS design stability by monitoring changes to requirements documents, execution of engineering change proposals, and the completion of contract deliverables related to drawings, ship specifications, and independent certification of the design. Construction is monitored using earned value management and through evaluation of manufacturing hours spent on rework, deficiencies detected and corrected, and the number of test procedures performed.

The Navy adopted a concurrent design-build strategy for the first two LCS seaframes, which has proven unsuccessful. Contributing challenges included the implementation of new design guidelines, delays in major equipment deliveries, and an unwavering focus on achieving schedule and performance goals. These events drove low levels of outfitting, out-of-sequence work, and rework—all of which increased construction costs. Also, incomplete designs during construction led to weight increases for both seaframes. According to the Navy, this weight growth contributed to a higher than desired center of gravity on LCS 1 that

degraded the stability of the seaframe. In fact, an inclining experiment performed during acceptance trials showed LCS 1 may not meet Navy stability requirements for the damaged ship condition. The Navy is taking steps to remove weight and implement stability improvements for LCS 1, while also incorporating design changes for future seaframes.

### Other Program Issues

As part of LCS 1 acceptance trials, the Navy's Board of Inspection and Survey (INSURV) identified 21 critical "starred" deficiencies and recommended the Chief of Naval Operations authorize delivery of LCS 1 after correction or waiver of these deficiencies. According to Navy officials, only 9 of these deficiencies were corrected prior to delivery. Navy officials report that transiting the ship away from Marinette, Wisconsin, prior to the winter freeze was a higher priority than timely correction of starred deficiencies. The Navy intends to correct remaining deficiencies during planned post-delivery maintenance availabilities. The Navy plans to hold an INSURV review of LCS 2 upon completion of construction and builder's trials for that seaframe.

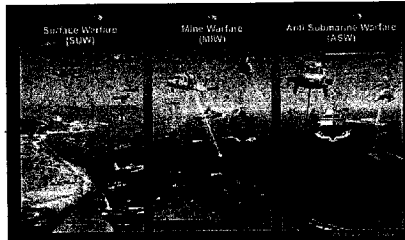
Navy officials report that the earned value management systems in each of the LCS shipyards do not meet Defense Contract Management Agency requirements for validation. Thus, the cost and schedule data reported by the prime contractors cannot be considered fully reliable by the Navy when evaluating contractor cost proposals or negotiating for construction of follow-on ships.

### Program Office Comments

The Navy stated the LCS program is delivering vital capabilities to the fleet and will be a critical component of the Navy. It noted that LCS 1 was delivered September 18, 2008—6 years and 1 day after the LCS program was established. In fiscal year 2009, the program will deliver a second ship of a completely different design. According to the Navy, while the initial cost and schedule objectives were overaggressive—and necessitated a concurrent design and construction plan—they provided the tension and urgency for these achievements, and lessons learned will be applied to future shipbuilding programs. In August 2008, INSURV evaluated LCS 1 and found it to be "capable, well-built, and inspection-ready." The Navy stated it is leveraging lessons learned from LCS 1 and LCS 2 to ensure future ship awards provide the right mix of capability and affordability.

**Littoral Combat Ship - Mission Modules**

The Navy's Littoral Combat Ship (LCS) will perform mine countermeasures, surface warfare and antisubmarine warfare missions using modular mission packages. Packages include weapons and sensors that operate from MH-60 helicopters or unmanned underwater, aerial, or surface vehicles. Initial packages are partially capable. They include engineering development models and some, but not all, systems planned. Mission capability improves with each package delivered until it reaches a baseline capability of production representative systems.

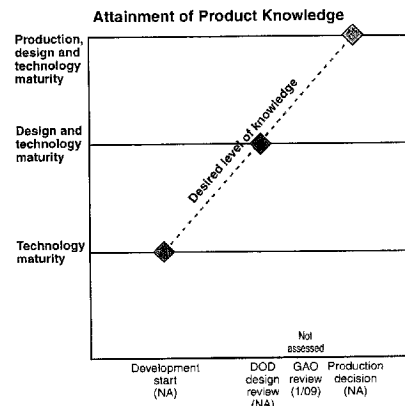


Source: © Northrop Grumman Corporation.

Concept	System development							
▲ LCS program start (5/04)	▲ First MCM delivery (9/07)	▲ ▲ First SUW delivery (7/08)	▲ ▲ First ASW delivery (9/08)	▲ GAO review (1/09)	▲ Milestone B- LCS (6/10)	▲ Initial capability MCM (2011)	▲ Initial capability ASW (2011)	▲ Initial capability SUW (2013)

Program Essentials	Program Performance (fiscal year 2009 dollars in millions)		
	As of 08/2007	Latest 11/2008	Percent change
Prime contractor: Northrop Grumman	\$475.0	\$780.3	64.3
Program office: Washington, DC	\$3,147.8	\$2,986.7	-5.1
Funding needed to complete:	\$3,622.8	\$3,767.0	4.0
R&D: \$274.2 million	\$56.607	\$58.860	4.0
Procurement: \$2,869.4 million	64	64	0.0
Total funding: \$3,143.7 million	NA	NA	NA
Procurement quantity: 58	Acquisition cycle time (months)		
	Above comparison of costs reported in 2007 and 2008 does not include mission package common equipment, or the helicopter or vertical takeoff and landing unmanned aerial vehicle.		

Operation of the Mine Countermeasures (MCM), Surface Warfare (SUW), and Anti-Submarine Warfare (ASW) packages requires a total of 25 critical technologies, including 13 sensors, 5 weapons, and 7 vehicles. Technology development has proceeded more slowly than expected. Individual mission systems in each package have experienced problems requiring design changes and resulting in schedule delay. For example, integration of MCM systems with the MH-60S helicopter has proved challenging due to problems with the cable that tows the various systems. Overall, the Navy will reach baseline capability for each package between 1 and 2 years later than previously planned. The Navy plans to procure 64 mission packages for use on 55 LCS seaframes. Procurement has slowed to keep pace with seaframe acquisition.



Common Name: LCS Modules

## LCS Modules Program

### Technology Maturity

Operation of the MCM, SUW, and ASW packages on the LCS requires a total of 25 critical technologies, including 13 sensors, 5 weapons, and 7 vehicles. Of these technologies, 17 are currently mature and 8 are nearing maturity.

The first of 24 MCM packages was delivered in September 2007 and included 7 of 10 planned mission systems. Four systems are not yet mature; two of these are struggling to reach full maturity. Officials note the Organic Airborne and Surface Influence Sweep is being redesigned to address corrosion issues and the Rapid Airborne Mine Clearance System requires design changes to perform in all environmental conditions. An airborne mine countermeasures system was decertified and its tow cable is being redesigned following the results of testing with the helicopter. The Navy also decertified the Remote Minehunting System during testing in 2007 due to reliability issues, and, according to officials, results of a recent operational assessment are pending. The Navy now plans to deliver the third and fourth mission packages in fiscal year 2011 and has delayed delivery of the baseline package until fiscal year 2012.

The first of 24 SUW packages was delivered in July 2008 and included 1 of 2 planned mission systems. The SUW package includes the fully mature 30mm gun and a variant of the Army's Non-Line-of-Sight (NLOS) system (missile and launcher), which is nearing maturity. The first package consisted of two gun engineering development models, without the NLOS launcher or missiles. The NLOS design for LCS has not yet been validated. Integration of the gun with LCS is not complete. A design review for the gun module is scheduled for October 2009. Delivery of a baseline package has been delayed to fiscal year 2013.

The first of 16 ASW packages was delivered in September 2008 and included 4 of 10 planned mission systems. Three systems remain immature including the Unmanned Surface Vehicle's Dipping Sonar, the Remotely Towed Array and the Remotely Towed Array Source. Failure to develop these technologies as expected could increase reliance on the MH-60R helicopter. The Navy has delayed

delivery of a second ASW package until fiscal year 2011, and delayed baseline capability from fiscal year 2011 to 2013.

### Other Program Issues

The development cost of the LCS packages has increased by more than \$300 million, or 64 percent since last year. Procurement costs have decreased for MCM, in part because the delivery of the more expensive baseline capability has been delayed. Reductions in fiscal year 2008 and 2009 budget requests have slowed mission package procurement to account for continuing delays in seaframe acquisition. The explanatory statement accompanying DOD Appropriation Act for Fiscal Year 2009 Congress asked the Navy to develop a plan for fielding the MCM capability independent of LCS. The program office indicates all packages are currently scheduled to undergo operational assessments with both LCS seaframe designs, beginning in June 2010. According to program officials, in September 2008, the Navy conducted a shore based integration exercise using simulated seaframe mission bays. Officials note this activity accelerated MCM mission package integration with both seaframes and reinforced previous crew training.

### Program Office Comments

Program officials noted that changes to the program between the 2008 and 2009 president's budgets resulted in an apparent increased development cost. Costs for the SUW package bought in fiscal year 2009 were realigned from procurement to development to support technical and operational evaluations. In addition, data provided to GAO for last year's assessment did not include costs of common equipment that was subsequently distributed among the MCM and ASW packages. The program office acknowledges technical maturity challenges for some mission systems and is working closely with mission system program offices to resolve any issues. The program office is leading a coordinated test approach to prove mission package capabilities and suitability for fleet delivery. The program office also provided technical comments that were incorporated as appropriate.

Senator MARTINEZ. My time's up, thank you very much.

Chairman LEVIN. Thank you, Senator Martinez.

Senator Begich.

Senator BEGICH. Thank you. Thank you very much, Mr. Chairman.

It has been very interesting, listening to all the testimony. I will try to ask my questions very quickly, and I may not ask every single one of you to answer because I want to get some specifics here.

Before I talk about the personnel issue, I'm a former mayor; I've just become a Senator. So, I believe I'm a mayor who just happens to be a Senator, so I like some of the comments you've made on personnel issues that I'll talk about in a second.

I'm not familiar with the CAIG. Is that the CAIG? I looked through the bill as quickly as I could, and I see an annual report to Congress. Do you think it would be helpful for us to require more? I believe it's a combination of oversight; it's not just internal oversight, but this body needs to do more. I think this bill attempts to do that. But, do you think there should be a report—and maybe there is and I'm just not familiar with it—that comes to this committee on a regular basis, maybe quarterly or twice a year, that shows what the CAIG said it would cost before a system is started?

Mr. Gansler, you made the comment that—I may get these words wrong—but it's almost like they ignore it. It comes out, it says, maybe, what it might really cost, but then they kind of push it down. I'm familiar with this, as a mayor. We call them HMS, Inc., studies, where the contractor wants to build it, as well the person inside the system who wants to build it, always seems to have a different price. When it's all done, it's pretty close to the one that HMS, Inc., did. Is that something we should have in this legislation, so we can see, before these systems start kicking off, here is what the real, or what another group said it could cost, so we at least have some understanding? I don't know who can answer that.

Dr. GANSLER. The idea of the independent cost analysis, right upfront, when we're doing the early systems engineering, is to be able to see the impact of the various requirements, and to be able to trade requirements, schedule, and cost as part of that early design requirements setting. Cost is actually an engineering challenge, just as schedule and technical performance are. So, if you, upfront, try to say, "What's the cost impact of this?" and the independent cost analysis group will say, "Historically here's what it's been," and then people will come back and say, "But, this time it's going to be different."

Senator BEGICH. Everything's different the next time.

Dr. GANSLER. Right, and so it's important to keep that in perspective, that the new technology comes along, and so forth. But, it's absolutely essential to get that independent estimate. Now, do you want to have Congress legislate what the price should be? I don't think so.

Senator BEGICH. No, I'm not asking that. But here we are, complaining about all these cost overruns. I agree with all your comments. You can write all the legislation you want, but you do not change the culture and remove people who are not doing the job they should be doing, and putting people in there who should be doing the job, you don't change anything, we'll be back here in a couple of years. So, I'm not saying, legislate the price, but we become more aware, so we are putting the pressure where it should be. Let's be honest about the pricing, so when we do the budgeting authorization and appropriation, we don't go from 75 to 95, with two-thirds probably in the planning and design stage, and we always get the answer, "We're this far, we have to do a little bit more, a little bit more, a little bit more." So what I'm asking is, should we have a more regular reporting period? Because once

you're a year into a project, even though some are longer, they're already obligating more money. By the time this system here moves, you could be 2 years into having any commentary on it.

That's my question. Should it be more regular reporting?

Dr. GANSLER. I think the thing you're missing is the fact that, in the development of a program, the program changes weekly. There's always technical issues that come up, there's always schedule problems, there's personnel problems, and so forth. You don't want Congress to be micromanaging the programs. You do want to make sure that the process is a good process. That's where I think the independent cost analysis is a very important thing and that your emphasis on it is the right thing to do. But, I don't think you want to get down to the point where you have a weekly report from the DOD.

Senator BEGICH. I didn't ask that. I'm trying to get to the point. Is annual enough?

Dr. GANSLER. I think that—if you've convinced the DOD that you care about this, that you are going to be monitoring it, and that's what you're trying to do with the threshold numbers and the controls on that—I think that you're giving the message that the DOD needs to care about cost.

Senator BEGICH. Okay. Let me make one comment. I forget who said it, about, "stop the obligation of money at a certain point." I know, as a mayor, that's what you do. You turn the dollars off, and suddenly you get a response, and you get people paying more attention. So, I might be a little different than earlier comments that were made. I'm a little more direct on that. But, the personnel issue, to me, this is the challenge. If you don't change the culture, nothing changes. We'll be back here, and the numbers will grow, as they have over the years. It's not about adding more people, and I think Congress made a huge error by reducing down the amount of people. That was a huge mistake. We basically took the people who manage our programs out of the equation.

So, besides putting more people into the system to make sure we have more folks out there, do you think—and I'm not sure I want to ask this question because I'm not sure you'll want to answer it—but, do you think, within the system that currently exists today, we have to change the deck? When I say "change the deck," change personnel, people, and not just add more people and move people around so we satisfy their issues. This is a very hard, direct question. I've had to do this, as mayor. You might have half a dozen, a dozen, or 100 people; it doesn't really matter—they're in the wrong place. Anyone dare to want to answer that question?

Mr. SULLIVAN. I would just say, just real quickly, that a lot of this is organizational. I think the people that work in the DOD now are great people, and really, really capable people, and good public servants and everything else.

Senator BEGICH. Right.

Mr. SULLIVAN. But, when we talk about culture, I guess, it's more the way things are organized. For example, I think, in our written statement, we have that the Under Secretary of Defense for Acquisition, Technology, and Logistics probably should have more ability to make the final decisions on things, acquisition, than he or she has now. One of the things that probably gets in the way

of that is the fact that that position had an average turnover of 20 months since it started in 1986. I think that's part of the problem; there's an accountability issue, people change over too much, there's not a lot of direct communication. The three processes, I think, that this legislation does address, that you're trying to get the three big processes that we've talked about to communicate with each other more and to share in decisionmaking; right now, that's not there. So, I don't know if the people are good people. The structures and the way they're organized and the way they come and go is the big issue.

Dr. GANSLER. If I might comment that if we implemented what Goldwater-Nichols says to do, relative to promotion potential for the acquisition community, that you'd get a big step forward there. Instead of putting someone into a four-star position who has no acquisition background, but happens to be called an acquisition job, that's where we lose out. Each of the promotion-potential reviews and so forth need to really show that we value the acquisition workforce, civilians and military, and that's a critical point, I think, in order to keep people coming in. Dr. Kaminski said they're not doing it for the money, they're doing it so they can have an impact, and they need to have promotion potential.

Senator BEGICH. I know my time's out, but you're about to jump out of your seat, Mr. Adolph.

Chairman LEVIN. Can you do it real quickly?

Mr. ADOLPH. Very quickly. There are three issues: numbers, training, and people. Particularly in the Air Force, they need to plus up because they drew down their acquisition workforce to a greater extent.

I think the training that Defense Acquisition University provides is on the mark, for the most part. They were a part of our study. They ground in what we found into their training courses. I believe people need to be moved around a bit more, particularly in the civilian workforce, so that they get a variety of experiences rather than 1 or 2 years' experience 10 times.

Senator BEGICH. Thank you very much, Mr. Chairman.

Chairman LEVIN. Thank you, Senator Begich.

Senator Lieberman.

Senator LIEBERMAN. Thanks, Mr. Chairman. Thanks to the panel. It's probably not been an exciting hearing in content, but it's actually very important, an educational hearing, and there's a lot on the line in it, so I thank the four of you for the accumulated experience and wisdom you've brought to the table. I thank Senator Levin and Senator McCain for their legislation, S. 454, which certainly would take us forward in significant ways. I hope it passes.

Earlier, Senator Collins referred to the fiscal responsibility summit that President Obama convened last week at the White House, and then a group of us on this committee happened to be in a breakout session on procurement reform. As Senator Collins indicated, most, though not all, but most, of us focused on the acquisition workforce, and the size of it. I want to talk to you about that in the time I have, hopefully, and at least one other subject we talked about.

Dr. Gansler, you had a chart here in your testimony which has two lines; one is procurement by DOD, in dollars, from 1990 to

2006, about as close as we can get to today, and then the other is the acquisition workforce. Obviously, the procurement dollars go up dramatically as the acquisition workforce goes down. But, beneath that, there are some numbers that are quite stunning, I think, and I know when I was here, Mr. Sullivan referred to them. The acquisition workforce, in 1990, was actually 500,000 people, and today it's dropped, but it's still 200,000 people, which is an enormous number of people in acquisition. I note in your testimony that you focus in on the DCMA and say that it had 25,000 people in 1990, down to 10,000 today. Then the other four general officers, and down to zero today. Give me some sense of the 200,000. Because my first reaction to it is, "Wow, 200,000 people, isn't it enough to handle acquisitions by the DOD, even though acquisitions are so large?"

Dr. GANSLER. A large share of those are in the military depots that you have insisted do 50 percent of the maintenance work. A depot that has 20,000 people, that adds up pretty fast. To get to 200,000, you only need 10 of those.

Senator LIEBERMAN. So, acquisition wouldn't be what most of those do?

Dr. GANSLER. That's part of the acquisition workforce because logistics is part of the acquisition.

Senator LIEBERMAN. Got it. But in the conventional meaning, I think that's important, so I wanted to bring out.

Dr. GANSLER. Very few people are actually doing contract work, program management work, or things like that. As Mr. Adolph pointed out, the test and evaluation community is down significantly, but they're part of that community. So it's the total encompassing the research labs that the government runs all the way through the maintenance and logistics support.

Senator LIEBERMAN. Is there any way, now or maybe afterward, to submit for the record, you could give us a sense of what we would normally, in conversation, consider to be the acquisition workforce—how many people in the DOD are actually involved in acquisition, contracting, et cetera?

Dr. GANSLER. It's a small percentage of the people that are actually involved in that.

In other words, you have the comptroller people, you have the personnel people, you have the policy people, and you have the acquisition workforce.

Senator LIEBERMAN. Right. I'm curious as to really what the size of the real acquisition workforce is, leaving out the depots and the rest.

Mr. SULLIVAN. I don't have that answer right now. I know we're doing work on that.

Senator LIEBERMAN. Good. Get it for the record, please.

Mr. SULLIVAN. Yes, sir.

[The information referred to follows:]

In our recent review of the Department of Defense's (DOD) acquisition workforce management (GAO-09-342), we found that, according to DOD data, the number of civilian and military personnel in the Department's acquisition workforce totaled about 126,000 at the end of fiscal year 2007 compared to about 129,000 personnel in 2001, a decline of about 2.5 percent. During this same time period, the number of contracting actions valued at over \$100,000 increased by 62 percent and dollars obligated on contracts increased by 116 percent, according to DOD. Moreover, DOD

has reported that the number of major defense acquisition programs has increased from 70 to 95. To augment its declining in-house acquisition workforce, DOD has relied more heavily on contractor personnel. However, DOD does not collect or track information on contractor personnel, despite their being a key segment of the total acquisition workforce.

Senator LIEBERMAN. There were two other things that there seemed to be an interesting consensus on, and they're quite different, about, you might say, principles for acquisition; a little different than anything we've talked about today. They're not unfamiliar. One was that our original position on acquisition should be to favor fixed-price contracts over cost-plus, and to favor competitive bidding, as opposed to negotiated contracts. I want to ask, to the extent that we have time—let's just focus on the fixed-price. Our sense, as we discussed at our breakout session with probably about 25 people, was, generally speaking, private sector favors competition. So, why are we favoring cost-plus? Does the taxpayer really benefit from that?

Mr. Adolph, you always get asked last because we're going left to right, so let's start from the right and ask you about that.

Mr. ADOLPH. I think the other three panel members have more expertise in this issue. But, when you're in the basic research arena, it's very difficult to do on a fixed-price basis. It should be accomplished using cost-plus contracts.

Once you get beyond research, then the next challenge in the development is system integration. That's not an insignificant task with the very complex systems we're developing today. But, once you get beyond that point then I think you reach a point where you can really consider going to fixed-price for downstream procurement.

Senator LIEBERMAN. Right. That's interesting.

Dr. Kaminski, I think, just to clarify—if I could really make it too simple—what if we had a law that said, “Defense contracts ought to be done on a fixed-price basis unless the Secretary certifies that there's a good reason not to”?

Dr. KAMINSKI. I think that would end up requiring a lot of certification, Senator Lieberman, for the following reason.

Senator LIEBERMAN. Right.

Dr. KAMINSKI. I believe fixed-price contracts are completely appropriate when we know precisely what it is we're going to buy. If there's uncertainty in what we're going to buy, and we know we're going to change, and we don't know yet quite how we're going to change, I think we end up on the wrong end of the bargain negotiating a fixed-price contract and then having to go back and renegotiate that effort for every change that occurs, especially when the contractor has already priced in some contingency in the fixed price.

So, there's a time, for example, in the program, where perhaps we are working through this in development, and then we settle in on what we want to buy, and we're ready to enter a well-defined production program. That would be a fine time to do a fixed-price contract.

So, I think you have to pass that criteria, knowing what it is you want to buy, and have it be predictable.



Senator LIEBERMAN. Okay. My time is running out, but, Mr. Sullivan, Dr. Gansler, if you'd give me a quick answer to a big question and follow up with writing.

Mr. SULLIVAN. For major developments, I think it would be very difficult to go to a fixed-price contract for that because of the unknowns that are involved. But, I would say that if you work on requirements and try to do some of the things that we've been talking about here today, in terms of staying in what is doable, and having shorter cycle times to get these things done, you could have cost-plus development contracts that don't get so out of control. It really goes back to how much knowledge you have when you set out.

Senator LIEBERMAN. Okay.

Dr. Gansler?

Dr. GANSLER. I think that it's a question of what's the meaning of a "fixed-price contract"? As Senator McCain said, you get 75 changes every week. The contract continues to change hourly, in effect. I think it's very clear, when you have a stabilized and lower-risk program, that a fixed-price makes a lot of sense, it does give an incentive for the contractors. On the other hand, the cost-plus, I would say, we haven't been using the incentives that are available with the cost-plus-type contracts as well as we should, and I think, clearly, for research-and-development-type activities, cost-plus is an appropriate way to do it, but the "plus" part is an incentive rather than a fixed fee, I think. I would use the incentive more.

Senator LIEBERMAN. Those are very helpful answers. You encourage me to think that we ought to take a look, not at fixed prices on across-the-board answer, but to apply it by some selective means, and that, in doing so, we might benefit the taxpayers.

Thanks very much.

Chairman LEVIN. Thank you, Senator Lieberman.

Senator Webb.

Senator WEBB. Thank you, Mr. Chairman. I'd like to add my appreciation for your taking on this issue. As has been so clear today, we're burning up a lot of money, and we're not getting a lot of product right now, particularly in the shipbuilding programs and aircraft programs.

Dr. Gansler, when you're talking about people, which everyone seems to agree is the major issue, I was thinking about all the different years and different positions I've had on different sides of the table, here, working on this issue. It's so clear that what we need is disciplined management, not only on the people side, but in the system itself. "People" include people in government, on this side of government, it includes people in business. We have challenges because there are not a lot of people in the military who use the business concepts, quite frankly, and they're asked to manage these programs. There are not a lot of businesspeople who are used to how product comes through a governmental system.

I believe it was Mr. Sullivan who mentioned the creation of the Under Secretary of Defense for Acquisition in 1986. I was actually on Caspar Weinberger's staff when that position was created. We had a very talented individual who came into the position. He was bewildered with all the different steps that were required to get a

system through the process. It's something you just don't see in the normal business world. There are lots of checks and balances. Some of them are appropriate, and some of them are less than appropriate.

Dr. Gansler, I found your analogy with the LCS brought back a lot of different memories. They say that a camel is a horse created by a committee. I can go all the way back to the M-16, when they first developed the M-16, and they developed it directly toward a jungle environment, and then the different requirements were put on it to be able to be used in the desert and other different places. They put a different round in it that carboned up the chamber so people were dying in Vietnam because the weapon system requirements had changed as it evolved.

I was in DOD when we were trying to do the Bradley fighting vehicle, and there were different requirements put on it here in Congress, so that it was very similar to what you were talking about with the LCS. They were saying it should perform different functions from the original design, and then there were all these press reports about the Bradley fighting vehicle falling over when it was going through a water obstacle because it got top heavy.

Or the FG-7s, the USS *Stark*-class ships, which were designed to build to cost. So, we have fixed cost that we were going to build a ship toward, and then you go inside one of these FG-7s, you could plink the bulkheads on a FG-7, they were so thin. So when an Exocet missile hit the USS *Stark* in the Persian Gulf when I was Secretary of the Navy, it went all the way through the ship because they had had to make adjustments based on the cost rather than on some other areas.

So it's a very complicated question. I think the key, when I look back, is if you can find the right leadership at the top on a program, negotiate and agree on general requirements—there are always going to be fixes—we'll get a program through. Probably the best example of that is when they put Al Gray, who later became Commandant of the Marine Corps, and he had the Development Center, they put him on the Light Armored Vehicle, and he got that program through in about a year. He just pushed it through, made all the negotiations, was very firm with people over here in Congress, as to what the requirements were for the Marine Corps, and it was a very successful program.

I have one question I would like to put in front of you because I'm very concerned about it, and that is the state of all these programs in the United States Navy right now. You talk about the Polaris as having been probably the best analytical prototype of how to build a weapon system. One of the things about our submarine programs is that we built the frame, and then we added the technology onto the frame, similar to, say, the C-130, rather than continually building a new frame with all the costs and the time that goes into that. I've just been really struck over the last couple of years at how difficult the Navy procurements appear to be, and I'm trying to get my arms around why. I would be happy to hear from any of you who would like to begin answering that question.

Dr. KAMINSKI. I'll make one comment. I think a key thing that impacts the programs are stability. So, if you see a program that we've had in production for some period of time, they have very

good learning curves on those ships when we have a stable production program. Our issues sometimes are with first-ship cost. But, if you look at the cost of subsequent ships, what's happening there is very competitive with commercial-kind of production experience. Where we're producing ships regularly—one of the ship families in which we're doing that is the DDG-51. We have two yards. We have some competitive arrangements. Not quite head-to-head competitions, but there are some incentives in those programs. But, it is a well-planned, stable program that we've been producing. I think that approach would benefit us. It's the areas where we've had instability where we've more problems.

Dr. GANSLER. Yes, I guess I would approach it by thinking about, "What is it the Navy really needs for the 21st century?" and what types of ships they're going to want. There is a resistance to change. Take the Arsenal ship, for example, which was primarily to support the Marines and the Army onshore, it was resisted significantly in terms of it being a low-cost ship for few people. The highest costs in the Navy are for people and fuel if you look at the life-cycle costs of a ship. So trying to drive down the number of people on the ship and improve the fuel utilization are things we need to stress. Those are not the traditional things that are emphasized in the Navy construction of ships. I think it's a different look that we need to think about. The LCS has the same thing. Is that something the Navy really wanted or really resisted? So it's more the institutional inertia that has to be changed, I think, in terms of what the future Navy for the 21st century is going to need.

Senator WEBB. Do any of you see this as leadership failures in the Navy? [No response.]

In terms of defining these objectives?

Dr. GANSLER. There have been some real successes. The F-18E/F on the Navy program was extremely well-managed, but that was because they had some really top people doing it, they had a clear objective, it was an incremental version of a prior demonstrated program, and it was well done.

Another big success is the patrol frigate. It kept up competition throughout its life, and it had the steepest learning curves of any ship in the Navy. So, there are some success stories, but I think lessons learned haven't been widely applied.

Senator WEBB. Thank you, Mr. Chairman. My time's up.

Chairman LEVIN. Thank you, Senator Webb.

Any other questions of this panel before we excuse them? [No response.]

Thank you all for your time. Some of you came some distance to get here, at some inconvenience. At least one of you had to give up a family commitment, and we won't identify who that was because the family is better off not knowing, maybe. [Laughter.]

But we're very grateful to all of you for your testimony. It's very, very helpful.

I will also submit for the record the text of the Weapon Systems Acquisition Reform Act of 2009; a statement from Ken Krieg, former Under Secretary of Defense for Acquisition, Technology, and Logistics; a statement from Moshe Schwartz from the Congressional Research Service; and the DOD Inspector General Acquisition Workforce Count Report.

[Additional material included for the record.]

II

111<sup>TH</sup> CONGRESS  
1<sup>ST</sup> SESSION

# S. 454

To improve the organization and procedures of the Department of Defense for the acquisition of major weapon systems, and for other purposes.

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IN THE SENATE OF THE UNITED STATES

FEBRUARY 23, 2009

Mr. LEVIN (for himself and Mr. McCAIN) introduced the following bill; which was read twice and referred to the Committee on Armed Services

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## A BILL

To improve the organization and procedures of the Department of Defense for the acquisition of major weapon systems, and for other purposes.

1 *Be it enacted by the Senate and House of Representa-*  
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. SHORT TITLE; TABLE OF CONTENTS.**

4 (a) **SHORT TITLE.**—This Act may be cited as the  
5 “Weapon Systems Acquisition Reform Act of 2009”.

6 (b) **TABLE OF CONTENTS.**—The table of contents for  
7 this Act is as follows:

- Sec. 1. Short title; table of contents.
- Sec. 2. Congressional defense committees.

TITLE I—ACQUISITION ORGANIZATION

- Sec. 101. Reports on systems engineering capabilities of the Department of Defense.
- Sec. 102. Director of Developmental Test and Evaluation.
- Sec. 103. Assessment of technological maturity of critical technologies of major defense acquisition programs by the Director of Defense Research and Engineering.
- Sec. 104. Director of Independent Cost Assessment.
- Sec. 105. Role of the commanders of the combatant commands in identifying joint military requirements.

#### TITLE II—ACQUISITION POLICY

- Sec. 201. Consideration of trade-offs among cost, schedule, and performance in the acquisition of major weapon systems.
- Sec. 202. Preliminary design review for major defense acquisition programs.
- Sec. 203. Maximization of competition throughout the life cycle of major defense acquisition programs.
- Sec. 204. Critical cost growth in major defense acquisition programs.
- Sec. 205. Organizational conflicts of interest in the acquisition of major weapon systems.
- Sec. 206. Awards for Department of Defense personnel for excellence in the acquisition of products and services.

#### 1 SEC. 2. CONGRESSIONAL DEFENSE COMMITTEES.

2 In this Act, the term “congressional defense commit-  
3 tees” has the meaning given that term in section  
4 101(a)(16) of title 10, United States Code.

### 5 TITLE I—ACQUISITION 6 ORGANIZATION

#### 7 SEC. 101. REPORTS ON SYSTEMS ENGINEERING CAPABILI- 8 TIES OF THE DEPARTMENT OF DEFENSE.

9 (a) REPORTS BY SERVICE ACQUISITION EXECU-  
10 TIVES.—Not later than 180 days after the date of the en-  
11 actment of this Act, the service acquisition executive of  
12 each military department shall submit to the Under Sec-  
13 retary of Defense for Acquisition, Technology, and Logis-  
14 ties a report setting forth the following:

1 (1) A description of the extent to which such  
2 military department has in place development plan-  
3 ning organizations and processes staffed by adequate  
4 numbers of personnel with appropriate training and  
5 expertise to ensure that—

6 (A) key requirements, acquisition, and  
7 budget decisions made for each major weapon  
8 system prior to Milestones A and B are sup-  
9 ported by a rigorous systems analysis and sys-  
10 tems engineering process;

11 (B) the systems engineering strategy for  
12 each major weapon system includes a robust  
13 program for improving reliability, availability,  
14 and maintainability as an integral part of de-  
15 sign and development; and

16 (C) systems engineering requirements, in-  
17 cluding reliability, availability, and maintain-  
18 ability requirements, are identified during the  
19 Joint Capabilities Integration Development Sys-  
20 tem process and incorporated into contract re-  
21 quirements for each major weapon system.

22 (2) A description of the actions that such mili-  
23 tary department has taken, or plans to take, to—

1           (A) establish needed development planning  
2           and systems engineering organizations and  
3           processes; and

4           (B) attract, develop, retain, and reward  
5           systems engineers with appropriate levels of  
6           hands-on experience and technical expertise to  
7           meet the needs of such military department.

8       (b) REPORT BY UNDER SECRETARY OF DEFENSE  
9       FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS.—Not  
10       later than 270 days after the date of the enactment of  
11       this Act, the Under Secretary of Defense for Acquisition,  
12       Technology, and Logistics shall submit to the Committee  
13       on Armed Services of the Senate and the Committee on  
14       Armed Services of the House of Representatives a report  
15       on the system engineering capabilities of the Department  
16       of Defense. The report shall include, at a minimum, the  
17       following:

18           (1) An assessment by the Under Secretary of  
19           the reports submitted by the service acquisition ex-  
20           ecutives pursuant to subsection (a) and of the ade-  
21           quacy of the actions that each military department  
22           has taken, or plans to take, to meet the systems en-  
23           gineering and development planning needs of such  
24           military department.

1           (2) An assessment of each of the recommenda-  
2           tions of the report on Pre-Milestone A and Early-  
3           Phase Systems Engineering of the Air Force Studies  
4           Board of the National Research Council, including  
5           the recommended checklist of systems engineering  
6           issues to be addressed prior to Milestones A and B,  
7           and the extent to which such recommendations  
8           should be implemented throughout the Department  
9           of Defense.

10 **SEC. 102. DIRECTOR OF DEVELOPMENTAL TEST AND EVAL-**  
11 **UATION.**

12           (a) ESTABLISHMENT OF POSITION.—

13           (1) IN GENERAL.—Chapter 4 of title 10, United  
14           States Code, is amended by inserting after section  
15           139b the following new section:

16 **“§ 139c. Director of Developmental Test and Evalua-**  
17 **tion**

18           “(a) There is a Director of Developmental Test and  
19           Evaluation, who shall be appointed by the Secretary of De-  
20           fense from among individuals with an expertise in acqui-  
21           sition and testing.

22           “(b)(1) The Director of Developmental Test and  
23           Evaluation shall be the principal advisor to the Secretary  
24           of Defense and the Under Secretary of Defense for Acqui-



1 sition, Technology, and Logistics on developmental test  
2 and evaluation in the Department of Defense.

3 “(2) The Director shall be subject to the supervision  
4 of the Under Secretary of Defense for Acquisition, Tech-  
5 nology, and Logistics and shall report to the Under Sec-  
6 retary.

7 “(c) The Director of Developmental Test and Evalua-  
8 tion shall—

9 “(1) develop policies and guidance for the devel-  
10 opmental test and evaluation activities of the De-  
11 partment of Defense;

12 “(2) monitor and review the developmental test  
13 and evaluation activities of the Department of De-  
14 fense;

15 “(3) review and approve the test and evaluation  
16 master plan for each major defense acquisition pro-  
17 gram of the Department of Defense;

18 “(4) supervise the activities of the Director of  
19 the Department of Defense Test Resource Manage-  
20 ment Center under section 196 of this title;

21 “(5) review the organizations and capabilities of  
22 the military departments with respect to develop-  
23 mental test and evaluation and identify needed  
24 changes or improvements to such organizations and  
25 capabilities; and

1           “(6) perform such other activities relating to  
2           the developmental test and evaluation activities of  
3           the Department of Defense as the Under Secretary  
4           of Defense for Acquisition, Technology, and Logis-  
5           tics may prescribe.

6           “(d) The Director of Developmental Test and Eval-  
7           uation shall have access to all records and data of the De-  
8           partment of Defense (including the records and data of  
9           each military department) that the Director considers nec-  
10          essary in order to carry out the Director’s duties under  
11          this section.

12          “(e) The Director of Developmental Test and Evalua-  
13          tion shall submit to Congress each year a report on the  
14          developmental test and evaluation activities of the Depart-  
15          ment of Defense during the preceding year.”.

16                (2) CLERICAL AMENDMENT.—The table of sec-  
17                tions at the beginning of chapter 4 of such title is  
18                amended by inserting after the item relating to sec-  
19                tion 139b the following new item:

                  “139c. Director of Developmental Test and Evaluation.”.

20                (3) CONFORMING AMENDMENT.—Section 196(f)  
21                of such title is amended by striking “the Under Sec-  
22                retary of Defense for Acquisition, Technology, and  
23                Logistics” and all that follows and inserting “the  
24                Under Secretary of Defense for Acquisition, Tech-

1 nology, and Logistics and the Director of Develop-  
2 mental Test and Evaluation.”.

3 (b) REPORTS ON DEVELOPMENTAL TESTING ORGA-  
4 NIZATIONS AND PERSONNEL.—

5 (1) REPORTS BY SERVICE ACQUISITION EXECU-  
6 TIVES.—Not later than 180 days after the date of  
7 the enactment of this Act, the service acquisition ex-  
8 ecutive of each military department shall submit to  
9 the Director of Developmental Test and Evaluation  
10 a report on the extent to which the test organiza-  
11 tions of such military department have in place, or  
12 have effective plans to develop, adequate numbers of  
13 personnel with appropriate expertise for each pur-  
14 pose as follows:

15 (A) To ensure that testing requirements  
16 are appropriately addressed in the translation  
17 of operational requirements into contract speci-  
18 fications, in the source selection process, and in  
19 the preparation of requests for proposals on all  
20 major defense acquisition programs.

21 (B) To participate in the planning of de-  
22 velopmental test and evaluation activities, in-  
23 cluding the preparation and approval of a test  
24 and evaluation master plan for each major de-  
25 fense acquisition program.

1 (C) To participate in and oversee the con-  
2 duct of developmental testing, the analysis of  
3 data, and the preparation of evaluations and re-  
4 ports based on such testing.

5 (2) FIRST ANNUAL REPORT BY DIRECTOR OF  
6 DEVELOPMENTAL TEST AND EVALUATION.—The  
7 first annual report submitted to Congress by the Di-  
8 rector of Developmental Test and Evaluation under  
9 section 139c(e) of title 10, United States Code (as  
10 added by subsection (a)), shall be submitted not  
11 later than one year after the date of the enactment  
12 of this Act, and shall include an assessment by the  
13 Director of the reports submitted by the service ac-  
14 quisition executives to the Director under paragraph  
15 (1).

16 **SEC. 103. ASSESSMENT OF TECHNOLOGICAL MATURITY OF**  
17 **CRITICAL TECHNOLOGIES OF MAJOR DE-**  
18 **FENSE ACQUISITION PROGRAMS BY THE DI-**  
19 **RECTOR OF DEFENSE RESEARCH AND ENGI-**  
20 **NEERING.**

21 (a) ASSESSMENT BY DIRECTOR OF DEFENSE RE-  
22 SEARCH AND ENGINEERING.—

23 (1) IN GENERAL.—Section 139a of title 10,  
24 United States Code, is amended by adding at the  
25 end the following new subsection:

1 “(c)(1) The Director of Defense Research and Engi-  
2 neering shall periodically review and assess the techno-  
3 logical maturity and integration risk of critical tech-  
4 nologies of the major defense acquisition programs of the  
5 Department of Defense and report on the findings of such  
6 reviews and assessments to the Under Secretary of De-  
7 fense for Acquisition, Technology, and Logistics.

8 “(2) The Director shall submit to the Secretary of  
9 Defense and to Congress each year a report on the techno-  
10 logical maturity and integration risk of critical tech-  
11 nologies of the major defense acquisition programs of the  
12 Department of Defense.”.

13 (2) FIRST ANNUAL REPORT.—The first annual  
14 report under subsection (c)(2) of section 139a of  
15 title 10, United States Code (as added by paragraph  
16 (1)), shall be submitted to Congress not later than  
17 March 1, 2011, and shall address the results of re-  
18 views and assessments conducted by the Director of  
19 Defense Research and Engineering pursuant to sub-  
20 section (c)(1) of such section (as so added) during  
21 the preceding calendar year.

22 (b) REPORT ON RESOURCES FOR IMPLEMENTA-  
23 TION.—Not later than 120 days after the date of the en-  
24 actment of this Act, the Director of Defense Research and  
25 Engineering shall submit to the congressional defense

1 committees a report describing any additional resources  
2 that may be required by the Director, and by other science  
3 and technology elements of the Department of Defense,  
4 to carry out the following:

5 (1) The requirements under the amendment  
6 made by subsection (a).

7 (2) The technological maturity assessments re-  
8 quired by section 2366b(a) of title 10, United States  
9 Code, as amended by section 202 of this Act.

10 (3) The requirements of Department of Defense  
11 Instruction 5000, as revised.

12 **SEC. 104. DIRECTOR OF INDEPENDENT COST ASSESSMENT.**

13 (a) **DIRECTOR OF INDEPENDENT COST ASSESS-**  
14 **MENT.—**

15 (1) **IN GENERAL.**—Chapter 4 of title 10, United  
16 States Code, as amended by section 102 of this Act,  
17 is further amended by inserting after section 139c  
18 the following new section:

19 **“§ 139d. Director of Independent Cost Assessment**

20 “(a) There is a Director of Independent Cost Assess-  
21 ment in the Department of Defense, appointed by the  
22 President, by and with the advice and consent of the Sen-  
23 ate. The Director shall be appointed without regard to po-  
24 litical affiliation and solely on the basis of fitness to per-  
25 form the duties of the Director.

1       “(b) The Director is the principal advisor to the Sec-  
2 retary of Defense, the Under Secretary of Defense for Ac-  
3 quisition, Technology, and Logistics, and the Under Sec-  
4 retary of Defense (Comptroller) on cost estimation and  
5 cost analyses for the acquisition programs of the Depart-  
6 ment of Defense and the principal cost estimation official  
7 within the senior management of the Department of De-  
8 fense. The Director shall—

9           “(1) prescribe, by authority of the Secretary of  
10 Defense, policies and procedures for the conduct of  
11 cost estimation and cost analysis for the acquisition  
12 programs of the Department of Defense;

13           “(2) provide guidance to and consult with the  
14 Secretary of Defense, the Under Secretary of De-  
15 fense for Acquisition, Technology, and Logistics, the  
16 Under Secretary of Defense (Comptroller), and the  
17 Secretaries of the military departments with respect  
18 to cost estimation in the Department of Defense in  
19 general and with respect to specific cost estimates  
20 and cost analyses to be conducted in connection with  
21 a major defense acquisition program under chapter  
22 144 of this title or a major automated information  
23 system program under chapter 144A of this title;

24           “(3) establish guidance on confidence levels for  
25 cost estimates on major defense acquisition pro-

1       grams and require the disclosure of all such con-  
2       fidence levels;

3               “(4) monitor and review all cost estimates and  
4       cost analyses conducted in connection with major de-  
5       fense acquisition programs and major automated in-  
6       formation system programs; and

7               “(5) conduct independent cost estimates and  
8       cost analyses for major defense acquisition programs  
9       and major automated information system pro-  
10      grams—

11              “(A) in advance of—

12                      “(i) any certification under section  
13                      2366a or 2366b of this title;

14                      “(ii) any certification under section  
15                      2433(e)(2) of this title; and

16                      “(iii) any report under section  
17                      2445c(f) of this title; and

18              “(B) whenever necessary to ensure that an  
19       estimate or analysis under paragraph (4) is un-  
20       biased, fair, and reliable.

21              “(c)(1) The Director may communicate views on mat-  
22       ters within the responsibility of the Director directly to  
23       the Secretary of Defense and the Deputy Secretary of De-  
24       fense without obtaining the approval or concurrence of any  
25       other official within the Department of Defense.



1       “(2) The Director shall consult closely with, but the  
2 Director and the Director’s staff shall be independent of,  
3 the Under Secretary of Defense for Acquisition, Tech-  
4 nology, and Logistics, the Under Secretary of Defense  
5 (Comptroller), and all other officers and entities of the De-  
6 partment of Defense responsible for acquisition and budg-  
7 eting.

8       “(d)(1) The Secretary of a military department shall  
9 report promptly to the Director the results of all cost esti-  
10 mates and cost analyses conducted by the military depart-  
11 ment and all studies conducted by the military department  
12 in connection with cost estimates and cost analyses for  
13 major defense acquisition programs of the military depart-  
14 ment.

15       “(2) The Director may make comments on cost esti-  
16 mates and cost analyses conducted by a military depart-  
17 ment for a major defense acquisition program, request  
18 changes in such cost estimates and cost analyses to ensure  
19 that they are fair and reliable, and develop or require the  
20 development of independent cost estimates or cost anal-  
21 yses for such program, as the Director determines to be  
22 appropriate.

23       “(3) The Director shall have access to any records  
24 and data in the Department of Defense (including the  
25 records and data of each military department) that the

1 Director considers necessary to review in order to carry  
2 out the Director's duties under this section.

3       “(e)(1) The Director shall prepare an annual report  
4 summarizing the cost estimation and cost analysis activi-  
5 ties of the Department of Defense during the previous  
6 year and assessing the progress of the Department in im-  
7 proving the accuracy of its costs estimates and analyses.

8       “(2) Each report under this subsection shall be sub-  
9 mitted concurrently to the Secretary of Defense, the  
10 Under Secretary of Defense for Acquisition, Technology,  
11 and Logistics, the Under Secretary of Defense (Comp-  
12 troller), and Congress not later than 10 days after the  
13 transmission of the budget for the next fiscal year under  
14 section 1105 of title 31. The Director shall ensure that  
15 a report submitted under this subsection does not include  
16 any information, such as proprietary or source selection  
17 sensitive information, that could undermine the integrity  
18 of the acquisition process.

19       “(3) The Secretary may comment on any report of  
20 the Director to Congress under this subsection.

21       “(f) The President shall include in the budget trans-  
22 mitted to Congress pursuant to section 1105 of title 31  
23 for each fiscal year a separate statement of estimated ex-  
24 penditures and proposed appropriations for that fiscal  
25 year for the Director of Independent Cost Assessment in

1 carrying out the duties and responsibilities of the Director  
2 under this section.

3 “(g) The Secretary of Defense shall ensure that the  
4 Director has sufficient professional staff of military and  
5 civilian personnel to enable the Director to carry out the  
6 duties and responsibilities of the Director under this sec-  
7 tion.”.

8 (2) CLERICAL AMENDMENT.—The table of sec-  
9 tions at the beginning of chapter 4 of such title, as  
10 so amended, is further amended by inserting after  
11 the item relating to section 139c the following new  
12 item:

“139d. Director of Independent Cost Assessment.”.

13 (b) REPORT ON MONITORING OF OPERATING AND  
14 SUPPORT COSTS FOR MDAPs.—

15 (1) REPORT TO SECRETARY OF DEFENSE.—Not  
16 later than one year after the date of the enactment  
17 of this Act, the Director of Independent Cost Assess-  
18 ment under section 139d of title 10 United States  
19 Code (as added by subsection (a)), shall review exist-  
20 ing systems and methods of the Department of De-  
21 fense for tracking and assessing operating and sup-  
22 port costs on major defense acquisition programs  
23 and submit to the Secretary of Defense a report on  
24 the finding and recommendations of the Director as  
25 a result of the review.

1           (2) TRANSMITTAL TO CONGRESS.—Not later  
2 than 30 days after receiving the report required by  
3 paragraph (1), the Secretary shall transmit the re-  
4 port to the congressional defense committees, to-  
5 gether with any comments on the report the Sec-  
6 retary considers appropriate.

7           (c) TRANSFER OF PERSONNEL AND FUNCTIONS OF  
8 COST ANALYSIS IMPROVEMENT GROUP.—The personnel  
9 and functions of the Cost Analysis Improvement Group  
10 of the Department of Defense are hereby transferred to  
11 the Director of Independent Cost Assessment under sec-  
12 tion 139d of title 10, United States Code (as so added),  
13 and shall report directly to the Director.

14           (d) CONFORMING AMENDMENTS.—

15           (1) Section 2306b(i)(1)(B) of title 10, United  
16 States Code, is amended by striking “Cost Analysis  
17 Improvement Group of the Department of Defense”  
18 and inserting “Director of Independent Cost Assess-  
19 ment”.

20           (2) Section 2366a(a)(4) of such title is amend-  
21 ed by striking “has been submitted” and inserting  
22 “has been approved by the Director of Independent  
23 Cost Assessment”.

24           (3) Section 2366b(a)(1)(C) of such title is  
25 amended by striking “have been developed to exe-

1       cute” and inserting “have been approved by the Di-  
2       rector of Independent Cost Assessment to provide  
3       for the execution of”.

4           (4) Section 2433(e)(2)(B)(iii) of such title is  
5       amended by striking “are reasonable” and inserting  
6       “have been determined by the Director of Inde-  
7       pendent Cost Assessment to be reasonable”.

8           (5) Subparagraph (A) of section 2434(b)(1) of  
9       such title is amended to read as follows:

10           “(A) be prepared or approved by the Di-  
11           rector of Independent Cost Assessment; and”.

12           (6) Section 2445c(f)(3) of such title is amended  
13       by striking “are reasonable” and inserting “have  
14       been determined by the Director of Independent  
15       Cost Assessment to be reasonable”.

16 **SEC. 105. ROLE OF THE COMMANDERS OF THE COMBATANT**  
17           **COMMANDS IN IDENTIFYING JOINT MILITARY**  
18           **REQUIREMENTS.**

19       Section 181(d) of title 10, United States Code, is  
20 amended—

21           (1) by inserting “(1)” before “The Under Sec-  
22       retary”; and

23           (2) by adding at the end the following new  
24       paragraph:

1       “(2) The Council shall seek and consider input from  
2 the commanders of the combatant commands in carrying  
3 out its mission under paragraphs (1) and (2) of subsection  
4 (b) and in conducting periodic reviews in accordance with  
5 the requirements of subsection (e).”.

6       **TITLE II—ACQUISITION POLICY**

7       **SEC. 201. CONSIDERATION OF TRADE-OFFS AMONG COST,**  
8                               **SCHEDULE, AND PERFORMANCE IN THE AC-**  
9                               **QUISITION OF MAJOR WEAPON SYSTEMS.**

10       (a) CONSIDERATION OF TRADE-OFFS.—

11               (1) IN GENERAL.—The Secretary of Defense  
12 shall develop and implement mechanisms to ensure  
13 that trade-offs between cost, schedule, and perform-  
14 ance are considered as part of the process for devel-  
15 oping requirements for major weapon systems.

16               (2) ELEMENTS.—The mechanisms required  
17 under this subsection shall ensure, at a minimum,  
18 that—

19                       (A) Department of Defense officials re-  
20 sponsible acquisition, budget, and cost esti-  
21 mating functions are provided an appropriate  
22 opportunity to develop estimates and raise cost  
23 and schedule matters before performance re-  
24 quirements are established for major weapon  
25 systems; and

1 (B) consideration is given to fielding major  
2 weapon systems through incremental or spiral  
3 acquisition, while deferring technologies that  
4 are not yet mature, and capabilities that are  
5 likely to significantly increase costs or delay  
6 production, until later increments or spirals.

7 (3) MAJOR WEAPONS SYSTEM DEFINED.—In  
8 this subsection, the term “major weapon system”  
9 has the meaning given that term in section 2379(d)  
10 of title 10, United States Code.

11 (b) DUTIES OF JOINT REQUIREMENTS OVERSIGHT  
12 COUNCIL.—Section 181(b)(1) of title 10, United States  
13 Code, is amended—

14 (1) in subparagraph (A), by striking “and” at  
15 the end;

16 (2) in subparagraph (B), by striking the period  
17 at the end and inserting “; and”; and

18 (3) by adding at the end the following new sub-  
19 paragraph:

20 “(C) in ensuring the consideration of  
21 trade-offs among cost, schedule and perform-  
22 ance for joint military requirements;”.

1 **SEC. 202. PRELIMINARY DESIGN REVIEW FOR MAJOR DE-**  
2 **FENSE ACQUISITION PROGRAMS.**

3 Section 2366b(a) of title 10, United States Code, is  
4 amended—

5 (1) in paragraph (1), by striking “and” at the  
6 end;

7 (2) by redesignating paragraph (2) as para-  
8 graph (3);

9 (3) by inserting after paragraph (1) the fol-  
10 lowing new paragraph (2):

11 “(2) has received a preliminary design review  
12 (PDR) and conducted a formal post-preliminary de-  
13 sign review assessment, and certifies on the basis of  
14 such assessment that the program demonstrates a  
15 high likelihood of accomplishing its intended mis-  
16 sion; and”;

17 (4) in paragraph (3), as redesignated by para-  
18 graph (2) of this section—

19 (A) in subparagraph (D), by striking the  
20 semicolon and inserting “, as determined by the  
21 Milestone Decision Authority on the basis of an  
22 independent review and assessment by the Di-  
23 rector of Defense Research and Engineering;  
24 and”;

25 (B) by striking subparagraph (E); and



1 (C) by redesignating subparagraph (F) as  
2 subparagraph (E).

3 **SEC. 203. MAXIMIZATION OF COMPETITION THROUGHOUT**  
4 **THE LIFE CYCLE OF MAJOR DEFENSE ACQUI-**  
5 **SITION PROGRAMS.**

6 (a) MAXIMIZATION OF COMPETITION.—The Sec-  
7 retary of Defense shall ensure that the acquisition plan  
8 for each major defense acquisition program includes meas-  
9 ures to maximize competition at both the prime contract  
10 level and the subcontract level of such program throughout  
11 the life cycle of such program.

12 (b) MEASURES TO MAXIMIZE COMPETITION.—The  
13 measures to maximize competition utilized for purposes of  
14 subsection (a) may include, but are not limited to, meas-  
15 ures to achieve the following, where cost-effective:

- 16 (1) Competitive prototyping.
- 17 (2) Dual-sourcing.
- 18 (3) Funding of a second source for interchange-  
19 able, next-generation prototype systems or sub-  
20 systems.
- 21 (4) Utilization of modular, open architectures  
22 to enable competition for upgrades.
- 23 (5) Periodic competitions for subsystem up-  
24 grades.
- 25 (6) Licensing of additional suppliers.

1           (7) Requirements for Government oversight or  
2 approval of make or buy decisions to ensure com-  
3 petition at the subsystem level.

4           (8) Periodic system or program reviews to ad-  
5 dress long-term competitive effects of program deci-  
6 sions.

7           (9) Consideration of competition at the sub-  
8 contract level and in make or buy decisions as a fac-  
9 tor in proposal evaluations.

10       (e) COMPETITIVE PROTOTYPING.—The Secretary of  
11 Defense shall modify the acquisition regulations of the De-  
12 partment of Defense to ensure with respect to competitive  
13 prototyping for major defense acquisition programs the  
14 following:

15           (1) That the acquisition strategy for each major  
16 defense acquisition program provides for two or  
17 more competing teams to produce prototypes before  
18 Milestone B approval (or Key Decision Point B ap-  
19 proval in the case of a space program) unless the  
20 milestone decision authority for such program waives  
21 the requirement on the basis of a determination  
22 that, but for such waiver, the Department would be  
23 unable to meet critical national security objectives.

24           (2) That if the milestone decision authority  
25 waives the requirement for prototypes produced by

1 two or more teams for a major defense acquisition  
2 program under paragraph (1), the acquisition strat-  
3 egy for the program provides for the production of  
4 at least one prototype before Milestone B approval  
5 (or Key Decision Point B approval in the case of a  
6 space program) unless the milestone decision author-  
7 ity waives such requirement on the basis of a deter-  
8 mination that, but for such waiver, the Department  
9 would be unable to meet critical national security ob-  
10 jectives.

11 (3) That whenever a milestone decision author-  
12 ity authorizes a waiver under paragraph (1) or (2),  
13 the waiver, the determination upon which the waiver  
14 is based, and the reasons for the determination are  
15 submitted in writing to the congressional defense  
16 committees not later than 30 days after the waiver  
17 is authorized.

18 (d) MAJOR DEFENSE ACQUISITION PROGRAM DE-  
19 FINED.—In this section, the term “major defense acquisi-  
20 tion program” has the meaning given that term in section  
21 2430 of title 10, United States Code.

22 (c) APPLICABILITY.—This section shall apply to any  
23 acquisition plan for a major defense acquisition program  
24 that is developed or revised on or after the date that is  
25 60 days after the date of the enactment of this Act.

1 **SEC. 204. CRITICAL COST GROWTH IN MAJOR DEFENSE AC-**  
2 **QUISITION PROGRAMS.**

3 (a) AUTHORIZED ACTIONS IN EVENT OF CRITICAL  
4 COST GROWTH.—Section 2433(e)(2) of title 10, United  
5 States Code, is amended—

6 (1) by redesignating subparagraph (C) as sub-  
7 paragraph (D);

8 (2) by striking subparagraph (B); and

9 (3) by inserting after subparagraph (A) the fol-  
10 lowing new subparagraphs (B) and (C):

11 “(B) terminate such acquisition program, un-  
12 less the Secretary determines that the continuation  
13 of such program is essential to the national security  
14 of the United States and submits a written certifi-  
15 cation in accordance with subparagraph (C)(i) ac-  
16 companied by a report setting forth the assessment  
17 carried out pursuant to subparagraph (A) and the  
18 basis for each determination made in accordance  
19 with clauses (I) through (IV) of subparagraph  
20 (C)(i), together with supporting documentation;

21 “(C) if the program is not terminated—

22 “(i) submit to Congress, before the end of  
23 the 60-day period beginning on the day the Se-  
24 lected Acquisition Report containing the infor-  
25 mation described in subsection (g) is required

1 to be submitted under section 2432(f) of this  
2 title, a written certification stating that—

3 “(I) such acquisition program is es-  
4 sential to national security;

5 “(II) there are no alternatives to such  
6 acquisition program which will provide  
7 equal or greater capability to meet a joint  
8 military requirement (as that term is de-  
9 fined in section 181(g)(1) of this title) at  
10 less cost;

11 “(III) the new estimates of the pro-  
12 gram acquisition unit cost or procurement  
13 unit cost were arrived at in accordance  
14 with the requirements of section 139d of  
15 this title and are reasonable; and

16 “(IV) the management structure for  
17 the acquisition program is adequate to  
18 manage and control program acquisition  
19 unit cost or procurement unit cost;

20 “(ii) rescind the most recent Milestone ap-  
21 proval (or Key Decision Point approval in the  
22 case of a space program) for such program and  
23 withdraw any associated certification under sec-  
24 tion 2366a or 2366b of this title; and

1           “(iii) require a new Milestone approval (or  
2           Key Decision Point approval in the case of a  
3           space program) for such program before enter-  
4           ing into a new contract, exercising an option  
5           under an existing contract, or otherwise extend-  
6           ing the scope of an existing contract under such  
7           program; and”.

8           (b) TOTAL EXPENDITURE FOR PROCUREMENT RE-  
9           SULTING IN TREATMENT AS MDAP.—Section 2430(a)(2)  
10          of such title is amended by inserting “, including all  
11          planned increments or spirals,” after “an eventual total  
12          expenditure for procurement”.

13       **SEC. 205. ORGANIZATIONAL CONFLICTS OF INTEREST IN**  
14                       **THE ACQUISITION OF MAJOR WEAPON SYS-**  
15                       **TEMS.**

16          (a) REVISED REGULATIONS REQUIRED.—Not later  
17          than 180 days after the date of the enactment of this Act,  
18          the Under Secretary of Defense for Acquisition, Tech-  
19          nology, and Logistics shall revise the Defense Supplement  
20          to the Federal Acquisition Regulation to address organiza-  
21          tional conflicts of interest by contractors in the acquisition  
22          of major weapon systems.

23          (b) ELEMENTS.—The revised regulations required by  
24          subsection (a) shall, at a minimum—

1           (1) ensure that the Department of Defense re-  
2 ceives advice on systems architecture and systems  
3 engineering matters with respect to major weapon  
4 systems from federally funded research and develop-  
5 ment centers or other sources independent of the  
6 prime contractor;

7           (2) require that a contract for the performance  
8 of systems engineering and technical assistance  
9 (SETA) functions with regard to a major weapon  
10 system contains a provision prohibiting the con-  
11 tractor or any affiliate of the contractor from having  
12 a direct financial interest in the development or con-  
13 struction of the weapon system or any component  
14 thereof; and

15           (3) provide for fair and objective “make-buy”  
16 decisions by the prime contractor on a major weapon  
17 system by—

18                 (A) requiring prime contractors to give full  
19 and fair consideration to qualified sources other  
20 than the prime contractor for the development  
21 or construction of major subsystems and com-  
22 ponents of the weapon system;

23                 (B) providing for government oversight of  
24 the process by which prime contractors consider  
25 such sources and determine whether to conduct

1 such development or construction in-house or  
2 through a subcontract;

3 (C) where appropriate, requiring that pro-  
4 gram managers, rather than prime contractors,  
5 make the determination whether such develop-  
6 ment or construction should be conducted in-  
7 house or through a subcontract; and

8 (D) providing for the consideration of  
9 prime contractors “make-buy” decisions in past  
10 performance evaluations.

11 (e) ORGANIZATIONAL CONFLICT OF INTEREST RE-  
12 VIEW BOARD.—

13 (1) ESTABLISHMENT REQUIRED.—Not later  
14 than 90 days after the date of the enactment of this  
15 Act, the Secretary of Defense shall establish within  
16 the Department of Defense a board to be known as  
17 the “Organizational Conflict of Interest Review  
18 Board”.

19 (2) DUTIES.—The Board shall have the fol-  
20 lowing duties:

21 (A) To advise the Under Secretary of De-  
22 fense for Acquisition, Technology, and Logistics  
23 on policies relating to organizational conflicts of  
24 interest in the acquisition of major weapon sys-  
25 tems.



1 (B) To advise program managers on steps  
2 to comply with the requirements of the revised  
3 regulations required by this section and to ad-  
4 dress organizational conflicts of interest in the  
5 acquisition of major weapon systems.

6 (C) To advise appropriate officials of the  
7 Department on organizational conflicts of inter-  
8 est arising in proposed mergers of defense con-  
9 tractors.

10 (d) MAJOR WEAPON SYSTEM DEFINED.—In this sec-  
11 tion, the term “major weapon system” has the meaning  
12 given that term in section 2379(d) of title 10, United  
13 States Code.

14 **SEC. 206. AWARDS FOR DEPARTMENT OF DEFENSE PER-**  
15 **SONNEL FOR EXCELLENCE IN THE ACQUI-**  
16 **SITION OF PRODUCTS AND SERVICES.**

17 (a) IN GENERAL.—Not later than 180 days after the  
18 date of the enactment of this Act, the Secretary of Defense  
19 shall commence carrying out a program to recognize excel-  
20 lent performance by individuals and teams of members of  
21 the Armed Forces and civilian personnel of the Depart-  
22 ment of Defense in the acquisition of products and serv-  
23 ices for the Department of Defense.

24 (b) ELEMENTS.—The program required by sub-  
25 section (a) shall include the following:

1           (1) Procedures for the nomination by the per-  
2           sonnel of the military departments and the Defense  
3           Agencies of individuals and teams of members of the  
4           Armed Forces and civilian personnel of the Depart-  
5           ment of Defense for eligibility for recognition under  
6           the program.

7           (2) Procedures for the evaluation of nomina-  
8           tions for recognition under the program by one or  
9           more panels of individuals from the government,  
10          academia, and the private sector who have such ex-  
11          pertise, and are appointed in such manner, as the  
12          Secretary shall establish for purposes of the pro-  
13          gram.

14          (c) AWARD OF CASH BONUSES.—As part of the pro-  
15          gram required by subsection (a), the Secretary may award  
16          to any individual recognized pursuant to the program a  
17          cash bonus authorized by any other provision of law to  
18          the extent that the performance of such individual so rec-  
19          ognized warrants the award of such bonus under such pro-  
20          vision of law.

○

March 14, 2009

Ken Krieg  
711 Xavier Court  
McLean, VA 22101

Mr. Peter Levine  
General Counsel  
Committee on Armed Services  
United States Senate  
Washington, DC 20510-6050

Dear Peter:

Thank you and Senators Levin and McCain for the opportunity to comment on the Weapon Systems Acquisition Reform Act of 2009. I enjoyed catching up with you a couple of weeks ago and hope the conversation was useful. I will leave the bulk of my comments to that discussion. But, as promised, I have tried to capture my thoughts about the proposal for an Independent Cost Assessment office. As I told you then, I concur with the objectives, but recommend a different course of action for now; always reserving the right to force a significant organizational change at a later date.

We shared a set of similar objectives:

- Get risk fully addressed and valued in decisions,
- Make the milestone decision maker trade between reducing risk elements and increasing the available budget to the most likely cost, and
- Making risk decisions stick over time.

Success in the objectives requires both analytic capability and commitment of decision makers to use it.

The problems we agreed on include:

- There are not enough good cost analysts in the system; especially in the services,
- There are competing purposes, even inside the cost community, between just doing better cost estimates and really exposing and increasing the understanding of risk inherent in programs,
- Decision makers vary greatly in their belief in full budgeting of risk (pendulum may be swinging but there will not be universal consensus),
- The enterprise (DoD and Congress) including everyone involved in requirements, budgeting and risk management (acquisition) does not stay disciplined to decisions (even those well made) over time. There should be pressure for both configuration control and financial (capital) discipline if you want to make good risk decision making stick over time), and
- We are stuck with the run out of decisions for a long time after they are made.

As both the Director of Program Analysis and Evaluation and as the Under Secretary for Acquisition, Technology and Logistics, I managed and used the Cost Analysis and Improvement Group (CAIG) and independent cost analysis in decisions. I am a big fan of their work and have a caution of trying not to do unintentional harm while trying to fix something.

From my experience, significant reorganizations take time to work through. The proposal to pull the CAIG out of PA&E would be a significant reorganization; the CAIG uses the resources of the rest of the PA&E staff quite effectively. Pulling them out into a stand-alone organization would, in my opinion, cause more disruption than add value.

In addition, there is real value in the candid discussion and advice that the CAIG director now provides to the USD(AT&L) if the Under Secretary values it. Pulling the organization out of PA&E and making it a widely reporting organization risks the effectiveness of that candor – again totally in my opinion.

Finally, improving the use of cost estimating in DoD to support the better management of risk requires more work in the services than in the office of the secretary of defense. The independent cost capability in the services was significantly reduced over time. The ability of the services to conduct “should cost” analyses was a victim of that reduction.

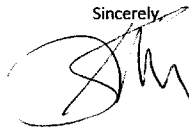
Based upon these opinions and logic, I would propose the following direction – for now:

- Keep the CAIG where it is and concentrating on Major Defense Acquisition Programs in milestones and Nunn-McCurdy reviews;
- Give the Director of the CAIG functional responsibility for the cost community in DoD; the CAIG would:
  - Set standards, approve and distribute tool sets, etc.
  - Review human capital initiatives in the cost community
  - Evaluate performance of other cost organizations
- Direct the Military Departments to rebuild their cost staffs to concentrate on ACAT 2s and 3s and provide should cost analyses for programs
- Ask the Department to advise the Congress on the degree to which its programs are budgeted to independent cost estimates.

You can reserve the creation of an independent cost office for another year.

Peter, I offer these thoughts in the spirit of trying to advance the objectives while minimizing unintended consequences. I wish you the best of luck.

Sincerely,



**Defense Acquisition Reform**

**Written Statement of**

**Moshe Schwartz**

**Analyst in Defense Acquisition**

**Congressional Research Service**

**submitted to**

**Senate Armed Services Committee**

**U.S. Senate**

**March 3, 2009**

Chairman Levin, Ranking Member McCain, and distinguished members of the committee, thank you for the opportunity to submit written remarks on behalf of the Congressional Research Service (CRS) to be included in the hearing record. As requested, this statement examines acquisition reform and options that Congress may choose to consider to improve the defense acquisition system. Specifically, this statement focuses on

- the Nunn-McCurdy Act as a mechanism for tracking and managing cost growth.
- unrealistic cost estimates as a driver of cost growth.
- programs that have high cost growth risks.

### **The Nunn-McCurdy Act as a Mechanism for Tracking and Managing Cost Growth**

For 25 years, the Nunn-McCurdy Act has served as one of the principal mechanisms for notifying Congress of cost overruns in Major Defense Acquisition Programs. The act's origins can be traced back to May 14, 1981, when Senator Sam Nunn rose to the floor of the Senate and offered a floor amendment requiring the Department of Defense (DOD) to notify Congress if, in Fiscal Year (FY) 1982, total program acquisition unit costs for any Major Defense Acquisition Program (MDAP)<sup>1</sup>, under certain circumstances, exceeded 15% or 25%.<sup>2</sup> The amendment was included in the Department of Defense Authorization, 1982.<sup>3</sup>

That same year, Representative Dave McCurdy, then chairman of the House Armed Services Committee Special Panel on Defense Procurement Procedures, held a series of hearings examining weapon system cost growth.<sup>4</sup> Together, Senator Nunn and Representative McCurdy successfully led the effort to pass the Nunn-McCurdy Act, which perpetuated the requirement that DOD notify Congress when cost overruns exceed certain thresholds.<sup>5</sup>

### **Nunn-McCurdy Provides Congress Improved Visibility into Cost Growth**

The Nunn-McCurdy thresholds are based on a comparison between a program's actual costs and the current baseline estimate<sup>6</sup> or the original baseline estimate.<sup>7</sup> As shown in **Table 1**, a

<sup>1</sup> A Major Defense Acquisition Program (MDAP) is a program estimated to require research, development, test, and evaluation (RDT&E) costs of more than \$365 million or procurement costs of more than \$2.190 billion (in FY 2000 constant dollars). In 1983, the procurement cost of a program had to be one billion dollars (in FY1980 constant dollars) to be considered an MDAP.

<sup>2</sup> Specifically, the amendment required DOD to notify Congress if total program acquisition unit costs for any MDAP for which no procurement funds were authorized increased by more than 15%, and total program acquisition unit cost for any MDAP or current unit acquisition cost increased by more than 25%. See: *Congressional Record* May 14th, 1981 pg. S. 5014-15.

<sup>3</sup> 95 Stat. 1129. See: *Congressional Record* May 14th, 1981 pg. S. 5016.

<sup>4</sup> U.S. Congress, House Armed Services Committee, Special Panel on Defense Procurement Procedures, *House Armed Services Hearings*, Vol. 11, 97th Cong., 1st sess. (Washington: GPO, 1981), p. 1.

<sup>5</sup> See, Department of Defense Authorization Act, 1983 (96 Stat. 718).

<sup>6</sup> A current baseline estimate is defined as the cost of the entire program, including research, development, test, & evaluation (RDT&E), and procurement. See: 10 U.S.C. § 2435(a). The baseline estimate is part of the Acquisition Program Baseline (APB). The APB "contains the most important cost, schedule, and performance parameters (both objectives and thresholds) for the program. It is approved by the Milestone Decision Authority (MDA), and signed by (continued...)"

“significant” Nunn-McCurdy breach occurs when the Program Acquisition Unit Cost (PAUC) or the Procurement Unit Cost (PUC) increases 15% or more over the current baseline estimate or 30% or more over the original baseline estimate.<sup>8</sup> A “critical” breach occurs when the PAUC or PUC increases 25% or more over the current baseline estimate or 50% or more over the original baseline estimate.

**Table 1. Nunn-McCurdy Breach Thresholds**

	Significant Breach	Critical Breach
Current Baseline Estimate	≥15%	≥25%
Original Baseline Estimate	≥30%	≥50%

Source: 10 U.S.C. § 2433.

When a Nunn-McCurdy breach occurs, DOD must submit a Selected Acquisition Report (SAR) to Congress, which includes cost, schedule, and performance information.<sup>9</sup> In the event of a critical breach, the Secretary of Defense must assess the program to determine the cause of the cost growth, project the cost of completing the program (with and without requirement modifications), and assess reasonable alternatives to the existing system. After the reassessment, for the program to continue uninterrupted, the Secretary of Defense must certify to Congress that the program is essential to national security; there is no viable alternative to the program; the new cost estimate is reasonable; and the management structure is sufficient to control cost growth.

### Nunn-McCurdy Does Not Require Reporting on Operations & Support Costs

The Nunn-McCurdy Act does not apply to all elements of a weapon system’s life-cycle costs. For example, the Act does not apply to costs incurred during operations, support, or disposal.<sup>10</sup> Analysts have estimated that Operations & Support (O&S) costs account for two-thirds or more of a system’s total life-cycle cost.<sup>11</sup> Weapon systems have experienced O&S cost growth as well

(...continued)

the program manager (PM) and his/her direct chain of supervision...” See: [competitivesourcing.navy.mil/reference\_documents/defs.cfm]. Last visited Nov. 6, 2008.

<sup>7</sup>An original baseline estimate is defined as the baseline estimate established prior to the program entering “system development and demonstration”, also known as “Milestone B”, or at program initiation, whichever occurs later. See: 10 U.S.C. § 2435(d).

<sup>8</sup> PAUC is defined as the total cost of development, procurement, and construction divided by the number of units. PUC is defined as the total procurement cost divided by the number of units. Program acquisition unit cost and procurement unit cost are defined in 10 U.S.C. § 2432(a).

<sup>9</sup> 10 U.S.C. § 2433. A Selected Acquisition Report “reports the status of total program cost, schedule, and performance, as well as program unit cost and unit cost breach information. For joint programs, the SAR reports the information by participant. Each SAR will include a full, life-cycle cost analysis for the reporting program, each of its evolutionary increments, as available, and for its antecedent program, if applicable.” See *Defense Acquisition Guidebook*, [https://akss.dau.mil/DAG/Guidebook/IG\_c10.9.2.asp]. Last visited Nov. 7, 2008.

<sup>10</sup> Operations and support costs are funded from Military Personnel, Operations and Maintenance, Procurement, and occasionally RDT&E appropriations.

<sup>11</sup> Walt Cooper, *O&S Trends and Current Issues*, Office of the Secretary of Defense, Cost Analysis Improvement Group, Washington, D.C., May 2007. See also, Office of the Under Secretary of Defense For Acquisition, Technology, and Logistics, *Report of the Defense Science Board on Developmental Test & Evaluation*, Washington, D.C., May 2008, p. 22.

as acquisition cost growth. Cost growth in O&S costs can reduce the funds available to acquire new or upgrade existing weapon systems. Given the costs associated with operations and support, Congress may want to consider applying Nunn-McCurdy type reporting requirements to O&S costs. This might entail changes in DOD's cost estimating procedures and other elements of the acquisition process.

Many of the decisions that determine O&S costs are made early in the acquisition process — prior to significant O&S costs being incurred. Because O&S costs are not incurred until much later in the life-cycle, these costs may not always get the same attention as acquisition costs at Milestone B (the engineering and manufacturing development and demonstration phase) and Milestone C (the production and deployment phase). Decisions made at these key decision points could result in lower acquisition costs at the expense of higher long term O&S costs — and ultimately higher overall life-cycle costs.

DOD has made efforts to improve how it tracks and estimates O&S costs. DOD and each military service tracks O&S costs through the Visibility and Management of Operating and Support Costs (VAMOSOC) program. And in October 2007, the Office of the Secretary of Defense, Cost Analysis Improvement Group also issued an *Operating and Support Cost Estimate Guide*.<sup>12</sup> Applying Nunn-McCurdy type of reporting requirements to O&S costs might help Congress set its budgetary priorities as well as gather and track cost data for future analysis. Another option for Congress would be to require an independent cost assessor to include in an annual report to Congress a comparison of original O&S cost estimates to current actual costs (adjusted for inflation) for ongoing programs. The extent to which these options may be viable depends on the reliability of the data available. Without good cost data on O&S costs, DOD and Congress may not have important information upon which to make budget decisions.

#### **Nunn-McCurdy as a Mechanism for Managing Cost Growth**

The Nunn-McCurdy Act, (10 U.S.C. 2433) is basically a “reporting requirement for programs” experiencing cost overruns, and is generally not structured to help manage programs or allocate funds.<sup>13</sup> Early proponents of Nunn-McCurdy believed that requiring DOD to report on cost growth would suffice because public exposure of cost overruns would force DOD to rein in cost growth in weapons programs.<sup>14</sup> Senator John Tower, then Chairman of the Senate Armed Services Committee, expressed a somewhat different view, stating more than 25 years ago that notifying Congress only after cost growth had occurred is like “closing the gate after the horse has galloped off into the boondocks.”<sup>15</sup>

<sup>12</sup> Office of the Secretary of Defense, Cost Analysis Improvement Group, *Operating and Support Cost Estimating Guide*, October 2007.

<sup>13</sup> See [<http://www.eia.org/news/pressreleases/2006-04-26.268.phtml>]. Last visited 12/23/2008.

<sup>14</sup> As Representative McCurdy explained, “The assumption behind the Nunn-McCurdy provision of the fiscal 1983 defense authorization bill was that the prospect of an adverse reaction from the Office of Management and Budget, Congress, or the public would force senior Pentagon officials to address the question of whether the program in question — at their newly reported, higher costs — were worth continuing.” See [<http://www.eia.org/news/pressreleases/2006-04-26.268.phtml>]. Last visited 12/23/2008.

<sup>15</sup> *Congressional Record* May 14n, 1981 pg. S. 5012.



Generally, a Nunn-McCurdy breach does not result in a program being cancelled. However, there have been some exceptions. For example, in July 2008, Congress was notified that the Armed Reconnaissance Helicopter (ARH) program had suffered a critical Nunn-McCurdy breach. In response, John Young, Under Secretary of Defense for Acquisition, Technology, and Logistics, in consultation with senior Army officials, cancelled the ARH program. Secretary of the Army Pete Geren justified the cancellation, stating that "The cost and schedule that were the focus of the decision to award the contract to Bell Helicopter are no longer valid. We have a duty to the Army and the taxpayer to move ahead with an alternative course of action to meet this critical capability for our soldiers at the best price and as soon as possible."<sup>16</sup>

In spite of Nunn-McCurdy and other defense acquisition reform efforts, DOD acquisition programs have continued to experience cost growth. GAO recently reported that 44% of programs in the FY2007 portfolio experienced acquisition unit cost growth of at least 25%, compared with 37% of programs experiencing such cost growth in the FY2000 portfolio.<sup>17</sup> GAO also reported that the total acquisition costs for MDAPs in the FY2007 portfolio increased 26% from first cost estimates, compared with a 6% increase in 2000.<sup>18</sup>

Some analyses show that the size of cost overruns have grown over time and may continue into the foreseeable future.<sup>19</sup> According to a RAND study, over the past 50 years, annual cost escalation rates for amphibious ships, surface combatants, attack submarines, and nuclear aircraft carriers have ranged from 7% to 11%, and the annual cost escalation rate for U.S. fighter aircraft was about 10%.<sup>20</sup> The combination of increased costs for individual systems and increased cost growth make it more difficult for DOD to develop an acquisition strategy that stays within budget while simultaneously allowing the United States to maintain the forces that it needs to meet future challenges.

Some analysts argue that acquisition reform may not succeed until policies are adopted that consistently punish programs or contractors for failing to perform. Some of these analysts have called for strengthening Nunn-McCurdy as a vehicle to manage MDAPs.<sup>21</sup>

<sup>16</sup> Department of Defense, "DoD Announces Non-Certification Of Armed Reconnaissance Helicopter Program," press release, October 16, 2008, <http://www.defenselink.mil/releases/release.aspx?releaseid=12288>.

<sup>17</sup> Ibid.

<sup>18</sup> Government Accountability Office. Defense Acquisitions: Assessments of Selected Weapons Programs. GAO-08-467SP. March 31, 2008. Highlights Page.

<sup>19</sup> For example, one analysis found that "cost overruns are increasing by an average of 1.86 percentage points per year. If this trend is allowed to continue, the analysis suggests that in 10 years the average overrun will exceed 56 percent...." See: Deloitte Consulting LLP, *Can We Afford Our Own Future? Why A&D Programs are Late and Over-budget — and What Can Be Done to Fix the Problem*, 2008, p. 2.

<sup>20</sup> Mark V. Arena, Irv Blickstein, and Obaid Younossi, et al., *Why Has the Cost of Navy Ships Risen? A Macroscopic Examination of the Trends in U.S. Naval Ship Costs Over the Past Several Decades*, RAND Corporation, 2006, p. xiv.

<sup>21</sup> For example, Clark Murdock of the Center for Strategic and International Studies, has been quoted as calling for a "Nunn-McCurdy on steroids that really punishes programs that have failed." See: Christopher J. Castelli, "DEFENSE: Acquisition Shop Prepares for Shift in Administrations," *Inside Missile Defense*, November 5, 2008, Vol. 14, No. 23.

## Unrealistic Cost Estimates as a Driver of Cost Growth and Nunn-McCurdy Breaches

For some 30 years, various DOD officials, analysts, and industry officials have argued that a primary cause of cost growth in DOD acquisitions is unrealistically low cost estimates.<sup>22</sup> Unrealistically optimistic cost estimates can make future cost growth almost inevitable. Michael Gilmore of the Congressional Budget Office recently stated when discussing overly optimistic cost estimates, “no program manager in the world is going to be able to manage the program in such a way that the costs will not grow... it’s not really so much cost growth as cost realism setting in.”<sup>23</sup> Such unrealistically low cost estimates set the stage for future Nunn-McCurdy breaches.

In 2006, Gary Payton, Air Force Deputy Under Secretary for Space Programs, made a direct link between unrealistically optimistic estimates and Nunn-McCurdy breaches. In a presentation entitled *Nunn-McCurdy’s Aren’t Fun*, he argued that “Unbridled optimism regarding cost, schedule, performance, and risks is a recipe for failure.”<sup>24</sup> As set forth in the presentation,

Understated costs leads to lower budget → leads to industry bidding price less than budget  
→ leads to lower award price → leads to government repeatedly changing scope, schedule,  
budget profile → leads to five to ten years later recognition “real” cost multiple of bid →  
leads to Nunn-McCurdy Breach.

GAO has also linked optimistic cost estimates with significant cost growth, finding that “the Navy tends to underestimate the costs needed to construct ships — resulting in unrealistic budgets and large cost increases after ship construction has begun.”<sup>25</sup>

### Why Cost Estimates Are Sometimes Unrealistically Optimistic

Senior Defense officials, past and current, acknowledge that program advocates have strong incentives to underestimate program acquisition costs. Contractors use low cost estimates to win the contract; program representatives use low estimates to argue for approval of the system against competing systems.<sup>26</sup> In 1981, then Deputy Secretary of Defense Frank C. Carlucci, testified, low cost estimates “are fueled by optimistic contractor proposals to win competitions

<sup>22</sup> Poor cost estimating was a recurring theme during the McCurdy hearings. For example, then Director of the Program Analysis and Evaluation Office, Maj. Gen. Patrick M. Roddy stated that there are three fundamental cost growth drivers, inflation, poor cost estimating, and scheduling. GAO stated “Cost estimating is probably the key ingredient in reducing cost growth...As far back as the early 1970’s, GAO has reported that both planning and development cost estimates on Federal acquisitions in many cases are quite optimistic...unrealistically low contractor and agency estimates on the front end aggravates cost growth. What is needed is more candor up front in presenting programs to the Congress and not promising more than can be realistically delivered.” And then Deputy Secretary of Defense Frank C. Carlucci, in a written statement to Congress, stated that “early cost, schedule, and performance estimates are overly optimistic”. See: House Armed Services Hearings, 97th Cong., 1st Sess., Volume 11, 1981. Op. Cit. P. 74, 1009, and 1085, respectively.

<sup>23</sup> U.S. Congress, House Committee on the Budget, *Long-Term Sustainability of Current Defense Plans*, 111th Cong., 1st sess., February 4, 2009.

<sup>24</sup> See [<http://www.dtic.mil/ndia/2006systems/Wednesday/payton.pdf>], p. 10. Last visited December 23, 2008.

<sup>25</sup> Government Accountability Office. DEFENSE ACQUISITIONS: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs. GAO-07-943T. July 24, 2007, p. 17.

<sup>26</sup> See: House Armed Services Hearings, 97th Cong., 1st Sess., Volume 11, 1981. Op. Cit. p. 883.

and program managers who want to see their programs funded.”<sup>27</sup> In a memo dated January 30, 2009, John Young echoed this sentiment, stating “the enterprise will often pressure acquisition teams and industry to provide low, optimistic estimates to help start programs.”<sup>28</sup>

There seems to be little disincentive for contractors or program representatives to use unrealistic cost estimates. With some notable exceptions, programs rarely get cancelled as a result of cost growth. Michael J. Busch, Director, Contracts and Proposals for Williams International, stated at the 1981 McCurdy hearings, “I...would not give contracts to contractors who had cost overruns of substantial size that were attributed to poor cost and schedule management...No, I would not continue to give contracts to somebody who can’t perform.”<sup>29</sup> Many analysts agree, arguing that cost estimates will generally continue to be unrealistically low until a policy is adopted that consistently punishes programs — and contractors — for relying on unrealistic cost estimates. Given the contraction in the defense industrial base and the limited number of companies able to produce certain weapons systems, some analysts questions how contractors could be effectively punished for failing to use realistic cost estimates or stay within budget.

### **Injecting More Realism in Cost Estimates and Strengthening Nunn-McCurdy**

The extent to which cost estimates are useful depends in part on the reliability of the cost estimates. The absence of reliable cost estimates may put Congress in the position of having to decide on budget priorities with potentially inadequate information upon which to base its decisions. One method of evaluating the reliability of a cost estimate is to develop a confidence level, which is generated by conducting uncertainty analyses that measure the probability of cost growth. Programs with a 50 percent confidence level have a 50 percent chance of staying within the estimated cost; programs with an 80 percent confidence level have an 80 percent chance of staying with the estimated costs. Another option Congress may consider would be to obtain the confidence levels of MDAP cost estimates and ensure that the confidence levels are developed using best practices.

Another option that Congress may consider would be to require an independent cost assessor to establish guidance on generating and requiring the disclosure of confidence levels and monitor cost estimates and analyses performed by DOD. Congress may also consider requiring an independent cost assessor to include in an annual report to Congress a comparison of DOD cost estimates and confidence levels, independent cost estimates and confidence levels, and actual MDAP costs. Such a report could provide Congress with a single source for measuring the effectiveness of cost estimates and confidence levels in predicting MDAP costs.

### **Relying on Cost Estimates and a Knowledge-Based Approach for Key Decision Points**

Another factor contributing to poor cost estimates is basing such estimates on inadequate knowledge as a result of immature technologies or design. John Young wrote in a recent memo

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<sup>27</sup> House Armed Services Hearings, 97<sup>th</sup> Cong., 1<sup>st</sup> Sess., Volume 11, 1981. Op. Cit. p. 1086.

<sup>28</sup> John J. Young, Jr., *Reasons for Cost Changes for Selected Major Defense Acquisition Programs (MDAPs)*, Memorandum, January 30, 2009.

<sup>29</sup> House Armed Services Hearings, 97<sup>th</sup> Cong., 1<sup>st</sup> Sess., Volume 11, 1981. Op. Cit. p. 653.

that low initial estimates are made based on inadequate knowledge.<sup>30</sup> Some analysts argue that as weapon systems have become increasingly complex, a knowledge-based approach has become more critical to developing realistic cost estimates. GAO recently reported that in approximately 60% of the programs it assessed, DOD lacked the knowledge necessary to “reasonably estimate the cost and time it would take to develop and produce the product.”<sup>31</sup>

Milestone B is when programs enter engineering and manufacturing development. According to a RAND study, cost growth for completed programs was 46% from Milestone B, compared to 16% from Milestone C, when programs enter the production and deployment phase.<sup>32</sup> John Young recently stated that a major driver of cost growth is programs passing milestone B with inadequate knowledge, including immature technologies, immature design, and fluid requirements.<sup>33</sup> Some of the programs he identified include

1. Joint Strike Fighter (insufficient understanding of design),
2. V-22 (immature technology),
3. Family of Medium Tactical Vehicles (design flaws), and
4. LPD-17 (flawed lead ship design process).

Allowing programs to proceed through Milestone B and other key points without sufficient knowledge increases the likelihood that cost estimates will be unrealistically optimistic and that programs will fail to stay on budget and on schedule.

One option Congress may consider is to require that MDAPs complete a preliminary design review (PDR) and a post-PDR assessment prior to Milestone B approval and that technological maturity and integration risks be rigorously assessed earlier in the acquisition process. The extent to which such options may prove to be effective may hinge, in part, on the extent to which programs will not be allowed to proceed if they fail to meet established benchmarks. As discussed above, John Young acknowledged that a major driver of cost growth is prematurely allowing programs to pass through key decision points and program reviews.

#### **Other Drivers of Cost Growth**

A number of other factors are drivers for cost growth in defense acquisitions. These factors include programs not getting stable funding, contracts that are awarded without full and open competition, insufficient testing early in the acquisition process, requirements creep, and poor contractor management and oversight. Each of these factors can undermine a program’s ability to execute on time and within budget. For example, adding requirements to a program after a cost estimate has been completed will likely undermine the realism of the estimate because the assumptions upon which the estimate is based are no longer valid. Similarly, early developmental

<sup>30</sup> John J. Young, Jr., *Reasons for Cost Changes for Selected major Defense Acquisition Programs (MDAPs)*, Memorandum, January 30, 2009.

<sup>31</sup> Government Accountability Office. DEFENSE ACQUISITIONS: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs. GAO-07-943T. July 24, 2007, p. 5.

<sup>32</sup> Mark V. Arena, Obaid Younossi, and Lionel A. Galway, et al., *Impossible Certainty Cost Risk Analysis for Air Force*, RAND National Defense Research Institute, 2006, p. xx.

<sup>33</sup> John J. Young, Jr., *Reasons for Cost Changes for Selected major Defense Acquisition Programs (MDAPs)*, Memorandum, January 30, 2009.

testing can identify flaws in a system early on in development. Generally, it is cheaper to identify and fix problems early in the acquisition process. The proposed bill seeks to address some of these issues by requiring DOD reestablish the position of Director of Developmental Testing and requiring military departments to assess their developmental testing capabilities. These requirements could result in a more robust testing capability earlier in the acquisition process. Such early testing may provide decision makers with critical information at key decision points.

### Programs That Have High Cost Growth Risks

Congress may consider putting in place a process for providing a higher level of scrutiny for programs that are considered high risk programs. Secretary of Defense Robert Gates testified that big-ticket items are the primary driver of overall cost growth, stating that “five programs account for more than half of total cost growth.”<sup>34</sup> Among the programs that he identified as having problems were those that either involved new technologies or were among the most expensive, including the V-22 Osprey, Future Combat Systems, and Joint Strike Fighter.

One category that could be considered high risk is those programs that involve significant leaps in technology. For example, the components or complimentary programs of the Future Combat System that have experienced significant cost growth, such as the Joint Tactical Radio System and Warfighter Information Network-tactical, contained the most significant leaps forward in technology. And the VH-71 presidential helicopter had a Nunn-McCurdy breach, in part, because it sought to incorporate dramatically improved capabilities.

Another category that could be considered high risk is DOD’s most expensive programs; even moderate cost growth on high-dollar programs can jeopardize other DOD acquisition programs. For example, an average of 10% cost growth in DOD’s ten most expensive acquisition programs would amount to cost overruns of approximately \$19 billion, or 13.5% of the funding required to execute the remaining 85 programs (see Table 2).

**Table 2. Planned RDT&E and Procurement Funding for MDAPs**

(in Billions)

	FY2008	FY2009	FY2010	FY2011	FY2012	Total
Funding for Top 10 MDAPs	\$39.1	\$40.6	\$37.3	\$35.2	\$42.0	194.2
Funding for remaining 85 MDAPs	\$33.2	\$31.5	\$26.9	\$25.4	\$24.1	141.1
Top 10 MDAPs as a percentage of total funding	54%	56%	58%	58%	64%	58%

Source: Government Accountability Office.

Notes: Data as of December 2006. Figures in FY2008 dollars.

Given the impact that cost growth on high-risk or high-value programs can have on DOD’s overarching acquisition strategy, one option for Congress would be to require DOD to take a more cautious risk-management approach to such programs. For example, Congress could require DOD to budget for certain programs at a higher confidence level, an option that has been raised in various forms by a number of observers, including the Defense Acquisition Performance

<sup>34</sup> U.S. Congress, Senate Committee on Armed Services, *Challenges Facing the Department of Defense*, 111th Cong., 1st sess., January 27, 2009, p. 11.

Assessment Panel and GAO.<sup>35</sup> Alternatively, DOD and an independent cost assessor could be required to submit to Congress, concurrent with a budget request, not only the confidence level for the current cost estimate, but what the cost estimate would be at an 80% confidence level.<sup>36</sup> Providing Congress with a range of cost estimates and associated confidence levels may give Congress more insight into the a program's potential cost growth—and potential risk.

An additional option that Congress may consider would be to require high-risk programs to pursue a more conservative development process. For example, such programs could generally more strictly enforce a requirement that programs pursue a spiral development strategy, an approach that may reduce the risks associated with the development of weapons systems containing a number of new technologies. Another option would be to require high-risk programs to achieve a high-level of technology development before being approved for Milestone B. As Air Force Secretary Michael Donely was recently quoted as saying, "too many of our weapon programs take on high levels of technical risk in development...[we must] "take a more cautious approach to new starts."<sup>37</sup>

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<sup>35</sup> See Lieutenant General Ronald Kadish, USAF (Ret), Dr. Gerald Abbott, and Mr. Frank Cappuccio, et al., *Defense Acquisition Performance Assessment Report*, Defense Acquisition Performance Assessment Project, January 2006, p. 13; U.S. Government Accountability Office, *Defense Acquisitions: Realistic Business Cases Needed to Execute Navy Shipbuilding Programs*, GAO-07-943T, July 24, 2007, p. 17.

<sup>36</sup> Using an 80% level was proposed by the *Defense Acquisition Performance Assessment Report*.

<sup>37</sup> Marina Malenic, "USAF Must Take More Cautious Approach To New Weapon Programs, Top Official Says," *Defense Daily*, February 27, 2009, p. 3.

April 17, 2006



## **Human Capital**

Report on the DoD Acquisition  
Workforce Count  
(D-2006-073)

Department of Defense  
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COR	Contracting Officer's Representative
DACM	Director Acquisition Career Management
DCC-W	Defense Contracting Command-Washington
DLA	Defense Logistics Agency
DMDC	Defense Manpower Data Center
DoD IG	Department of Defense Inspector General
GAO	Government Accountability Office
IGCE	Independent Government Cost Estimate
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics





DEPARTMENT OF DEFENSE  
 OFFICE OF THE DEPUTY INSPECTOR GENERAL  
 AND AUDIT AGENCY  
 ACQUISITION, TECHNOLOGY, PERSONNEL, AND READINESS

April 17, 2006

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION,  
 TECHNOLOGY, AND LOGISTICS  
 UNDER SECRETARY OF DEFENSE FOR PERSONNEL  
 AND READINESS  
 AUDITOR GENERAL, U.S. ARMY AUDIT AGENCY

SUBJECT: Report on the DoD Acquisition Workforce Count  
 (Report No. D-2006-073)

We are providing this report for review and comment. We received comments on a draft of this report from the Director, Human Capital Initiatives, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics; the Director, Army Contracting Agency; the Director, Defense Manpower Data Center; and the Military Deputy, Office of the Assistant Secretary of the Air Force (Acquisition). We considered the management comments when preparing the final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. Defense Management Data Center comments to Recommendation A.2. were partially responsive. As a result of management comments from the office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, we renumbered draft report Recommendation A.1.b(2) as final report Recommendation A.3., and redirected it to the Under Secretary of Defense for Personnel and Readiness to respond in coordination with the Office of the Under Secretary of Defense for Acquisition Technology and Logistics. We request Defense Management Data Center comments on Recommendation A.2. and Under Secretary of Defense (Personnel and Readiness) comments on Recommendation A.3. by June 1, 2006.

If possible, please send management comments in electronic format (Adobe Acrobat file only) to [Audcm@dodig.mil](mailto:Audcm@dodig.mil). Copies of the management comments must contain the actual signature of the authorizing official. We cannot accept the / Signed / symbol in place of the actual signature. If you arrange to send classified comments electronically, they must be sent over the SECRET Internet Protocol Router Network (SIPRNET). We appreciate the courtesies extended to the staff. Questions should be directed to Ms. Kimberley A. Caprio at (703) 604-9202 (DSN 664-9202) or Mr. Benjamin A. Mehlman at (703) 604-9291 (DSN 664-9291). See Appendix E for the report distribution. The team members are listed inside the back cover.

By direction of the Deputy Inspector General for Auditing:

Richard B. Joffe  
 Assistant Inspector General  
 Acquisition and Contract Management

**Department of Defense Office of Inspector General****Report No. D-2006-073****April 17, 2006**

(Project No. D2005-D000CB-0181)

**DoD Acquisition Workforce Count****Executive Summary**

**Who Should Read This Report and Why?** Service acquisition executives, program managers, DoD contracting officials, and personnel with interest in the DoD acquisition workforce should read this report. This report addresses the DoD acquisition workforce count and congressional reporting as well as related contract administration and surveillance.

**Background.** The DoD acquisition workforce is subject to two methods of counting and congressional reporting. The first method, known as the "Acquisition Organization" workforce counting approach, was used by the 1986 President's Blue Ribbon Commission on Defense Management (the Packard Commission) and counts all personnel employed in 22 designated DoD acquisition organizations as part of the acquisition workforce, regardless of an employee's occupation. As of September 30, 2004, there were 206,653 civilian and military personnel included in the 22 designated DoD acquisition organizations. The second acquisition workforce counting method is known as the "Refined Packard" approach. In May 1997, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics contracted with Jefferson Solutions, a division of Jefferson Consulting Group, to review alternative ways of identifying the acquisition workforce. In September 1997, Jefferson Solutions reported to the Office of the Under Secretary a proposed Refined Packard acquisition workforce methodology of combining occupational and organizational data for identifying those in the workforce. In a December 18, 1997, letter, the Secretary of Defense forwarded the Jefferson Solutions report to Congress and stated that, beginning October 1, 1998, members of the acquisition workforce would be uniformly identified using the Refined Packard model. While accepting the new approach, the House Armed Services Committee requested that DoD continue to report the Acquisition Organization workforce count in conjunction with the Refined Packard count.

As of September 30, 2004, there were 134,602 civilian and military personnel included in the DoD Refined Packard count. Of the 134,602 personnel in the Refined Packard workforce count, 69 percent (92,588) were assigned and included in the DoD Acquisition Organization count, while 31 percent (42,014) of the DoD Refined Packard workforce were assigned outside the 22 major DoD acquisition organizations. The Refined Packard model removed 55 percent (114,065) of the 206,653 personnel included in the Acquisition Organization count because those personnel perform non-acquisition support functions, such as firefighting, police, human resources, administration, accounting, legal, engineering technicians, supply, transportation, and trades (such as equipment and facilities operations and maintenance).

**Results.** DoD annually reports to Congress a count of its acquisition workforce as compiled by the Defense Manpower Data Center through application of the Refined Packard method. The FY 2004 and prior Refined Packard workforce counts were

unverifiable. As a result, DoD acquisition workforce planning risks, including for the Quadrennial Defense Review, could increase because annual Refined Packard workforce support and expenditures may be based on unreliable data and may not accurately reflect the true DoD acquisition workforce (finding A). Defense Manpower Data Center management controls for the acquisition workforce counting process were not adequate to ensure the count reflects the true DoD acquisition workforce. Implementing our recommendations will improve Defense Manpower Data Center acquisition workforce counting procedures.

The Defense Contracting Command-Washington did not properly negotiate or administer support service contract DASW01-03-F-0393 with Jefferson Solutions. In addition, the contracting officer representative approved Jefferson Solutions monthly invoices without requesting written support of services performed, hours expended, or products provided. As a result, the Government is not assured that fair and reasonable prices were negotiated with Jefferson Solutions, nor that work performed by Jefferson Solutions in identifying and reporting the Refined Packard workforce was done properly for the time and materials expended or that Government resources were used economically (finding B).

**Recommendations.** We recommend that the Director, Defense Procurement and Acquisition Policy develop and implement written standard operating procedures and guidance for defining and counting the acquisition workforce, methodologies used to perform periodic workforce counts, and requirements to maintain and support acquisition workforce count documentation; and revise DoD Instruction 5000.55 to ensure consistent acquisition workforce information format and reporting from the DoD Components. We also recommend that the Under Secretary of Defense for Personnel and Readiness in coordination with the Under Secretary of Defense for Acquisition, Technology, and Logistics revise the instruction to estimate contractor equivalents that support the DoD acquisition workforce, and include such estimates as supplementary annual DoD acquisition workforce reporting data to Congress. We recommend the Director, Defense Manpower Data Center develop a knowledge management program to maintain corporate knowledge of Defense Manpower Data Center information systems and processes. We recommend that the Commander, Defense Contracting Command-Washington ensure that acquisition workforce count contracts supporting Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics components require written contractor monthly progress reports.

**Management Comments and Audit Response.** Management concurred with recommendations to develop and implement written standard operating procedures and guidance for defining and counting the acquisition workforce, methodologies used to perform periodic workforce counts, and requirements for acquisition workforce count documentation; and to revise DoD Instruction 5000.55 to ensure consistent acquisition workforce information format and reporting from the DoD Components. Management also concurred with the recommendation to ensure that acquisition workforce count contracts supporting the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics components require written contractor monthly progress reports. We request by June 1, 2006, the Under Secretary of Defense for Personnel and Readiness comment regarding the redirected recommendation to revise DoD Instruction 5000.55 to estimate contractor equivalents that support the DoD acquisition workforce, and that the Director, Defense Manpower Data Center provide additional comments regarding the recommendation to develop a knowledge management program to maintain corporate knowledge of Defense Manpower Data Center information systems and processes.

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## Background

During the last 15 years, DoD has experienced significant challenges and expectations regarding its acquisition workforce due to declining number of workers, while the workload and the demand for technical expertise and skill sets are increasing. The National Defense Authorization Act for Fiscal Year 1996, section 906 (Public Law 104-106) implements a plan to restructure the DoD acquisition organization by reducing the number of civilian and military personnel employed or assigned to acquisition organizations by 25 percent over a 5-year period and to eliminate duplication of functions among existing acquisition organizations. However, from FY 1999 through FY 2004, the total DoD procurement dollars increased 78 percent (from \$135 billion to \$241 billion) and total DoD procurement actions increased 14 percent (from 5.8 million to 6.6 million).

**Strategic Planning for the DoD Acquisition Workforce.** On September 27, 2005, the Under Secretary for Defense for Acquisition, Technology, and Logistics (USD(AT&L)) stated in testimony to the Senate Committee on Armed Services that his office initiated a comprehensive review of the acquisition workforce. It will have a DoD acquisition workforce strategic plan in place no later than 120 days after the completion of the Quadrennial Defense Review. The USD(AT&L) stated that the strategic plan would incorporate the National Security Personnel System and would be aligned with Quadrennial Defense Review results and analysis of the current acquisition workforce and evolving workload requirements, such as service contracts and contingency operations. The USD(AT&L) noted that a thoughtful acquisition workforce strategic plan would define processes and tools to assess workforce capability and to tactically recruit, develop, and retain the right talent, with emphasis on smart execution and implementation.

The USD(AT&L) noted that the DoD acquisition workforce has had to contend from FY 1998 through FY 2004 with a 105 percent increase in constant DoD contracting dollars and a 58 percent increase in contracting actions over \$100,000, which are often the most complex. The USD(AT&L) noted that the average age of the DoD civilian workforce is 46.7 years old and the number of workforce members with 30 or more years of experience continues to increase. Therefore, DoD will face losing a significant amount of acquisition workforce knowledge, experience, and capability. The USD(AT&L) also expressed concern about an impending talent gap created by a 10-year acquisition workforce drawdown, but noted that DoD has taken measures to alleviate the talent gap through Defense Acquisition University development of increased on-line and on-site acquisition training and the establishment of a Web-based acquisition Community of Practice system.

**Defense Acquisition Workforce Improvement Act.** The 1990 Defense Acquisition Workforce Improvement Act (section 1701-1764, title 10, United States Code) (the Act). The Act was enacted to improve the effectiveness of the civilian and military acquisition workforce through enhanced education, training, and career development, and thereby improve the acquisition process. The Act requires DoD to establish formal career paths for those people who want to pursue careers in acquisition. DoD has accomplished this by dividing acquisition positions into 11 categories and establishing a formal certification process. The Act requires each of the Military Services to designate a Director, Acquisition Career Management (DACM) to oversee implementation of the Act's

requirements. The Defense Acquisition University is required to designate a "Fourth Estate" DACM to oversee implementation of the Act's requirements at Defense agencies and DoD field activities.

**Acquisition Workforce Counting Methods.** Acquisition workforce counts support DoD acquisition workforce planning and estimating expenditures for workforce training and development, as well as annual congressional reporting. The Senate and House Armed Services Committees used two formats to count the DoD acquisition workforce. The first method, known as the "Acquisition Organization" workforce counting approach, counts all personnel employed in 22 designated DoD acquisition organizations as part of the acquisition workforce, regardless of an employee's occupation. See Appendix C for a list of the 22 acquisition organizations. The second method is known as the "Refined Packard," or the "Acquisition, Technology, and Logistics" workforce counting approach, which combines occupational and organizational data for identifying employees in the acquisition workforce.

**Workforce Counting Process.** The Office of the USD(AT&L) has designated the Defense Manpower Data Center (DMDC) as the lead office for conducting annual acquisition workforce counts. A May 13, 1999, USD(AT&L) policy memorandum, "Refined Packard Key Acquisition and Technology Workforce Identification Policy for the Fiscal Year 1999," designates the DMDC as the official database for the acquisition workforce personnel counts. The Military Services and the Defense agencies submit quarterly acquisition workforce count data to DMDC. The data are stored in a DMDC data repository. DMDC reviews, revises, and augments the data submissions by breaking out the submission by pay grades, certifications, and civilian and military components. For the Refined Packard count, DMDC is assisted by the AT&L contractor Jefferson Consulting Group (Jefferson Solutions), which creates an annual Refined Packard acquisition workforce count report. DMDC also creates an annual Acquisition Organization workforce count report. A USD(AT&L) component, the Office of the Director, Defense Procurement and Policy, exercises oversight over the workforce counting process.

**Military Services and Defense Logistics Agency Acquisition Workforce Counting Processes.** Guidance and processes used by the Military Services and the Defense Logistics Agency (DLA) to count and report the acquisition workforce vary greatly. All three services code their acquisition positions in individual Military Service personnel management information systems. Army acquisition positions are coded by the Office of the Director Acquisition Career Management (DACM), while the Navy and Air Force major commands code their acquisition positions. The coding creates the databases that serve as the basis for both the Acquisition Organization and the Refined Packard counts. The Military Services DACM staffs are responsible for the acquisition workforce count submitted to DMDC. DMDC makes an assessment of the acquisition workforce count and sends results back to the Army, Navy, and Air Force DACM staffs for review and correction. Individual Military Service DACM staffs send corrections back to DMDC, and DMDC submits the corrected totals for the inclusion to the Military Services Refined Packard count.

The DLA Customer Support Office in Columbus, Ohio, submits quarterly DLA Acquisition Workforce count data directly to DMDC. The Customer Support Office produces quarterly Acquisition Workforce counts through extraction of DLA Acquisition Personnel File records from the Defense Civilian Personnel Data System and use of DLA

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Acquisition Position Files. DMDC performs a match between the Acquisition Personnel File records and Acquisition Position File records; the results of that match become the DLA Refined Packard count. See Appendix D for a detailed explanation of the Military Services and DLA acquisition workforce counting processes, criteria, and counting systems.

**Acquisition, Technology, and Logistics Policy Memorandums.** The Office of the USD(AT&L) has issued several policy memorandums regarding conduct of annual acquisition workforce counts. An April 6, 2001, USD(AT&L) policy memorandum on “Assimilation of Newly Identified Personnel into the Acquisition and Technology Workforce” describes a process of coding designated acquisition and technology positions and personnel by position category career field into the Defense Civilian Personnel Data System and comparable military personnel systems. Subsequently, a November 21, 2003, policy memorandum on “Moratorium on Designated People and Positions as Part of the Defense Acquisition, Technology, and Logistics (AT&L) Workforce” imposes a plus or minus 1 percent change restriction on the number of Defense acquisition and support personnel to implement requirements of the FY 2004 National Defense Authorization Act. A November 9, 2005, policy memorandum on “Lifting of the Moratorium on Designating People and Positions as Part of the Defense Acquisition, Technology, and Logistics (AT&L) Workforce” rescinds the November 21, 2003, memorandum, and allows DoD components to resume designation of new positions that perform acquisition functions.

**DoD Instruction 5000.55, “Reporting Management Information on DoD Military and Civilian Acquisition Personnel and Position,” November 1, 1991.** DoD Instruction 5000.55 outlines the acquisition workforce personnel data submission requirements for both civilian and military personnel. The instruction establishes a management information system capable of providing standardized information on acquisition positions and on persons serving in acquisition positions. In addition, the instruction attempts to create a DoD-wide capability for monitoring, reporting, and tracking the composition, education, experience, and training status of the acquisition workforce and to establish uniform procedures for submitting manpower, personnel, and assignment information on selected DoD acquisition workforce civilian and military personnel. The instruction also establishes procedures for reporting functional and training-related data on selected DoD civilian and military personnel to evaluate the mandatory training requirements and status of the acquisition workforce. DoD Instruction 5000.55 designates DMDC as custodian of all automated records collected under the instruction and to provide data quality control, inquiry capabilities, and administrative and computer support. The instruction also requires DACMs to maintain documentation on the identification of DoD civilian and military acquisition positions.

**DoD Directive 5000.52, “Defense Acquisition, Technology, and Logistics Workforce Education, Training, and Career Development Program,” January 12, 2005.** The revised Directive updates policies and responsibilities for an education, training, and career development program for the acquisition workforce and establishes a single Acquisition Corps throughout DoD. This includes defining the responsibilities of the Offices of the Under Secretaries of Defense for Acquisition, Technology, and Logistics; Personnel and Readiness; Comptroller; and Intelligence; and for DoD Component Heads. The directive implements chapter 87 of title 10, United States Code on Defense Acquisition Workforce information systems, career development programs, and methods of identifying Refined Packard workforce positions.

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**DoD Instruction 5000.66, "Operation of the Defense Acquisition, Technology, and Logistics Workforce Education, Training, and Career Development Program," December 21, 2005.** The instruction implements DoD Directive 5000.52 and provides uniform guidance for managing acquisition workforce positions and career development. The instruction designates and identifies workforce positions; the attainment and maintenance of competencies through education, training, and experience; management of the Defense Acquisition Corps; selection and placement of personnel in acquisition positions; and workforce metrics. The instruction states that the USD(AT&L) will determine uniform policies and procedures for the acquisition workforce education, training, and career development programs and implement DoD issuances including a Desk Guide for workforce career management. On January 10, 2006, the Defense Acquisition University issued "A Desk Guide for Acquisition, Technology, and Logistics Workforce Career Management" (Desk Guide) to provide more detailed program guidance. The Desk Guide states that all acquisition workforce positions fall in 1 of the 15 categories and that positions can include part-time, temporary, and full-time Government civilian and military personnel.

### **Objectives**

The overall audit objective was to review the effectiveness of the DoD acquisition workforce. The specific objective was to review the impact on the DoD acquisition workforce of changes in workload requirements, contracting methods, and mandated workforce reductions. For purposes of this report, we address how effectively DoD identified personnel included in the acquisition workforce. The review of the management control program at major acquisition organizations as it relates to the acquisition workforce was also an announced objective.

### **Managers' Internal Control Program**

DoD Directive 5010.38, "Management Control (MC) Program," August 26, 1996, and DoD Instruction 5010.40, "Management Control (MC) Program Procedures," August 28, 1996, require DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

**Scope of the Review of the Management Control Program.** We reviewed the adequacy of DMDC management controls over the acquisition workforce counting process. Specifically, we reviewed DMDC management controls over annual acquisition workforce count standard operating procedures, including documented analysis or reconciliations of quarterly Military Service and Defense agency workforce count submissions. We reviewed management's self-evaluation applicable to those controls.

We also reviewed the adequacy of Army, Navy, Air Force, and DLA management controls over the acquisition workforce counting process. Specifically, we reviewed management controls over their operating procedures and methodology. Because we did not identify a material weakness, we did not assess management's self-evaluation.



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**Adequacy of Management Controls.** We identified a material management control weakness for DMDC as defined by DoD Instruction 5010.40. DMDC management controls for the acquisition workforce counting process were not adequate to ensure the count reflects the true DoD acquisition workforce. Implementing recommendations A.1. and A.2. will improve DMDC acquisition workforce counting procedures. A copy of the report will be provided to the senior official responsible for management controls in the Office of the Under Secretary of Defense for Personnel and Readiness.

Army, Navy, Air Force, and DLA management controls over the acquisition workforce counting process were adequate as they applied to the audit objective.

**Adequacy of Management's Self-Evaluation.** DMDC did not identify the acquisition workforce counting process as an assessable unit; therefore, DMDC did not identify or report the material management control weakness identified by the audit.

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## A. DoD Acquisition Workforce Database and Counting Controls

DoD annually reports to Congress the Refined Packard workforce count as compiled by the DMDC. The FY 2004<sup>1</sup> and prior Refined Packard workforce counts were unverifiable. The counts were unverifiable because:

- DMDC lacked standard operating procedures and corporate knowledge of past Refined Packard workforce counts, events, and requirements;
- neither DMDC, nor a DoD contractor supporting the count, maintained analyses or performed reconciliations of quarterly Military Service and Defense agency workforce counts used to create the annual Refined Packard workforce count;
- two DMDC acquisition workforce Management Information Systems were only partially operational.

In addition the Refined Packard and Acquisition Organization counts did not include and did not report contract equivalents; and DoD acquisition workforce planning risks, including risks for the Quadrennial Defense Review, could increase because annual Refined Packard workforce support and expenditures may be based on unreliable data and may not accurately reflect the true DoD civilian, military, and contracted acquisition workforce.

### DoD Acquisition Workforce

The DoD acquisition workforce is subject to two methods of counting and congressional reporting. The first method is known as the "Acquisition Organization" workforce counting approach. The second method is known as the "Refined Packard," or the "Acquisition, Technology, and Logistics," workforce counting approach. Both methods continue to be used as both are requested by congressional oversight committees on an ad hoc basis. The audit did not determine the extent of support for workforce counts made through the Acquisition Organization method as those counts were derived directly from DoD civilian and military personnel databases.

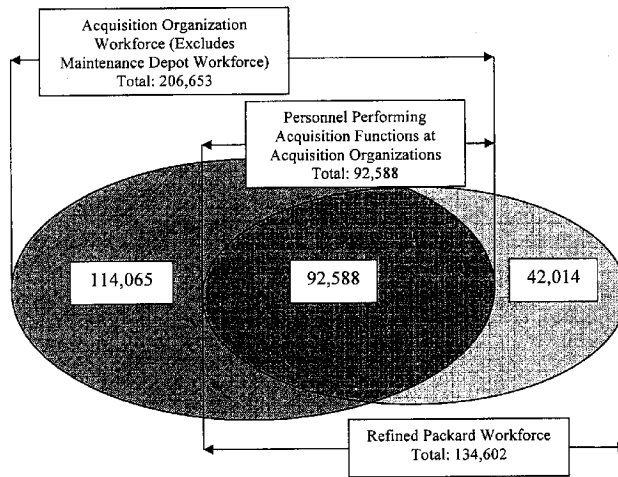
**Acquisition Workforce Count.** The Acquisition Organization workforce counting approach was used by the 1986 President's Blue Ribbon Commission on Defense Management (Packard Commission). The approach counted all personnel employed in 22 designated DoD acquisition organizations as part of the acquisition workforce, regardless of an employee's occupation. As of September 30, 2004, there were 206,653 civilians and military personnel included the 22 designated DoD acquisition organizations. The total DoD Acquisition Organization workforce count since FY 1999 is shown in Table 1.

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<sup>1</sup> FY 2004 Refined Packard count as of September 30, 2004, reported in March 2005.

Fiscal Year	1999	2000	2001	2002	2003	2004
Workforce	230,556	219,419	215,090	212,482	213,670	206,653

DoD does not count DoD civilians assigned to maintenance depots in the Acquisition Organization workforce count. AT&L personnel stated that the House Armed Services Committee requested that DoD report acquisition workforce levels to the committee using the Acquisition Organization format. Of the 206,653 acquisition organization personnel counted for FY 2004, 55 percent (114,065) were non-acquisition personnel performing support functions, such as firefighting, police, human resources, administration, accounting, legal, engineering technicians, supply, transportation, and trades (such as equipment and facilities operations and maintenance). The remaining 45 percent (92,588) were performing designated acquisition workforce missions and are included in the DoD Refined Packard workforce count as shown in the Figure below.



**Acquisition Organization and Refined Packard Workforce as of September 30, 2004**

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**Refined Packard Workforce Count.** In May 1997, the Office of the USD(AT&L) contracted with Jefferson Solutions to review alternative ways of identifying the acquisition workforce instead of using the Acquisition Organization workforce counting method. This effort was in response to congressional criticism that DoD lacked a consistent, Defense-wide approach for determining both the size of the acquisition workforce and the skill sets of those serving in it. In September 1997, Jefferson Solutions reported to AT&L a proposed Refined Packard acquisition workforce methodology of combining occupational and organizational data for identifying those in the workforce. In a December 18, 1997, letter, the Secretary of Defense forwarded the Jefferson Solutions report to Congress and stated that, beginning October 1, 1998, members of the acquisition workforce would be uniformly identified using the Refined Packard model.<sup>2</sup> While accepting the new approach, the House Armed Services Committee requested that DoD continue to report both the Acquisition Organization workforce count and the Refined Packard workforce count. The Senate Armed Services Committee relies on the Refined Packard method.

**Refined Packard Model.** The Refined Packard model uses occupations and organizations for determining whether an individual will be counted as part of the workforce under three categories. The model can be briefly stated as follows:

- Civilians in Category I occupations (such as contracting) are assumed to be performing acquisition functions regardless of the organization in which they serve. Therefore, all of these individuals across DoD are included in the acquisition workforce.
- Civilians in Category II occupations are counted only when serving in organizations that primarily perform acquisition missions, such as the materiel commands or technology missions, and research labs. Category II occupations cover such job series such as electronics engineering, budget analysis, and computer engineering.
- Military or civilian personnel in Category III occupations can be added to the count or removed from the count, at the discretion of the Military Services and Defense agencies. For example, military enlisted personnel performing key acquisition functions can be added using this capability.
- Military officers subject to the Defense Acquisition Workforce Improvement Act are counted as part of the acquisition workforce.

As of September 30, 2004, there were 134,602 civilian and military personnel included in the Refined Packard workforce count. Of the 134,602 personnel, 69 percent (92,588) was assigned and included in the DoD Acquisition Organization workforce count, while 31 percent (42,014) of the Refined Packard workforce count was assigned outside the 22 major DoD acquisition organizations. This total compares with a September 30, 2003, count of 134,431. The comparable Refined Packard workforce counts totaled 132,593 for FY 2002; 129,249 for FY 2001; 135,014 for FY 2000; and 138,851 for FY 1999. The

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<sup>2</sup> DoD refers to the acquisition workforce count produced by the "Refined Packard" model as the "Acquisition, Technology, and Logistics" count.

total acquisition personnel for the Military Services and Fourth Estate<sup>3</sup> from FY 1999 through FY 2004 are shown in Table 2.

Fiscal Year	Army	Navy	Air Force	Fourth Estate	Totals
1999	39,592	47,895	29,258	22,106	138,851
2000	40,080	41,373	28,959	24,602	135,014
2001	41,074	37,158	27,820	23,197	129,249
2002	41,783	39,661	28,444	22,705	132,593
2003	47,697	41,622	27,888	17,224	134,431
2004	48,251	41,552	27,775	17,024	134,602

As shown in Table 3, the Refined Packard count has remained substantially less than the corresponding fiscal years' Acquisition Organization workforce count.

Fiscal Year	1999	2000	2001	2002	2003	2004
Acquisition Organization	230,556	219,419	215,090	212,482	213,670	206,653
Refined Packard	138,851	135,014	129,249	132,593	134,431	134,602

### Verification of Acquisition Workforce Count

The Refined Packard workforce count for FY 2004 was unverifiable for the following reasons. DMDC lacked standard operating procedures and corporate knowledge of past Refined Packard workforce counts, events, and requirements. Neither DMDC nor the DoD support contractor, Jefferson Solutions, maintained analyses or performed count reconciliations. Neither the Refined Packard workforce count nor the Acquisition Organization workforce count included reported contract equivalents. Two DMDC acquisition workforce Management Information Systems were only partially operational.

**Annual Workforce Count Procedures and Corporate Knowledge.** DMDC lacked standard operating procedures and corporate knowledge of past Refined Packard workforce counts, events, and requirements. DMDC lacked processes and written procedures for compiling and reporting the annual DoD-wide count of the acquisition

<sup>3</sup> Fourth Estate is composed of the acquisition workforce for the Defense Contract Management Agency, Defense Logistics Agency, Defense Information Systems Agency, Missile Defense Agency, Defense Contract Audit Agency, and other DoD agencies and field activities.

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workforce. Although DMDC and Jefferson Solutions performed analyses of workforce data provided by the Military Services and the Defense agencies, no files or records were maintained by DMDC, Jefferson Solutions, or the Military Services to document the scope of FY 2004 or prior year reviews of Military Service or Defense agency Refined Packard submissions. DMDC management stated they were not required to maintain standard operating procedures or written documentation for compiling and reporting the DoD acquisition workforce count.

DMDC also lacked any personnel with corporate knowledge of how Refined Packard workforce counts were conducted and reported prior to FY 2004. While Jefferson Solutions personnel maintained corporate knowledge of Refined Packard counting methodology, Jefferson Solutions did not document or maintain standard operating procedures of past Refined Packard workforce counts, events, and requirements. All key DMDC personnel involved in the workforce counting process either retired or left the agency from 1997 through 2003, effectively leaving new staff for 2004. DMDC did not maintain a knowledge management program<sup>4</sup> to allow replacement personnel to gain experience or background on the program.

**Analysis of Workforce Counts.** Neither DMDC nor Jefferson Solutions maintained analyses or reconciliations of quarterly Military Service and Defense agency workforce counts used to create the annual Refined Packard workforce count. The FY 2004 and prior Refined Packard workforce counts were unverifiable. For example, DMDC could not explain nor provide written documentation why there were significant increases and decreases for acquisition workforce personnel for the Military Services and Defense agencies from FY 1999 through FY 2004. DMDC also did not maintain documentation for review and correction of the acquisition workforce counts with the Military Services and Defense agencies. DMDC personnel relied upon input by Jefferson Solutions personnel to analyze the FY 2004 Refined Packard workforce count. Because Jefferson Solutions did not maintain detailed records of yearly workforce count analyses, DMDC lacked sufficient audit trails for analyzing and reconciling quarterly Military Service and Defense agency workforce submissions.

**DMDC Acquisition Workforce Management Information Systems.** The 2004 "DMDC Profile" handbook listed two information systems used to support the annual acquisition workforce counting process. However, as of January 2006, neither management information system was fully operational or reliable. As a result, the DMDC lacked the management information system infrastructure to support its Acquisition Organization and Refined Packard workforce counts.

**Defense Acquisition Workforce Improvement Act Management Information System.** The Defense Acquisition Workforce Improvement Act Management Information System was a title given by DMDC for its use of four defense personnel systems to extract acquisition workforce information to meet the Defense Acquisition Workforce Improvement Act and DoD Instruction 5000.55 reporting and training requirements. The Defense Acquisition Workforce Improvement Act Management Information System was not an integrated management information system, but rather a

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<sup>4</sup> Knowledge management is a systematic approach to finding, understanding, and using knowledge to achieve organizational objectives. Many organizations are developing tools, systems, and awareness among employees that capturing and sharing knowledge is an important organizational practice. Knowledge management creates value when knowledge most important to the organization is shared and reused.

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“wrapper” for DMDC use of the four existing systems used to produce the Acquisition Organization and Refined Packard workforce counts. It could not provide a trace of actions performed by DMDC or the Military Services in producing or reconciling annual workforce counts. DMDC management stated the management information system was not meant to be an integrated system.

**Defense Acquisition Workforce Management Information System.** The Defense Acquisition Workforce Management Information System included a nonoperational Web-based Data Mart application to be used for DoD Instruction 5000.55 workforce reporting purposes. The Data Mart application was to store, report, and summarize personnel data elements, position information, and training-related information supporting the requirements associated with the Defense Acquisition Workforce Improvement Act. If DMDC can make the Data Mart application operational, it will provide a means to support an auditable trace to the annual workforce counts. The management information system also included an operational “Outreach” application to allow the Office of the Secretary of Defense and Defense Acquisition University users to create, tailor, and use a list of DoD Acquisition Workforce e-mail addresses for educational and informational purposes. The Outreach application does not support Acquisition Organization and Refined Packard workforce counts.

**Use of Contracted Acquisition Workforce Support Services.** Neither Acquisition Organization nor the Refined Packard workforce counts included or reported contractor full-time equivalents<sup>5</sup> (contractor equivalents) used to support acquisition activities. The Military Services and DoD agencies are supplementing acquisition workforce shortfalls with contracted acquisition workforce personnel including procurement, engineering, program management, and supply support. Although DoD is not required to report the number of contractor equivalents, omitting contractors from the workforce count results in the invisibility of a large part of the true acquisition workforce. Table 4 shows the number and percentage of contractor equivalents at six DoD locations visited.

Contracted acquisition workforces are not required to meet Defense Acquisition Workforce Improvement Act training and certification requirements. In some cases contracted personnel may be integrated into the Government acquisition workforce structure performing the same duties as the Government personnel.

**Reasons for Use of Contracted Acquisition Support.** According to focus group<sup>6</sup> interviews conducted as a part of the audit at the six acquisition workforce locations, increased use of contracted acquisition support occurred because of increased workload coupled with past reductions of acquisition workforce personnel. Focus group comments also indicated that prioritizing acquisition and contracting job responsibilities led to the identification of severable functions that could be contracted out. Contracted acquisition support personnel were used to meet these priority skill sets. The acquisition workforce shortfalls were prevalent across several acquisition career fields including program management, quality assurance/engineering, and contracting.

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<sup>5</sup> Per the DoD A-76 Costing Manual of March 14, 2001, a civilian full-time equivalent position is generally considered equal to 1,776 hours of annual productive effort.

<sup>6</sup> Focus groups included program managers, quality assurance/engineers, and contracting personnel.

Table 4. Acquisition Workforce Contractor Equivalents for Locations Visited					
Location Visited	DoD Civilians	DoD Military	Contractor Equivalents	Total Government Acquisition Workforce + Contractor Equivalents	Contractor Percentage of Combined Acquisition Workforce
Army Acquisition Support Center	85	15	22	122	18 percent
Naval Sea Systems Command	14,040	453	Not Determinable*	Not Determinable	Not Determinable
Air Force Aeronautical Systems Center	2,265	797	1,133	4,195	27 percent
Air Force Space and Missile Systems Center	514	632	2,053	3,199	64 percent
Defense Supply Center Columbus	712	0	133	845	16 percent
Defense Supply Center Richmond	798	0	250	1,048	24 percent
*The Naval Sea Systems Command could not provide data on the number of contractor equivalents.					

**Program Management.** Program managers from the focus groups indicated program offices heavily rely on contracted support personnel because their offices are not authorized or do not have the personnel resources to hire additional Government personnel to meet current workload requirements. The Government lacked the ability to compete with private industry for experienced acquisition workforce positions in certain metropolitan regions, including Washington, D.C.; Los Angeles; and Boston. For example, Air Force Personnel at the Space and Missile Systems Center in Los Angeles,



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California, noted that Federally Funded Research and Development Centers and contracted system engineering and technical assistance support are being used in “hard-to-compete” job locations. Other comments noted regional Government personnel hiring freezes caused by budget restrictions as a primary restriction.

**Quality Assurance/Engineering.** Quality assurance and engineering personnel from the focus groups indicated that quality assurance workforce reductions created increased workload requirements for engineering personnel. For example, several sites noted that system safety engineers (who concentrate on system failures and risk management operations) have been significantly reduced from the acquisition workforce, while transferring the additional workload and responsibilities to remaining Government engineering personnel. Government personnel at the Naval Sea Systems Command, the Air Force Aeronautical Systems Center, and the Space and Missile Systems Center noted the quality assurance function was being performed by engineers. Personnel stated that the lack of Government resources tends to increase program delivery date noncompliance issues because the Government is not able to identify and fix system failures prior to delivery.

**Contracting.** Both Government contracting workforce and contracting managers noted that contracting personnel have experienced increased workload requirements because of post-9/11 procurement demands. The Government contracting workforce and contracting managers also stated deployments of contracting personnel to overseas locations are increasing and that deployed personnel positions<sup>7</sup> are not being backfilled, causing shortages of Government personnel and greatly increasing workloads of warranted contracting officers. Contracting personnel at all locations visited indicated contract close-out procedures have been generally outsourced as contracted acquisition support services. Contracting managers generally noted that contract close-out was considered one area where Government contracted for support services to compensate for Government acquisition personnel shortages.

### **Effect of Potential Inaccurate Acquisition Workforce Count**

DoD acquisition workforce planning risks could increase because annual Refined Packard workforce support and expenditures may be based on unreliable data. A lack of standard operating procedures for workforce counts and requirements have created conditions that may lead to a lack of consistency and comparability of acquisition workforce data throughout recent years including FY 2004. A lack of corporate knowledge, including prior analyses and reconciliations of quarterly Military Service and Fourth Estate workforce counts may contribute to a lack of understanding. DoD annual reporting to Congress should provide more specific information about Acquisition Organization and Refined Packard workforce count changes. Information provided should explain workforce deletions, newly created positions, and shifts of personnel from non-Refined Packard workforce to Refined Packard workforce positions, as well as shifts between different Refined Packard workforce position categories.

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<sup>7</sup> Deployments included transfer of both Government civilian and military personnel to forward locations, as well as Military Reserve/National Guard call-ups of Government civilians to active duty.

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Six acquisition offices reviewed reported contractors comprising 16 to 64 percent of the combined Government/contractor acquisition workforce. Contracted acquisition workforce equivalents are not required to meet Defense Acquisition Workforce Improvement Act training and certification requirements, as are their DoD civilian and military counterparts. As a result, the need to track the number of contractor equivalents has increased. Thus, DoD should revise Instruction 5000.55 to estimate and track contractor equivalents that support the DoD acquisition workforce, and include the estimates as supplementary DoD reporting data to Congress. If contractor equivalent estimates are not included, the total efforts and needs of the Refined Packard workload will not be recognized.

### **Management Comments on the Finding and Audit Response**

**Management Comments on DMDC Role in Acquisition Workforce Counts.** The Director, DMDC stated the report inaccurately reflected the DMDC role in providing refined Packard counts. The Director stated the DMDC primarily receives and compiles data from the Military Services and Office of Secretary of Defense agencies, which are allowed to modify workforce counts without justification after an initial DMDC analysis. The Director stated that DMDC was not in a position to provide reconciliations on workforce counts or provide written documentation on significant increases or decreases in DoD acquisition workforce personnel. The Director, DMDC deferred to the role and responsibility of the Director, Defense Procurement and Acquisition Policy in developing and implementing standard procedures and guidance.

**Audit Response.** DoD Instruction 5000.55, "Reporting Management Information on DoD Military and Civilian Acquisition Personnel and Positions," November 1, 1991, designates DMDC to serve as custodian of all automated records collected and to provide data quality control, inquiry capabilities, and administrative and computer support. A May 13, 1999, Under Secretary of Defense (AT&L) policy memorandum, emphasizes that the DMDC database is the official repository for acquisition workforce personnel counts. We agree that the Director, Defense Procurement and Acquisition Policy is responsible for developing and implementing acquisition workforce standard procedures and guidance; however, we believe that the existing DoD policy requires DMDC to provide accurate and reliable acquisition workforce information. Without DMDC measures to ensure the accuracy of periodic workforce submissions, DMDC role would be limited to compiling and maintaining unreliable data.

### **Recommendations, Management Comments, and Audit Response**

**Renumbered and Redirected Recommendations.** As a result of Office of USD(AT&L) comments we renumbered draft report Recommendation A.1.b.(2) as Recommendation A.3. in the final report and redirected it to the Under Secretary of Defense for Personnel and Readiness to comment in coordination with the USD(AT&L). We renumbered draft report Recommendation A.1.b(1) as final report Recommendation A.1.b.

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**A.1. We recommend that the Director, Defense Procurement and Acquisition Policy:**

**a. Develop and implement written standard operating procedures and guidance for counting the acquisition workforce to include:**

(1) a definition of the acquisition workforce count that includes the Acquisition Organization Count and the Refined Packard workforce count.

(2) a definition of the methodologies and procedures used to perform periodic workforce counts derived from Military Services and Fourth Estate databases.

(3) requirements to maintain and support acquisition workforce count documentation as required by DoD Instruction 5000.55.

**b. Revise DoD Instruction 5000.55 to update the information requirements for automated data files to ensure consistent acquisition workforce information format and reporting from the DoD components.**

**Management Comments.** The Director, Human Capital Initiatives, Office of the USD(AT&L), responding for the Director, Defense Procurement and Acquisition Policy, concurred with Recommendations A.1.a. and A.1.b., stating that he directed a complete update of the AT&L workforce management information requirements, which included a review and update of the workforce count definition. The Director stated that USD(AT&L) will ensure supporting workforce count methodology and procedures are in place and that requirements are in place to ensure maintenance and support of workforce count documentation. The Director also stated that standard policy, guidance, and process updates are being implemented with a new count methodology to facilitate workforce analysis and human capital strategic planning.

**Audit Response.** Although the Director, Human Capital Initiatives, concurred with Recommendation A.1., the comments did not address the time line for implementation of the written standard operating procedures and guidance and revision to the DoD Instruction. In separate follow-up correspondence the Office of the USD(AT&L) noted that the implementation would be by August 31, 2006.

**A.2. We recommend that the Director, Defense Manpower Data Center develop a knowledge management program to maintain corporate knowledge of Defense Manpower Data Center information systems and processes.**

**Management Comments.** The Director, DMDC concurred with the recommendation, stating that DMDC did not fully pass along knowledge related to the methods used in attempting to identify personnel in the acquisition workforce. The Director stated that the DMDC has taken steps to rectify the situation.

**Audit Response.** Although the Director, DMDC concurred with Recommendation A.2., the comments were not fully responsive because they did not address the development of a knowledge management program or identify specific steps taken to pass along knowledge and did not provide a timetable to implement such a program. We request

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further comments from the Director, DMDC regarding implementation of Recommendation A.2.

**USD(AT&L) Comments.** Although not required to comment, the Director, Human Capital Initiatives, Office of the USD(AT&L), commented that his office would work closely with the Under Secretary of Defense for Personnel and Readiness to clarify requirements, policy, and processes that impact the management information services provided through DMDC.

**A.3. We recommend that the Under Secretary of Defense for Personnel and Readiness in coordination with the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics revise DoD Instruction 5000.55 to estimate contractor equivalents, to the best extent estimable, who support the DoD acquisition workforce, and include such estimates as supplementary acquisition workforce reporting data in annual DoD reporting to Congress.**

**USD(AT&L) Comments.** The Director, Human Capital Initiatives, Office of the USD(AT&L), commenting to the draft report recommendation directed to the Director, Defense Procurement and Acquisition Policy, stated the recommendation came under the purview of the office of the Under Secretary of Defense for Personnel and Readiness because that office had broader authority to establish the requirement and direct collection of DoD contractor personnel data.

**Audit Response.** As a result of Office of USD(AT&L) comments, we have renumbered and redirected the recommendation in the final report to the Under Secretary of Defense for Personnel and Readiness to respond in coordination with the Office of the USD(AT&L).

**Air Force Comments.** Although not required to comment, the Military Deputy, Office of the Assistant Secretary of the Air Force (Acquisition) stated there is currently no requirement for DoD to report acquisition workforce contractor equivalents and questioned the relevancy of counting contractors.

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## **B. Contracted Support Services for the Acquisition, Technology, and Logistics Workforce**

The Defense Contracting Command-Washington (DCC-W) did not properly negotiate or administer support service contract DASW01-03-F-0393 to Jefferson Solutions. In addition, the contracting officer's representative (COR) approved Jefferson Solutions' monthly invoices without requesting written support for services performed, hours expended, or products provided. The contract negotiation and administration problems occurred because:

- DCC-W did not maintain support for the independent Government cost estimate (IGCE) determination of labor hours, labor rates, and direct and indirect costs, which appeared to be based on unverified contractor proposal data;
- DCC-W did not require signatures on or dating of the IGCE and did not maintain letters of delegation to the COR;
- DoD contracting officials did not place adequate emphasis on contract administration and surveillance; and
- DCC-W did not require written monthly progress reports.

As a result, the Government was not assured that it negotiated fair and reasonable prices with Jefferson Solutions, that work performed by Jefferson Solutions in identifying and reporting the Refined Packard workforce count was done properly for the time and materials expended, nor that Government resources were used economically.

### **Refined Packard Workforce Count Support Contracts**

DCC-W, on behalf of the Office of the USD(AT&L), awarded the DoD-wide Refined Packard workforce identification contracts. Since 1997, DCC-W has awarded five contracts to Jefferson Solutions to support DoD acquisition workforce issues. DCC-W and Jefferson Solutions had no records relating to the initial contract. The subsequent four contracts are valued at \$2.447 million. The following table summarizes the last four contracts awarded.

Table 5. Contract Actions Reviewed

Contract No.	Award Date	Contract Value
DASW01-99-F-1028	March 15, 1999	\$451,194
DASW01-01-F-0349	December 18, 2000	\$413,906
DASW01-02-F-0538	February 1, 2002	\$432,679
DASW01-03-F-0393	March 1, 2003	\$1,149,259
<b>Total</b>		<b>\$2,447,038</b>

**Prior Contracts.** On March 15, 1999, DCC-W awarded a firm-fixed-price contract (DASW01-99-F-1028) for a period of 10 months to Jefferson Solutions. Modification P00001 extended the period of performance to January 14, 2001, for the continued implementation of the Acquisition and Technology workforce identification. Jefferson Solutions was to provide to the Office of the USD(AT&L) both consulting expertise and advice for further refinement of the Refined Packard methodology. The total cost of the contract was \$451,194. The contracting officer could not locate a 1997 contract awarded to Jefferson Solutions for reporting the acquisition workforce and stated the contract was sent to a warehouse and may have been destroyed.

On December 18, 2000, DCC-W awarded a firm-fixed-price contract (DASW01-01-F-0349) for a period of 12 months to Jefferson Solutions to provide consulting expertise and advice relevant to further refinement of the Refined Packard algorithm. Modification P00001 extended the period of performance to January 31, 2002. The contract was not competitively awarded and was follow-on work to contract DASW01-99-F-1028. Total cost of the contract was \$413,906.

On February 1, 2002, DCC-W awarded a firm-fixed-price contract (DASW01-02-F-0538) for a period of 12 months to Jefferson Solutions to provide for the full identification and quantification of the DoD key acquisition workforce based on the Refined Packard methodology. Modification P00001 extended the contract one month to February 28, 2003. The total cost of the contract was \$432,679. The contract was not competitively awarded and was follow-on work to contract DASW01-01-F-0349. A sole-source justification stated that Jefferson Solutions was the only contractor that could continue the effort in a timely and cost-effective fashion. The sole-source justification was not signed or dated.

**Current Contract.** On March 1, 2003, DCC-W awarded a firm-fixed-price contract (DASW01-03-F-0393) for a base period of 11 months and up to 3 option years to Jefferson Solutions to provide for the full identification and quantification of the DoD-wide acquisition workforce, based on the methodology refined by the December 1997 DoD Workforce Identification Working Group. The base year was awarded for \$266,699. As of March 14, 2005 (modification P00006), the total cost of the contract was \$1,149,259.

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## Government Oversight of Refined Packard Workforce Count Contractor

Based on a review of support service contract DASW01-03-F-0393:

- DCC-W did not properly negotiate or administer support service contract DASW01-03-F-0393 to Jefferson Solutions. A DCC-W award to Jefferson Solutions was based on an unsupported IGCE. The DCC-W contracting officer should have performed a price analysis to ensure the Government received a fair and reasonable price. The contractor was not required to provide written monthly progress reporting.
- The COR approved 28 Jefferson Solutions monthly invoices for contract DASW01-03-F-0393 from March 2003 through June 2005 without requesting written support for services performed, hours expended, or products provided. Each of the contractor invoices stated only "Provide for the full identification and quantification of the DoD-wide Acquisition Technology and Logistics (AT&L) Workforce, based on the methodology refined by the December 1997 DoD Workforce Identification Working Group." None of the monthly invoices provided any further information on the monthly activities performed to support payment.

## Contract Negotiation and Administration

The contract negotiation and administration problems occurred because DCC-W did not maintain support for the IGCE determination of estimated amounts and did not require signatures on or dating of the IGCE. DCC-W did not maintain letters of delegation to the COR and did not place adequate emphasis on contract administration and surveillance of Jefferson Solutions products.

**Independent Government Cost Estimate.** Federal Acquisition Regulation Subparts 15.404-1(b)(2) and 15.404-1(c)(2) note the Government may use various cost or price analysis techniques to determine a fair and reasonable price. Such techniques include a comparison of costs proposed by the offeror for individual cost elements with an independently prepared Government estimate of the costs. DCC-W could not support its estimated amounts for labor hours, labor rates, and direct and indirect costs for contract DASW01-03-F-0393. The IGCE consisted of a list of labor categories, rates, and hours. DCC-W maintained no explanation of the sources or analyses pertaining to the estimated cost information. The IGCE appeared to be based on data from the contractor proposal and not from a price analysis completed by the Government to ensure the Government received a fair and reasonable price. The IGCE total estimated cost and fee was \$266,860. The total firm-fixed price for the base year for the contractor proposal was \$266,699. The difference between the IGCE and the contractor price proposal was only \$161. In addition, the IGCE did not include an estimate for the three option periods in the proposal. The proposed first two option periods and prices were

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included in the negotiated contract without change. Further, the contracting officer stated that DCC-W policy did not require Government signatures on and dating of IGCEs or estimates of contractor-proposed option periods until June 2005.

**Fair and Reasonable Price.** The Memorandum of Negotiations for contract DASW01-03-F-0393 notes that a request for quotes was submitted to 10 contractors, using the GSA Advantage E-Buy Web site. Jefferson Solutions was the only contractor that submitted a proposal. The memorandum stated that the COR reviewed the Jefferson Solutions price proposal and determined the costs were realistic for the work to be performed when compared with previous contracts for the same type of work. All previous contracts were awarded to and performed by Jefferson Solutions. DCC-W contracting officials should have performed a price analysis to ensure the Government received a fair and reasonable price.

The memorandum also noted that because the award was based on full and open competition, a detailed price analysis was not performed in accordance with the requirements of Federal Acquisition Regulation Subpart 15.804-3(b). The memorandum's reference to Subpart 15.804-3(b) is erroneous because the subpart did not exist at the time of the February 3, 2003, solicitation.<sup>8</sup> The memorandum did not reference Federal Acquisition Regulation Subpart 15.404-1(a)(2) requirement that a price analysis shall be used when cost or pricing data are not required. Had the contracting officer required a price analysis, he could have demonstrated whether the proposed price was reasonable in comparison with current or recent prices for the same or similar items.

**COR Letter of Delegation.** The Defense Federal Acquisition Regulation Supplement Subpart 201.602-2 and the DCC-W "Contracting Officer's Representative (COR) Guide," (COR Guide) April 15, 2005, note the appointment of a COR must be made by the contracting officer in writing. Subpart 201.602-2 and the DCC-W COR Guide additionally require that the designation specify the extent of the COR authority to act on behalf of the contracting officer, identify the limitations on the COR authority, specify the period covered by the designation, state the authority is not redelegable, and state that the COR may be personally liable for unauthorized acts.

While the Memorandum of Negotiations for contract DASW01-03-F-0393 referred to COR actions, the DCC-W contracting officer did not designate a COR in writing as required by the Defense Federal Acquisition Regulation Supplement. The contracting officer stated that DCC-W does not use the term COR for GSA Federal Supply Schedule contracts; rather, it uses the term "point of contact" to refer to the COR function. DASW01-03-F-0393 and prior DCC-W contracts with Jefferson Solutions designated points of contact in the offices of the USD(AT&L) or the Director, Defense Procurement and Policy. However, the designations did not meet the requirements of Defense Federal Acquisition Regulation Supplement Subpart 201.602-2 and the DCC-W COR Guide because they did not specify the

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<sup>8</sup> Review of prior Federal Acquisition Regulation revisions indicated that no Federal Acquisition Regulation 15.804 reference existed past July 1997.



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period covered by the designation, the extent or limitations of the COR authority, or state the authority was not redelegable.

**Contract Administration and Surveillance and Contractor Progress Reporting.** The DCC-W COR Guide noted the COR was required to maintain effective surveillance of the contract and document the surveillance performed. Surveillance documentation includes progress reports submitted by the contractor. COR/point of contact surveillance files were limited and consisted of a copy of the contract, e-mails, contractor invoices, and COR/point of contact approvals. COR/point of contact surveillance consisted primarily of a review of contractor invoices, e-mails, and verbal progress reports over the telephone with the contractor. The contracting officer could not explain why the contract did not require written monthly progress reports, and noted the COR/point of contact could not properly monitor contractor performance to determine whether work was properly performed and progress was being made without written monthly progress reports.

The Office of the Defense Procurement and Policy COR/point of contact noted after our review of their contracting files that the contractor should be required to provide written monthly progress reports. On October 21, 2005, the contracting officer issued modification P00007 to contract DASW01-03-F-0393 to require the contractor to provide USD(AT&L) with written monthly progress reports.

## Summary

A DCC-W award to Jefferson Solutions was justified through an unsigned, undated, and unsupported IGCE. The Government was not assured that fair and reasonable prices were negotiated because the IGCE lacked sufficient detail for supporting labor rates, labor categories, labor hours, and direct as well as indirect costs, and no one performed a price analysis. DCC-W contracting officials should have performed a price analysis to ensure the Government received a fair and reasonable price. The contracting officer took corrective action to require the contractor to provide written monthly progress reports.

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**Recommendation and Management Comments**

**B.1. We recommend that the Commander, Defense Contracting Command-Washington require that acquisition workforce count contracts supporting Office of Under Secretary of Defense for Acquisition, Technology, and Logistics components include written contractor monthly progress reports to the contracting officer and points of contact or contracting officer representatives.**

**Army Comments.** The Director, Army Contracting Agency, responding for the Director, Defense Contracting Command-Washington, concurred with the recommendation and noted that any future contract requirements for these or similar services will include the proper Government and contractor reporting requirements.

**Office Under Secretary Defense for Acquisition, Technology & Logistics Comments.** Although not required to comment, the Director, Human Capital Initiatives, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, commented that the final option for the workforce count support contract was not exercised and that a new acquisition is planned.

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## Appendix A. Scope and Methodology

We performed this audit from May 2005 through January 2006 in accordance with generally accepted government auditing standards. The audit analyzed existing Federal, DoD, and Service (including DLA) acquisition workforce policy and guidance, assessed Service and DLA compliance with acquisition workforce guidance regarding workforce counts, and evaluated management controls over the acquisition workforce counting process. This analysis included determining the processes used by the Office of the Secretary of Defense to count and report the acquisition workforce and determining the extent of support for counts made through the Refined Packard method. The audit did not determine the extent of support for workforce counts made through the Acquisition Organization method as those counts were derived directly from DoD civilian and military personnel databases. We reviewed documents from FY 1997 through FY 2005.

In addition, the audit team held focus group discussions with management and nonmanagement acquisition workforce personnel, including program management, contracting, quality assurance, and engineering work groups, to identify areas of concern to the workforce and prepare a potential DoD-wide questionnaire on acquisition workforce issues for use in later audits.

The audit team conducted site visits to Office of the Secretary of Defense components including the Office of the USD(AT&L) and its Defense Procurement and Acquisition Policy and Defense Acquisition University components, the Office of the Under Secretary of Defense for Personnel and Readiness and its DMDC component, and support contractor Jefferson Solutions. The audit also performed site visits or met with personnel from the Army Acquisition Support Center; the Army Contracting Agency; the Office of the Assistant Secretary of the Navy for Research, Development, and Acquisition; the Naval Sea Systems Command; the Office of the Assistant Secretary of the Air Force for Acquisition; the Air Force Materiel Command; the Aeronautical Systems Center; the Air Force Space and Missile Systems Center; DLA Headquarters; Defense Supply Center-Columbus; and Defense Supply Center-Richmond. We determined the use and extent of contracted support services at acquisition workforce field organizations and locations visited.

**Use of Computer-Processed Data.** We relied on data received from the Military Services, DMDC, and DLA information systems for the FY 2004 Refined Packard workforce counts. We did not test those information systems. Issues that came to our attention are included in Finding A.

**Government Accountability Office High-Risk Area.** The Government Accountability Office has identified several high-risk areas in DoD. This report provides coverage of the Strategic Human Capital Management and the DoD Approach to Business Transformation—Weapon Systems Acquisition high-risk areas.

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## Appendix B. Prior Coverage

During the last 5 years, the Government Accountability Office (GAO) and the Department of Defense Inspector General (DoD IG) have issued seven reports discussing the DoD acquisition workforce. Unrestricted GAO reports can be accessed over the Internet at <http://www.gao.gov>. Unrestricted DoD IG reports can be accessed at <http://www.dodig.mil/audit/reports>.

### GAO

GAO Report No. GAO-05-233, "Federal Acquisition: Progress in Implementing the Services Acquisition Reform Act of 2003," February 2005

GAO Report No. GAO-04-83, "Human Capital: Implementing Pay for Performance at Selected Personnel Demonstration Projects," January 2004

GAO Report No. GAO-03-443, "Federal Procurement: Spending and Workforce Trends," April 2003

GAO Report No. GAO-03-55, "Acquisition Workforce: Status of Agency Efforts to Address Future Needs," December 2002

GAO Report No. GAO-02-737, "Acquisition Workforce: Agencies Need to Better Define and Track the Training of Their Employees," July 2002

GAO Report No. GAO-02-630, "Acquisition Workforce: Department of Defense's Plans to Address Workforce Size and Structure Challenges," April 2002

### DoD IG

DoD IG Report No. D-2001-129, "Contracting Officer Determinations of Price Reasonableness When Cost or Pricing Data Were Not Obtained," May 30, 2001

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## Appendix C. DoD Acquisition Organizations List

DoD Instruction 5000.55, November 1, 1991, defines an acquisition organization as one of 22 listed organizations and any successor organization of these commands, including subordinate elements, whose mission includes planning, managing, and executing acquisition programs. The list is used as the basis for the Acquisition Organization workforce counting method and is shown below:

### Office of the Secretary of Defense

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics

### Department of the Army

Army Acquisition Executive  
Army Materiel Command  
Army Space and Missile Defense Command

### Department of the Navy

Office of the Assistant Secretary of the Navy for Research, Development, and Acquisition  
Naval Air Systems Command  
Naval Sea Systems Command  
Naval Supply Systems Command  
Naval Facilities Engineering Command  
Naval Space and Warfare Systems Command  
Naval Strategic Systems Program Office  
Office of Naval Research  
Navy Program Executive Office/Direct Reporting Program Manager Organization  
Marine Corps Systems Command

### Department of the Air Force

Office of the Assistant Secretary of the Air Force for Acquisition  
Air Force Materiel Command  
Air Force Space and Missile Center  
Air Force Program Executive Office

### Combatant Command

U.S. Special Operations Command–Acquisition Center

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**Other Defense Organizations**

Defense Logistics Agency  
Defense Contract Management Agency  
Missile Defense Agency

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## Appendix D. Military Services and Defense Logistics Agency Acquisition Workforce Counting Processes

The FY 2004 and prior Refined Packard workforce counts were unverifiable and may not accurately reflect the true DoD acquisition workforce. Guidance and processes used by the services to count and report the acquisition workforce vary greatly.

**Army Counting Process.** The Military Deputy to the Army's Acquisition Executive serves as the Army DACM. The Director, Army Acquisition Support Center serves as the Army Deputy Director Acquisition Career Management. The Army DACM reports quarterly a Refined Packard acquisition workforce count to DMDC as required by DoD Instruction 5000.55. The Army's Career Acquisition Personnel and Position Management Information System (Army information system) is the Army database system for Army's acquisition workforce and is used to report data to DMDC. The Army Acquisition Support Center uses the Army information system for acquisition workforce training, personnel history, and qualifications. Army personnel noted that DMDC can also obtain Army-related acquisition workforce information directly from the Defense Civilian Personnel Data System. The Army's information system comprises acquisition workforce data from multiple sources including the Defense Civilian Personnel Data System, the Total Officer Management Information System, and manually counted data of enlisted personnel.

**Revisions to Army Workforce Counting Methodology.** Army Acquisition Support Center officials stated that while the Refined Packard workforce count provides a good definition of the acquisition workforce, the Army may expand its acquisition workforce count by at least 12,000 personnel (25 percent) to include facilities engineering personnel at three major Army commands, including the Corps of Engineers-Civil Works, the Installation Management Agency, and Office of the Assistant Chief of Staff for Installation Management. Army Acquisition Support Center personnel stated the expansion would begin with the FY 2006 Refined Packard workforce count as a result of personnel description changes made during FY 2005.

**Army Workforce Projection Methods.** The Office of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology is responsible for sizing the Army acquisition workforce. The Army uses a Forecast Framework Model to assess the current workforce count, project future workforce size, and conduct a "gap analysis" comparing current demographics with the desired demographics and flagging significant differences. The acquisition workforce projections are analyzed by the Army Acquisition, Logistics, and Technology personnel to identify any significant growth in accession requirements. The analysis identifies Army acquisition workforce reductions due to retirements or migrations or where a new or increased workload requirement has been projected. The Army also considers industry and academia information describing emerging

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technical skills and acquisition community best practices in strategic planning recommendations.

**Navy Counting Process.** The Department of Navy DACM has the primary responsibility of developing and implementing policies and procedures for the Navy Refined Packard workforce count and the Navy AT&L Workforce Education, Training, and Career Development Program on behalf of the Assistant Secretary of the Navy for Research, Development, and Acquisition, who serves as the Navy Service Acquisition Executive. The Navy DACM is also responsible for establishing and maintaining a management information system to support workforce management, compliance monitoring, tracking, and reporting for the Department of the Navy Acquisition Workforce.

**Navy Workforce Counting Systems.** The Navy DACM relies on civilian and military acquisition personnel and position data systems that are updated monthly by Department of the Navy command levels. The Navy DACM does not use the Refined Packard method to assemble the workforce count. Instead, the Navy DACM uses the Refined Packard methodology as a tool to assist the components in identifying and assimilating positions into the acquisition workforce. The Navy DACM uses a Navy computer program to pull coded Department of the Navy acquisition workforce positions from the Defense Civilian Personnel Data System, the Navy Total Force Manpower Management System, the Navy Officer Personnel Information System, and the Marine Corps Acquisition Workforce System of Management. The acquisition positions within the personnel and position data systems are coded by management level personnel at the Department of Navy commands. The Navy DACM process removes all nonacquisition personnel, including some personnel considered as Refined Packard Method Category One. However, the Navy DACM stated that DMDC and Jefferson Solutions revised the Navy DACM submission for the FY 2004 DoD-wide acquisition workforce count by adding back approximately 200 Category One personnel that had been eliminated by this Navy DACM process.

**Navy Workforce Counting Criteria.** Secretary of the Navy Instruction 5300.36, "Department of the Navy Acquisition Workforce Program," May 31, 1995, and the Navy DACM, "Interim Guidance Department of the Navy (DoN) Acquisition, Technology, and Logistics (AT&L) Workforce Education, Training, and Career Development Program," October 11, 2005, are supplied to major commands as guidance for implementing acquisition workforce coding and revised Defense Acquisition Workforce Improvement Act requirements. The Navy DACM noted that the interim guidance is consistent with the revised DoD Directive 5000.52 and should replace the same topics covered in Secretary of the Navy Instruction 5300.36. The Navy DACM also stated that the Navy will publish a revised Secretary of the Navy policy instruction and operating guidance by July 2006, after the Office of the USD(AT&L) publishes a DoD operational instruction and Web-based Desk Guide.

Neither the Secretary of the Navy Instruction nor the Navy interim guidance includes procedures for the Navy DACM or component of the Department of the Navy commands to verify the validity of coded acquisition workforce data. The Navy DACM stated that its office did not maintain written standard operating



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procedures for assembling the count or to verify the validity of coded workforce data made by the Department of the Navy commands. However, the Navy DACM noted that its office had requested the Naval Audit Service to validate the data through audit examination.

**Air Force Counting Process.** The Air Force DACM leads the Acquisition Professional Development Program on behalf of the Service Acquisition Executive. The Air Force DACM is responsible for the Air Force acquisition workforce count submitted to DMDC.

**Air Force Workforce Counting Systems.** The Air Force DACM staff performs an acquisition workforce count by retrieving data on acquisition coded positions from four Air Force systems: a DoD Instruction 5000.55 file, an Acquisition Career Management System, the Air Force Personnel Data System,\* and the DMDC Refined Packard workforce count. The Air Force DACM staff includes in the Air Force acquisition workforce all personnel whose social security numbers are in at least three of the four systems or if they were in both the Acquisition Career Management System and the Air Force Personnel Data System. The Air Force DACM staff submits information to DMDC to allow DMDC to make an assessment of the Air Force acquisition workforce count. DMDC sends results back to the Air Force DACM staff for review and correction. The Air Force DACM staff sends corrections back to DMDC in a spreadsheet format.

**Air Force Workforce Counting Criteria.** An undated Web-based Air Force acquisition guidance implements Air Force Major Command coding of acquisition positions in the manpower and data personnel systems. The Air Force coding guidance notes that when job duties are predominantly acquisition-related, then the position falls under the requirements of the Air Force's Acquisition Professional Development Program. The Air Force DACM staff noted there were data entry and coding problems with personnel entering the data at Air Force bases. The Air Force DACM staff was in the process of writing new policies and procedures for coding and counting the acquisition workforce. The new policies and procedures were expected to be completed for the FY 2006 end-of-year acquisition workforce count.

**DLA Counting Process.** The DLA Customer Support Office in Columbus, Ohio, submits quarterly DLA Acquisition Workforce count data directly to the Defense Manpower Data Center. DLA has a Component Acquisition Executive responsible for all acquisition functions within the agency. The Component Acquisition Executive serves on the DLA Acquisition Career Program Board, which periodically convenes to discuss and make decisions on acquisition workforce policy issues affecting DLA. However, DLA is not required by DoD guidance to maintain a DACM to assist in DLA acquisition workforce training, education, and career development. The Defense Acquisition University's Defense Agency Workforce Support Office performs DACM functions in support of the Defense agencies.

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\* The Air Force Personnel Data System includes data from the DoD Military Personnel Data System and the Defense Civilian Personnel Data System

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**DLA Workforce Counting Systems.** The Customer Support Office produces quarterly acquisition workforce counts through extraction of DLA Acquisition Personnel File records from the Defense Civilian Personnel Data System and use of DLA Acquisition Position Files. The Acquisition Personnel File and Acquisition Position File records are periodically updated by the DLA Customer Support Offices in Columbus, Ohio, and New Cumberland, Pennsylvania. DMDC performs a match between the Acquisition Personnel File records and Acquisition Position File records; the results of that match become the DLA acquisition workforce count.

In FY 2004, the Customer Support Office also provided DMDC the acquisition workforce count data for the Defense Contract Management Agency. Compilation of the Defense Contract Management Agency acquisition workforce count was transferred to the Department of the Army in April 2005. Annually, Jefferson Solutions asks the DLA Headquarters Human Resource Policy and Information Office to review and comment on the Refined Packard workforce count for that year. For the FY 2004 count, DLA did not provide comments to Jefferson Solutions.

**DLA Workforce Counting Criteria.** DLA uses the DoD Instruction 5000.55 as guidance and does not maintain supplementary criteria regarding maintaining and reporting acquisition workforce data. Once a planned revised DoD instruction is issued, DLA personnel stated that the agency will review and determine if any supplementary internal guidance is necessary. The Customer Support Office does not maintain standard operating procedures but does maintain standard reporting queries and schedules for the DLA acquisition workforce count.

## **Appendix E. Report Distribution**

### **Office of the Secretary of Defense**

Under Secretary of Defense for Acquisition, Technology, and Logistics  
  Director, Defense Procurement and Acquisition Policy  
  Director, Acquisition Resources and Analysis  
Under Secretary of Defense for Personnel and Readiness  
  Director, Defense Manpower Data Center  
Under Secretary of Defense (Comptroller)/Chief Financial Officer  
  Deputy Chief Financial Officer  
  Deputy Comptroller (Program/Budget)  
  Director, Program Analysis and Evaluation

### **Department of the Army**

Office of the Administrative Assistant to the Secretary of the Army  
  Commander, Defense Contracting Command-Washington  
  Auditor General, U.S. Army Audit Agency

### **Department of the Navy**

Naval Inspector General  
  Auditor General, Naval Audit Service

### **Department of the Air Force**

Assistant Secretary of the Air Force for Financial Management and Comptroller  
  Auditor General, Department of the Air Force

### **Combatant Command**

Inspector General, U.S. Joint Forces Command

### **Other Defense Organization**

Director, Defense Logistics Agency

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**Non-Defense Federal Organizations and Individuals**

Office of Management and Budget

**Congressional Committees and Subcommittees, Chairman and Ranking Minority Member**

Senate Committee on Appropriations  
Senate Subcommittee on Defense, Committee on Appropriations  
Senate Committee on Armed Services  
Senate Committee on Homeland Security and Governmental Affairs  
House Committee on Appropriations  
House Subcommittee on Defense, Committee on Appropriations  
House Committee on Armed Services  
House Committee on Government Reform  
House Subcommittee on Government Management, Finance, and Accountability,  
Committee on Government Reform  
House Subcommittee on National Security, Emerging Threats, and International  
Relations, Committee on Government Reform

## Under Secretary of Defense for Acquisition, Technology, and Logistics Comments



OFFICE OF THE UNDER SECRETARY OF DEFENSE  
3000 DEFENSE PENTAGON  
WASHINGTON, DC 20301-3000

MAR 14 2006

MEMORANDUM FOR PROGRAM DIRECTOR, CONTRACT MANAGEMENT,  
OFFICE OF INSPECTOR GENERAL, DEPARTMENT OF  
DEFENSE

THROUGH DIRECTOR, ACQUISITION RESOURCES AND ANALYSIS <sup>703</sup> 3/17/06  
SUBJECT: Draft Audit Report, "Report on the DoD Acquisition Workforce Count,"  
(Project No. D2005-D00CB-0181)

This is in response to your February 13, 2006 memorandum asking for our  
comments on subject draft report. Our response to each of the audit report  
recommendations is attached.

We appreciate the opportunity to respond to your draft audit report and look  
forward to resolving the cited issues. My point of contact is Mr. Garry Shafovaloff. He  
can be contacted by telephone at (703) 805-4969 or email at [garry.shafovaloff@dau.mil](mailto:garry.shafovaloff@dau.mil).

  
Frank J. Anderson, Jr.  
Director, Human Capital Initiatives

Attachment:  
As stated

cc:  
OUSD (AT&L)  
OUSD (P&R)/DMDC  
OUSD (AT&L)/DPAP  
DOA/DCCW  
OSD AT&L Workforce Management Group Members



Director, Human Capital Initiatives (OUSD (AT&L))  
Comments on Draft DoD JG Audit Report  
"Report on the DoD Acquisition Workforce Count"  
OIG Project No. D2005-D006CD-0181

**OIG Recommendation A.1.a.(1).** Develop and implement written standard operating procedures and guidance for counting the acquisition workforce to include: (1) a definition of the acquisition workforce count which includes the Acquisition Organization Count and the Refined Packard Count.

**OUSD (AT&L) Response A.1.a.(1).** Concur. The Director, Human Capital Initiatives (OUSD (AT&L)) has recently directed a complete update of AT&L workforce management information requirements, to include a review and update of the workforce count definition. As part of this effort the workforce count definition and supporting processes are being updated.

**OIG Recommendation A.1.a.(2).** Develop and implement written standard operating procedures and guidance for counting the acquisition workforce to include: (2) a definition of the methodologies and procedures used to perform periodic workforce counts derived from Military Services and Fourth Estate databases.

**OUSD (AT&L) Response A.1.a.(2).** Concur. OUSD (AT&L) is updating the count definition and will ensure supporting methodology and procedures are in place.

**OIG Recommendation A.1.a.(3).** Develop and implement written standard operating procedures and guidance for counting the acquisition workforce to include: (3) requirements to maintain and support acquisition workforce count documentation as required by DoD Instruction 5000.55.

**OUSD (AT&L) Response A.1.a.(3).** Concur. OUSD (AT&L) will ensure appropriate requirements are in place to ensure maintenance and support of workforce count documentation.

**OIG Recommendation A.1.b.(1).** Revise DoD Instruction 5000.55 to update the information requirements for automated data files to ensure consistent acquisition workforce information format and reporting from the DoD components.

**OUSD (AT&L) Response A.1.b.(1).** Concur. Management information requirements are being updated. Standard policy, guidance and process updates are being implemented with a new count methodology to facilitate comprehensive workforce analysis and human capital strategic planning.

	Final Report Reference
<p><b>OIG Recommendation A.1.b.(2).</b> Estimate contractor equivalents, to the best extent estimable, which support the DoD acquisition workforce, and include such estimates as supplementary acquisition workforce reporting data in annual DoD reporting to Congress.</p>	Renumbered A.3 Redirected
<p><b>OUSD (AT&amp;L) Response A.1.b.(2).</b> This proposal would have to be worked by OUSD (P&amp;R) to address the broader issue of reporting for DoD contractor personnel. OSD (P&amp;R) is the proper authority for establishing the requirement and directing collection.</p>	Renumbered A.3 Redirected
<p><b>OIG Recommendation A.2.</b> We recommend the Director, Defense Manpower Data Center (DMDC) develop a knowledge management program to maintain corporate knowledge of Defense Manpower Data Center information systems and processes.</p>	
<p><b>OUSD (AT&amp;L) Response A.2.</b> The Director, Human Capital Initiatives (OUSD (AT&amp;L)) will work closely with OUSD (P&amp;R)/CPMS to ensure clarity of requirements, policy and processes which impact the management information services provided by through DMDC and the Defense Civilian Personnel Data System (DCPDS).</p>	
<p><b>OIG Recommendation B.1.</b> We recommend that the Commander, Defense Contracting Command-Washington require that acquisition workforce count contracts supporting Office of Under Secretary of Defense for AT&amp;L components include written contractor monthly progress reports to the contracting officer and points of contact or contracting officer representatives.</p>	
<p><b>OUSD (AT&amp;L) Response B.1.</b> The final option of the workforce count contractor support contract was not exercised. A new acquisition is planned for contractor support for the AT&amp;L Human Capital Initiatives/workforce office.</p>	

## Department of the Army Comments



DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY  
ACQUISITION LOGISTICS AND TECHNOLOGY  
US ARMY CONTRACTING AGENCY  
5109 LEESBURG PIKE SUITE 302  
FALLS CHURCH VA 22041-3201

MAR 16 2006

SFCA

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE,  
400 ARMY NAVY DRIVE, ARLINGTON, VA 22202-4704

SUBJECT: Response to the Department of Defense, Inspector General  
(DODIG), Report on DoD Acquisition Workforce Count (Project No.  
D2005-D000C8-0181), Dated February 13, 2006

This correspondence provides the Headquarters, Army Contracting Agency's (HQ ACA) response to recommendation B.1, concerning the subject audit of DoD acquisition workforce levels.

The HQ, ACA concurs with the recommendation that formal Contracting Officer Representative (COR) designations and contractor monthly progress reports should be required. The contract performance periods under these contracts expired, therefore no further corrective actions can be taken. Any future contract requirements for these or similar type services, will include the proper government and contractor reporting requirements.

*Sandra O. Sieber*  
Sandra O. Sieber  
Director  
Army Contracting Agency

KE6-1122



## Defense Manpower Data Center Comments



DEPARTMENT OF DEFENSE  
Manpower Data Center

REPLY TO DMDC

- 500 CENTER STREET, SUITE 847  
400 GULLING ROAD  
SANTA FE, CA 97101-0771
- 1600 N. WILSON BLVD, SUITE 400  
ARLINGTON, VIRGINIA 22206-7003

March 13, 2006

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

SUBJECT: Draft Report on DoD Acquisition Workforce Count (Project No. D2005-0181)

Thank you for the opportunity to review and provide comments on your draft report, "DoD Acquisition Workforce Count," Project No. D2005-D000CB-0181. DMDC concurs in part with the findings and recommendations.

With regard to Finding A, we believe the report inaccurately reflects DMDC's role in providing refined Packard counts. DMDC primarily receives and compiles data from the Military Services and OSD agencies and in fact, the Services are allowed to modify the counts after DMDC's initial analysis without providing justification for their changes. Thus we are not in a position to perform reconciliations of workforce counts nor to "... explain nor provide written documentation why there were significant increases and decreases for acquisition workforce personnel for the Military Services and Defense agencies ...". We believe Recommendation A.1 more properly recognizes the role and responsibilities of the Director, Defense Procurement and Acquisition Policy in developing and implementing standard procedures and guidance.

With regard to Recommendation A.2, that "the Director, Defense Manpower Data Center develop a knowledge management program to maintain corporate knowledge of Defense Manpower Data Center information systems and processes," I concur that DMDC did not fully pass along knowledge related to the methods used in attempting to identify personnel in the acquisition workforce, and I have taken steps to rectify that situation.

Should you have any additional questions, my point of contact for this report is Kris Hoffman. Ms. Hoffman can be reached via email to [kris.hoffman@osd.pentagon.mil](mailto:kris.hoffman@osd.pentagon.mil) or via phone at 831-583-2400 (commercial) or 878-2951 (DSN).

Robert J. Brandewie  
Director

## Department of the Air Force Comments



DEPARTMENT OF THE AIR FORCE  
WASHINGTON DC

15 MAR 2006

OFFICE OF THE ASSISTANT SECRETARY

MEMORANDUM FOR DEPARTMENT OF DEFENSE INSPECTOR GENERAL  
ATTN: DEPUTY INSPECTOR GENERAL FOR AUDITING

FROM: SAF/AQ

SUBJECT: Air Force Comments on the Draft Report on the Acquisition Workforce (AWF)  
Count, DoD IG Code D2005CB-0181, 13 February 2006

The following is in reply to your memorandum requesting the Assistant Secretary of the Air Force (Financial Management and Comptroller) provide Air Force comments on subject report.

The DoDIG report listed 2 major Findings. The Air Force concurs with these findings without comment. The report also makes 5 recommendations. The Air Force non-concurs with the third recommendation; "We also recommend that the Director revise the instruction to estimate contractor equivalents which support the DoD acquisition workforce, and include such estimates as supplementary annual DoD acquisition workforce reporting data to Congress."

There is currently no requirement for DoD to report AWP contractor equivalents and there is some question to the relevancy of counting contractors. Most contracts are written to provide a product or service – the number of contractors needed to accomplish this service is not relevant to the contract. Furthermore, the purpose of the count – support of acquisition workforce planning, certification, and training – is not applicable to support contractors. Personnel hired under a support contract are assumed to already be qualified and no further certification or training is necessary by the DoD or Services.

The SAF/AQ point of contact is Major Tony Veerkamp. Major Veerkamp can be reached at 703-588-7130 or at email: Tony.Veerkamp@pentagon.af.mil.

DONALD J. HOFFMAN, Lt Gen, USAF  
Military Deputy, Office of the Assistant Secretary  
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## **Team Members**

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Chairman LEVIN. We'll stand adjourned.  
[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR JOSEPH I. LIEBERMAN

STATUS OF CURRENT ACQUISITION SYSTEM

1. Senator LIEBERMAN. Mr. Sullivan and Dr. Gansler, I have several concerns with the acquisition system as it currently operates. Most importantly, it seems that the requirements validation process under the Joint Capabilities Integration and Development System (JCIDS) is not synchronized with the Planning, Programming, Budgeting, and Execution (PPBE) funding process. Can any effort at reform succeed without addressing this fundamental flaw in acquisition management?

Mr. SULLIVAN. We do not believe that there can be success until there is better synchronization between the Department of Defense's (DOD) requirements, funding, and acquisition processes. The Government Accountability Office (GAO) has previously reported that the lack of integration between the JCIDS and PPBE processes is a key factor that contributes to the Department's inability to achieve a balanced portfolio of weapon system programs that meets the needs of the joint warfighter and matches needs with available resources. The JCIDS process has not been effective in prioritizing needs from a joint, Department-wide perspective, and it largely approves capability needs without accounting for the resources or technologies that will be needed to acquire the desired capabilities. Resource allocation decisions in DOD take place through the PPBE process, which is separate from JCIDS. PPBE largely allocates resources on a Service-by-Service basis and does not effectively link resources to capabilities. In addition, the process allows too many programs to start development with unreliable cost estimates and without a commitment to fully fund them. Until DOD establishes a more integrated approach to weapon system acquisition, it will continue to struggle to effectively prioritize warfighting needs, make informed trade-offs, and achieve a balanced mix of weapon systems that are affordable, feasible, and provide the best value to the warfighter.

Dr. GANSLER. I believe "cost" should be an essential part of the "requirements process"—since, in a resource-constrained environment, it directly determines "numbers" (of systems procured) and that determines force effectiveness (even more than individual weapon's effectiveness).

2. Senator LIEBERMAN. Mr. Sullivan and Dr. Gansler, what are your recommendations for effectively balancing the requirement validation process with the calendar-driven funding process?

Mr. SULLIVAN. To improve DOD's ability to deliver weapon systems at the right time and right cost, GAO has recommended that the Department implement an enterprise-wide portfolio management approach to making weapon system investments that integrates the determination of warfighting needs with available resources and cuts across the Services by functional or capability areas. Such an approach would focus on assessing weapon system investments collectively from an enterprise level, rather than as independent and unrelated initiatives. By following a disciplined, integrated process—during which the relative pros and cons of competing weapon system proposals are assessed based on strategic objectives, warfighter needs, and available resources, and where tough decisions about which investments to pursue and not to pursue are made—DOD could minimize duplication between Service components and more effectively support each new development program it commits to. Furthermore, to ensure effective weapon investment decisions are made, GAO has recommended that a single point of accountability be established at the Department level with the authority, responsibility, and tools to implement portfolio management.

Dr. GANSLER. My answer to question #1 (above) will greatly aid in this; but, in general, the "requirements process" must look well beyond the near-term budget (funding) process. Nonetheless, the frequent budget changes (particularly, by Congress) introduce great instability and inefficiency into the implementation of the weapons acquisition process.

#### JOINT REQUIREMENTS

3. Senator LIEBERMAN. Mr. Sullivan and Dr. Kaminski, I am concerned that DOD has historically done a poor job of procuring capabilities that address joint requirements, and more specifically, that the Services have little incentive to spend what they see as their limited budgets on capabilities that will principally benefit sister Services. One particular instance of this is the Multi-Platform Radar Technology Insertion Program, and the Air Force's apparent reluctance to procure a system that will principally serve the Army's battlefield management requirements. How can the acquisition process better prioritize and procure such crucial joint capabilities?

Mr. SULLIVAN. GAO has recommended that DOD should determine and allocate appropriate resources for more effective joint capabilities development planning. The functional capabilities boards, which were established to manage the JCIDS process and facilitate the prioritization of needs, have not been staffed or resourced to effectively carry out these duties. Similarly, the combatant commands (COCOMs) also lack the analytic capacity and resources to become more fully engaged in JCIDS. GAO recently reviewed JCIDS documentation related to new warfighting capabilities and found that most—almost 70 percent—were sponsored by the military Services with little involvement from the joint community, including the COCOMs,

which are responsible for carrying out military missions. The Services drive the determination of capability needs, in part because they retain most of DOD's analytical capacity and resources for requirements development.

Within the Department's PPBE process, the individual military Services are responsible for budgeting and allocating resources under authority that is commonly understood to be based on title 10 of the United States Code—to organize, train, and equip military forces. In this structure, the budget is based more on individual, service-focused needs than on joint warfighting needs. In the past, GAO has reported that this situation has contributed to interoperability problems among weapon systems and unnecessary duplication of capabilities in some areas. The Office of the Secretary of Defense (OSD) reviews and makes adjustments to the Services' budgets, but this takes place toward the end of the PPBE cycle when it can be difficult and disruptive to make changes, such as moving funds to higher-priority programs or to support joint needs. DOD has recently taken steps to establish capability portfolio management in selected areas in an attempt to overcome the service-centric nature of the resource allocation process. However, because the portfolios are largely advisory and lack authority and control over the allocation of resources, there may be limits to achieving joint capabilities.

Dr. KAMINSKI. The priority must be set in the budget process, with key oversight from OSD and the Joint Chief of Staff. The procurement can be improved by first developing (a several year process) then assigning key program management personnel with the requisite training and domain experience. Alignment of the responsibility, authority, and accountability of the program manager will require that a degree of trust be established between the program manager and those responsible for our oversight mechanisms. We must be prepared to delegate authority to the program manager, and provide him or her with some flexibility to manage—to adjust levels and allocation of funding, to adjust the allocation of performance parameters, to adjust schedule, and to tailor the acquisition approach to be responsive to the need. Clearly, there must be bounds established beyond which the program manager must seek approval from oversight authorities. But I believe these bounds are too narrow and inflexible today. We also need to provide sufficient upfront funding, and maintain funding stability throughout program execution.

4. Senator LIEBERMAN. Mr. Sullivan and Dr. Kaminski, are either the JCIDS or PPBE as currently constructed able to overcome parochial service interests in this regard?

Mr. SULLIVAN. No, I do not believe that the JCIDS and PPBE processes are constructed effectively to address the service-centric manner in which weapon systems are acquired in DOD. Past studies chartered by DOD and other organizations have reported similar conclusions and made a number of recommendations to improve the acquisition of joint warfighting capabilities.

Dr. KAMINSKI. Both help, but I don't believe they are sufficient.

#### DEPARTMENT OF DEFENSE SCIENCE AND TECHNOLOGY PROGRAM

5. Senator LIEBERMAN. Dr. Gansler and Dr. Kaminski, as we try to reduce risk in acquisition programs, what role does (or should) DOD science and technology (S&T) program play?

Dr. GANSLER. S&T are critical to both "staying ahead" (which is the basis of our national security strategy of "technological superiority") as well as to risk reduction—since we need to prove out the S&T first, before introducing it into weapons acquisition.

Dr. KAMINSKI. With good S&T programs supporting development planning, we can assign managers to develop prototypes, critical systems or components needed to better understand cost/performance trades and reduce risk. With the appropriate technology base in place, it is reasonable to expect that many of these developments can be completed in 2–4 years, so one manager will be in place from start to delivery of those critical subsystems during the development planning phase. This should allow the full system development to proceed on a shorter schedule as a result of the risk reduction.

6. Senator LIEBERMAN. Dr. Gansler and Dr. Kaminski, do you think that the Department's S&T programs, and in particular the DOD laboratories, are sufficiently resourced and staffed to provide support to the acquisition programs and address the problems you are discussing today?

Dr. GANSLER. The DOD's S&T program must be adequately funded to "stay ahead"; and, traditionally, whenever there is a shortage of DOD money it is one of

the areas the Services tend to cut (since it is long-term). Thus, in the likelihood of a coming budget crunch, it must be protected—not just in the DOD labs, but particularly in the universities and in industry.

Dr. KAMINSKI. No. We are short in both quantity and quality of staffing, and are not using the latest tools to support early modeling, simulation, and testing.

7. Senator LIEBERMAN. Dr. Gansler and Dr. Kaminski, what recommendations do you have for this committee to improve the quality of the DOD S&T program and the quality of the DOD laboratories?

Dr. GANSLER. Adequate funding, and allowance for foreign graduate students, scholars, and researchers (per Presidential Decision Directive-189) to work on DOD S&T, along with “peer review” of all proposals, are critical to the United States staying ahead. The SBIR and STTR programs are also a great benefit, and must be maintained.

Dr. KAMINSKI. The first step is to ensure that we not only restore, but also enhance early and continuing systems engineering coupled with the effective development planning needed to drive our S&T program. This will require commitment of more significant investment dollars earlier in our acquisition programs, and a commitment to build a cadre of systems engineers and development planners with the education, training, and domain experience needed to be effective. Attracting “best and brightest” to this work—and keeping them—will require a personnel system that will identify and track these important human resources and establish a career path to allow those who are successful to advance to senior program management and leadership positions. Their domain experience will be enhanced by managing the building of critical technology demonstrators and subsystems during the development planning program, reducing risk, and building skills and experience at the same time.

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QUESTION SUBMITTED BY SENATOR JACK REED

S. 454 LEGISLATION

8. Senator REED. Dr. Gansler, in the proposed S. 454 legislation, section 203 focuses on maximizing competition throughout the life cycle of major acquisition programs. One proposed provision is that modular, open architectures are used to enable competition for upgrades. Please comment on how the implementation of this recommendation would positively impact major weapons programs that have been sole sourced for decades, and how the Services can rapidly implement these changes to achieve maximum benefits. In addition, please comment on the feasibility of applying this provision to current programs, not just new programs.

Dr. GANSLER. Let me begin by noting that the objective should not be “maximizing competition”; rather, it should be “maximizing the effectiveness of competition.” Competition for its own sake, can be detrimental. For example, there must always be the “option” of competition, but if a firm is constantly improving performance and lowering costs, they should be rewarded by not recompeting the program; but there must always be the option of introducing competition if costs are rising (so the “threat” of competition is what creates the incentive for lowering costs; and the follow-on is the reward).

Open architectures are clearly one way to allow competition to be introduced at the subsystem level (which often is 70–80 percent of the total weapons cost); so it should be greatly encouraged—both on upgrades of current systems and on new ones.

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QUESTIONS SUBMITTED BY SENATOR DANIEL K. AKAKA

WEAPON SYSTEMS ACQUISITION REFORM ACT

9. Senator AKAKA. Mr. Sullivan, section 105 of the Weapon Systems Acquisition Reform Act recommends the Joint Requirement Oversight Council (JROC) seeks input from the combatant commanders in identifying joint military requirements. Currently, the combatant commanders produce an annual Integrated Priority List (IPL) that attempts to satisfy this same goal. In your prepared testimony, you stated some of the combatant commanders do not feel their needs are sufficiently addressed. What must be done within DOD to fully implement the intent of this legislation to ensure combatant commander’s influence throughout the acquisition system to decrease the Service-centric environment we’ve seen for years?

Mr. SULLIVAN. GAO and several other studies have recommended that DOD increase joint analytic resources for a less stovepiped understanding of warfighting needs. While each COCOM submits an IPL to the Chairman of the Joint Chiefs of Staff each year, which defines the COCOM's highest-priority needs, it does not appear that the COCOM needs are well integrated with JCIDS. According to officials from several COCOMs that we have met with, needs identified through IPLs are not typically developed into JCIDS capability proposals. Some COCOM officials pointed out to us that because of their limited resources, they must pick and choose capability needs and persuade one or more of the military Services to sponsor a proposal that addresses the COCOM's need. The Department has been working to give more time and priority to the commanders' IPLs, but more attention is needed.

10. Senator AKAKA. Mr. Sullivan, in your prepared testimony, you mentioned the establishment of the DOD capability portfolio management process. DOD identified nine joint capability area portfolios to mitigate the tendency to develop Service-centric, stovepiped solutions. However, the capability portfolio managers lack the necessary authority and control required to be successful. How can DOD reform their capability portfolio management process to mitigate the tendency to develop Service-centric, stovepiped solutions?

Mr. SULLIVAN. DOD's capability portfolios are intended to advise the Deputy Secretary of Defense on how to optimize investments within their respective capability areas. They have no independent decisionmaking authority and must operate within the Department's existing framework for acquiring weapon systems. That is, capability needs are still determined through JCIDS and resources are allocated through PPBE. Although it is too soon to assess the impact of capability portfolio management, according to some DOD officials, the portfolios provided key input and recommendations in the 2010 budget process. However, without portfolios in which managers have authority and control over resources, DOD is at risk of continuing to acquire weapon systems in a stovepiped manner. Ultimately, DOD needs to develop an integrated portfolio approach that brings the determination of requirements together with the allocation of resources. To be effective, such an approach must have committed leadership, empowered portfolio managers, and accountability at all levels of the Department.

11. Senator AKAKA. Dr. Gansler, Dr. Kaminski, and Mr. Adolph, changes made to a system after acceptance of review cost many times more than the same changes made during the requirements gathering phase. How can we improve the requirements gathering phases of the acquisition of major weapons systems to front-load these changes to achieve significant cost savings?

Dr. GANSLER. Please refer to my answer to question #1. If cost is a requirement, then changes that come in must not only have showed how they will improve performance but how they will live within the cost requirement.

Clearly, the earlier this is done, the better; but technology changes, threat changes, et cetera, do come along, and as long as they are explicitly within the overall cost requirement they can be allowed in.

Dr. KAMINSKI. Requirements adjustments during execution of acquisition programs are not necessarily bad if they are conducted within the framework of value propositions. Good program management requires continuing adjustment of the requirements flow-down and allocation to major subsystems based upon expected performance, schedule, and cost. Even top level requirements require continuing assessment and adjustment based upon similar value propositions. As we discover more about costs and performance during execution, good program managers should be interacting with requirements developers to adjust as needed to provide the best value for the user. This requires some flexibility in cost allocation, and it also places demands upon requirements developers to become involved in tradeoff decisions. To be effective, requirements developers as well as acquisition managers must have experience with systems engineering tools and techniques, and both must have sufficient domain experience to engage productively in cost-performance tradeoffs.

Mr. ADOLPH. A disciplined analysis of alternatives process should be employed to support the JCIDS and acquisition processes, from capability needs identification to include system design and development as well as life-cycle improvement. Emphasis must be placed on improving the processes for relating mission effectiveness and cost to system design, system performance, and suitability. Effective feedback processes are of special importance for spiral developments to identify enhancements which will improve performance and suitability. Improving the quality and speed of this feedback is increasingly important in responding to rapid changes in threat environments.

12. Senator AKAKA. Dr. Gansler, Dr. Kaminski, and Mr. Adolph, significant cost overruns are incurred from the instability of mission and design requirements during testing and even, in some cases, production. To what extent do you think it would be advantageous to more rigorously enforce a freeze on fundamental requirements at the system requirements review gate?

Dr. GANSLER. The greatest causes of cost growth, after program initiation, are budget changes (often caused by Congress) and “requirements” changes—both of which can be controlled by discipline. (See question #11.)

Dr. KAMINSKI. It is always beneficial to have a firm understanding of very top level requirements at the start of a program. But adjustments of subordinate requirements during execution of acquisition programs are not necessarily bad if they are conducted within the framework of value propositions. Even top level requirements need continuing assessment based upon evolving value propositions. As we discover more about costs and performance during execution, good program managers should be interacting with requirements developers to adjust as needed to provide best value for the user. This requires some flexibility in cost allocation, and it also places demands upon requirements developers to become involved in tradeoff decisions. To be effective, requirements developers as well as acquisition managers must have experience with systems engineering tools and techniques, and both must have sufficient domain experience to engage productively in cost-performance tradeoffs.

Mr. ADOLPH. Rigorous enforcement of key requirements thresholds should be the norm when entering system development and demonstration. There needs to be more rigor and discipline in the entire requirements definition and acquisition process. Issues that need to be addressed in relation to requirements setting include technology readiness (see response to question 13 below), the translation of requirements into design criteria, with attention to testability at the subsystem and system levels, as well as defining thresholds for key performance parameters.

13. Senator AKAKA. Dr. Gansler, Dr. Kaminski, and Mr. Adolph, cost overruns are also caused by the inherent unpredictability of the development of new technologies in the course of fulfilling system contracts. Would you recommend restricting the proposed designs for weapons systems to proven technologies while adequately funding contractual vehicles for pure research?

Dr. GANSLER. I would restrict the first “block” of the system to proven technology; then—using “spiral development”—evolve the system’s future blocks as future technology is proven out; and as long as the future technology either improves performance (at the same cost) or lowers the cost. This future technology should be funded in parallel with the system, until it is proven.

Dr. KAMINSKI. This will be helped by better development planning and alignment of incentives. With good development planning, we can assign managers to develop prototypes, critical systems or components needed to better understand cost/performance trades and reduce risk. It is reasonable to expect that many of these developments can be completed in 2–4 years, so we do not need to restrict ourselves to proven technology at the beginning of development planning. As these critical subsystems are delivered and tested, the risk reduction and domain experience gained in both government and industry will allow us to prove the critical technologies involved and reduce the time required to develop, integrate, and test the full system. We can rely on the experience gained during development planning to apply informed judgment to adjust requirements to improve value, reduce time, and better estimate and manage costs.

Mr. ADOLPH. Weapon system design should be based on proven technologies. History has shown repeatedly that doing otherwise introduces unacceptable risk in to weapons system development which necessarily translates into cost growth and schedule delays. Assessing whether a technology is sufficiently mature is currently accomplished through the Technology Readiness Levels (TRL) construct which should employ government test and evaluation (T&E) as the key component in moving a technology from TRL 4 to TRL 6. Recent consideration has been given to strengthening early involvement of the test community by reinvigorating the government developmental test process and by involvement of OT&E in readiness assessments. These are sound initiatives and should be focused on providing rigor to the TRL assessments in terms of the test methodology as well as the test environment. Implementation of this more disciplined approach will require a reversal to the trend of cutting back on government test personnel as well as strengthening their role in supporting the acquisition process. In that regard, the Director of Developmental Test and Evaluation should make an assessment of technological maturity and integration risk, based on test results and report the findings to the Undersecretary of Defense for Acquisition, Technology and Logistics.



There may be rare exceptions when a requirement is so pressing that risks must be taken to design a system which incorporates an unproven technology. In those instances, a high-priority, adequately funded, and closely monitored effort must be undertaken to mature the technology. This must include an early, rigorous assessment of the difficulties associated with the development effort as well as testing to fully assess the requisite maturity.

Additionally, the TRL process has been focused on the technology of system components. Problems with manufacturing these components in production quantities have also led to significant cost growth for weapons systems. Previous legislation established the Manufacturing Technology Program to identify and develop initiatives to improve manufacturing quality, productivity and technology. Consideration should be given to expanding the TRL process to evaluate the maturity of the production methods by which parts are manufactured.

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QUESTIONS SUBMITTED BY SENATOR BILL NELSON

MODELING AND SIMULATION

14. Senator BILL NELSON. Dr. Gansler, Dr. Kaminski, and Mr. Adolph, computer modeling and simulation (M&S) tools can be very useful in discovering problems in major systems before we spend a lot of money or time on hardware development. DOD has some programs in M&S—which in my opinion are underfunded and disjointed. What is your assessment of M&S activities within DOD and their ability to address some of the acquisition problems we are discussing here today?

Dr. GANSLER. M&S can be a great aid in system design and performance evaluation, and should be an important element in the development of all systems.

Dr. KAMINSKI. M&S can have a very significant positive impact on acquisition performance if there is sufficient emphasis on continuing validation of M&S tools and integration with T&E. Giving early and serious attention T&E will require strengthening our T&E organizations and personnel. T&E is often an afterthought, and contracts are often written without any mention of how we will test the product. We spend large amounts of money when a large development team waits for test results. The alternative is to spend less money and time by early development of M&S tools, continuously validating the models with testing at critical points, and considering the investment in M&S and test resources as a critical part of our systems engineering and development planning efforts.

Mr. ADOLPH. With some exceptions, the capabilities and limitations of simulations, simulators and physics-based models of individual subsystems are well understood. These tools are generally used where appropriate. However the use of modeling to support requirements definition, analysis of alternatives, and test design needs to be pursued more vigorously. The expectations regarding the use of M&S to support elements of the acquisition process, including system integration, T&E, and manufacturing have increased along with advances in computer technology. Distributed T&E (and training) using multiple ranges, laboratories, and facilities have benefited from the use of live, virtual, and constructive simulations. However, the availability of adequate models and modeling tools involving human dynamics for use in T&E, mission planning, systems engineering, and risk assessment has not kept pace.

M&S to support acquisition/test programs has been the norm for decades, and received additional impetus in the 1990s with advances in information processing technology. In many cases, the incremental improvements as related to acquisition were oversold in the late 1980s and 1990s. Additionally, the requirements for verification, validation, and accreditation have proven to be more costly and time-consuming than anticipated. Many of the M&S activities initiated in the last 15 years were disjointed, with few successful attempts to coordinate requirements, build and share common models, correlate performance, and ensure that the models were adequate for the intended applications. Numerous recent M&S developments have been terminated after spending millions because of the failure to produce a useful product.

Building models to meet every need is not feasible. An overall M&S vision is required to identify where efforts should be focused, and to ensure that new efforts are within that vision. If high priority M&S efforts within that vision could be identified, it would be possible to establish requirements, understand what is currently available, and then determine shortfalls in M&S capability. One approach is exemplified by the Testing in a Joint Environment Roadmap, which was recently developed by DOT&E and approved by the Deputy Secretary of Defense. While focused on T&E usage, this capability would meet a significant percentage of contractor de-

velopment and testing M&S requirements. The T&E roadmap identifies a requirement for a distributed live, virtual, constructive T&E capability; largely supported by existing models of friendly and threat systems. Much of this capability could come from existing models of acquisition systems developed by program contractors, in conjunction with threat models available from the intelligence agencies. However, there has been virtually no effort to identify requirements for high priority joint missions, to determine what friendly and threat force representations are required, assess the availability of existing models that meet those requirements, and then use that information to define M&S shortfalls. Additionally, there are insufficient mechanisms and processes to feed back data from operational tests and field exercises to further validate and refine models. Archiving mechanisms that can store and locate data for future applications are needed.

There are also supporting M&S requirements (engineering and physics-based models) which are required in the validation of higher-level engagement models. Higher level models, such as envisioned in the T&E roadmap, could be used to identify areas with the greatest risk and uncertainty to better define areas where engineering and physics-based models are required. The initial effort should be to review the past studies on M&S in the DOD and determine those requirements that could contribute the most to improving M&S capability. While most studies have identical or similar recommendations, the majority of those recommendations have not been implemented.

15. Senator AKAKA. Dr. Gansler, Dr. Kaminski, and Mr. Adolph, how would you recommend addressing shortfalls in DOD activities in M&S?

Dr. GANSLER. To address shortfalls, I would ask an independent group (such as the Defense Science Board) for an assessment and a set of recommendations (including appropriate funding).

Dr. KAMINSKI. We need upfront investment in M&S tools to understand the value propositions and the tradeoffs among cost, schedule, and performance of the mission. We spend large amounts of money when a large development team waits for test results. The alternative is to spend less money and time by early development of M&S tools, continuously validating the models with testing at critical points, and considering the investment in M&S and test resources as a critical part of our systems engineering and development planning efforts.

Mr. ADOLPH. Focused M&S business plans must be developed. Separate plans are needed for requirements definition, acquisition/test, training and force structure evaluations. As discussed above, the latter plans should be used to identify critical joint missions and provide a basis for prioritizing M&S requirements; to understand current capabilities and identify major shortfalls.

An issue that needs to be addressed is the availability of existing models to meet current requirements. Many models were developed by system contractors to meet specific needs. In some cases they are proprietary and there are rarely provisions for models to be maintained current so they represent a system in the field with normal improvements and modifications, or changes to the treats. Often contractors are not funded to make their models generally available. The government must address issues relating to long-term configuration control, upgrades, ownership, and funding throughout the system lifecycle, to include training. In addition, addressing the requirements for a single joint mission doesn't capture requirements across several potential joint missions and scenarios.

However, it would provide a starting point for future requirements and identify the most sensitive issues in implementation of the overall concept. Addressing one major joint mission scenario would identify a large percentage of requirements for other joint missions.

Finally, an important consideration is the physical location of major simulation laboratories and related facilities. There are often valid reasons to locate a simulation capability at a contractor development facility to support initial development; however it places limitations on the future utility and accessibility of the simulation, as well as the need to replicate parts of the simulation capability at a government test facility or logistics center. Prior to making a decision regarding the location of simulation facilities for each major program, an assessment should be made as to the most cost-effective locations(s), taking into account follow-on and future programs. This decisionmaking process should include the appropriate Service MRTFB representatives, as well as the TRMC. (See also my response to question #17.)

## TEST AND EVALUATION ENTERPRISE

16. Senator AKAKA. Mr. Adolph, a major step in developing weapons systems is ensuring that they are appropriately tested during their development and before their operational use. I believe that DOD is letting its testing enterprise decline precipitously in terms of testing equipment, infrastructure, and workforce. What role do you feel that the DOD testing enterprise plays in ensuring acquisition programs deliver their systems on schedule and on budget?

Mr. ADOLPH. The role of the DOD testing enterprise is addressed in detail in the recent Defense Science Board Task Force Report on Developmental T&E. My written testimony covers the major findings and recommendations from that study, and while it emphasizes the impacts of reliability, availability, and maintainability on life-cycle costs, the implementation of some acquisition reform initiatives diminished the role of government T&E in the acquisition process.

A brief summary response follows. The traditional role of the government during the test planning phase included the identification of test resource requirements and test facilities, the development of a test strategy and detailed T&E plans. When programs moved from the planning phase to the execution phase, the government traditionally performed operational assessments, participated in test conduct and analysis, and performed an evaluation of the test results for the government Program Office. With a few exceptions, this is no longer the case. In many instances the government testing enterprise has gone from vigorous test participation to oversight to out-of-sight.

As a minimum, government test organizations should reconstitute and retain a cadre of experienced T&E personnel to perform the following functions:

- Participate in the translation of operational requirements into contract specifications and key performance parameters
- Participate in RFP preparation and source selection, including assurance that contractor developed models and simulations are available to the government
- Participate in technology maturity determination and prototype evaluations
- Perform operational assessments in conjunction with the systems engineering process
- Participate in developmental T&E planning and technical reviews
- Participate in test conduct, analysis, reporting capabilities, and limitations, with emphasis on government analysis and reporting

17. Senator AKAKA. Mr. Adolph, what is your assessment of the state of the DOD's testing facilities and their ability to perform their designated missions?

Mr. ADOLPH. The focus of DOD's testing facilities is the Major Range and Test Facility Base (MRTFB) which is comprised of those ranges and facilities designated most critical to supporting the T&E needs of DOD development and acquisition programs. Since the 1970s, DOD's intent has been to ensure the capabilities and capacities of these MRTFB facilities/ranges meet the T&E requirements of emerging technologies and weapon system programs, taking into consideration the long-lead times necessary to acquire these capabilities, which often dictates that new test technologies be developed and matured. Likewise, a skilled T&E workforce must be in place to address the challenges of testing and evaluating new weapon systems with increasing complexities of technologies, integration, and missions. Given that this is the intention of the MRTFB, where do we stand today?

As I noted in my written statement, several changes resulted from the implementation of acquisition reform initiatives in the late 1990s. Among them was a de-emphasis on the use of government test facilities, testers, and evaluators. When programs need to use government test facilities, the first inclination has sometimes been to use non-MRTFB capabilities to avoid reimbursement costs required by the MRTFB charge policies, often using training ranges having little or no T&E infrastructure. If the MRTFB facilities/ranges are used, programs typically prefer to request only the raw data to perform their own evaluations. Consequently, the Services have been reducing their budgets and T&E workforce for sustaining the MRTFB. Not only has the MRTFB experienced loss of a large number of the experienced subject matter engineering experts, scientific, and mathematical personnel, several MRTFB test facilities are being mothballed or closed. The government skills to restore or replace them will be lost over time.

Investments in new test capabilities in the MRTFB for anticipated weapon system technologies and test programs have been increasingly awaiting the first program to need them for funding rather than using T&E institutional funds. This practice is counter to the intent of having an MRTFB; i.e., anticipating and having T&E ca-

pabilities in place when new development or acquisition programs require them. Some new T&E capabilities require long-lead times to plan, budget, and to develop to be ready when needed by a program, thus can cause the test program schedules to slip, inadequate capabilities to be accepted as work-arounds, or not to be tested at all. Furthermore, these facilities are normally specialized for the programs paying for them, and may have little or no residual use for other programs, particularly when they are co-located with the prime contractor's manufacturing facility. While the Test Resources Management Center (TRMC) "Strategic Plan for DOD Test and Evaluation Resources" serves as a good guide to the actions required to sustain a capable MRTFB, the TRMC has virtually no power to require the military departments to sustain adequate operating or investment funding beyond the funds managed through the Central Test and Evaluation Investment Program and T&E/S&T Program. As a result, my assessment is that in some instances, the MRTFB no longer meet its intended purpose of having adequate capabilities and capacity available for future acquisition programs.

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QUESTIONS SUBMITTED BY SENATOR E. BENJAMIN NELSON

FISCAL RESPONSIBILITY

18. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, cost overruns and fiscal irresponsibility are great concerns for me. During his hearing in January, the Secretary of Defense stated that many programs that cost more than anticipated are built on an inadequate initial foundation, which in my opinion begins with defining requirements. It has been reported that many of the COCOMs do not believe their requirements are sufficiently represented by the current process, which seems to be centered on each Service, not the Armed Forces as a whole. This results in duplication of capabilities, non-alignment of requirements to capability, and interoperability problems, all of which lead to expensive requirements creep. Should COCOMs play a lead role in defining needed capabilities?

Mr. SULLIVAN. Yes, we believe that the COCOMs should play a stronger role in defining capability needs. Requirements determination in DOD, particularly for major weapon system programs, continues to be driven largely by the military Services. Our work has revealed that although the COCOMs—which are responsible for planning and executing military missions—are the principal joint warfighting customer in DOD, they have played a limited role in determining requirements. In analyzing requirements documentation related to new capability proposals, we recently reported that most—almost 70 percent—were sponsored by the military Services with little involvement from the COCOMs. Other studies have also raised concerns that the Services and the COCOMs do not routinely collaborate to identify possible joint capability solutions.

- The Defense Acquisition Performance Assessment Panel concluded that JCIDS resulted in capabilities that did not meet warfighter needs in a timely manner and recommended that JCIDS be replaced with a COCOM-led requirements process in which the Services and defense agencies compete to provide solutions.
- The Defense Science Board similarly reported that JCIDS has not provided for increased warfighter influence, but instead actually suppresses joint needs in favor of military Service interests, and recommended an increase in the formal participation role of the COCOMs in the JCIDS process.
- The Center for Strategic and International Studies has also recommended that the Joint Forces Command take the lead in conducting capabilities development planning for the COCOMs and become a formal member of the JROC.

By continuing to rely on capability needs defined primarily by the Services, DOD may be losing opportunities for improving joint warfighting capabilities and reducing the duplication of capabilities.

Dr. GANSLER. The Packard Commission and (subsequently) Goldwater-Nichols stated that all requirements were "joint" (since that is the way we fight). The JROC was set up to represent the COCOMs in the "requirements process." Interoperability should always be a critical design and test requirement. The COCOMs should be the source of requirements for both "urgent needs" and for JCTDs.

Dr. KAMINSKI. I believe that the COCOMs should play a strong role. But to do so, they need to develop the expertise needed to engage in cost, schedule, and performance tradeoffs. Even top level requirements need continuing assessment based upon evolving value propositions. As we discover more about costs and performance

during execution, good program managers should be interacting with requirements developers to adjust as need to provide best value for the user. This requires some flexibility in cost allocation, and it also places demands upon requirements developers to become involved in tradeoff decisions. To be effective, requirements developers as well as acquisition managers must have experience with systems engineering tools and techniques, and both must have sufficient domain experience to engage productively in cost-performance tradeoffs.

Mr. ADOLPH. I don't have the background or experience to respond to this question.

19. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, how successful are DOD's processes for matching warfighter needs with resources?

Mr. SULLIVAN. GAO has previously reported that DOD's inability to achieve a balanced portfolio of weapon system programs that matches joint warfighting needs with available resources is due in part to the fragmented structure of the Department's requirements, funding, and acquisition processes. The JCIDS process has not been effective in prioritizing needs from a joint, Department-wide perspective, and it largely approves capability needs without accounting for the resources or technologies that will be needed to acquire the desired capabilities. Resource allocation decisions in DOD take place through the PPBE process, which is separate from JCIDS. PPBE largely allocates resources on a Service-by-Service basis and does not effectively link resources to capabilities. In addition, the process allows too many programs to start development with unreliable cost estimates and without a commitment to fully fund them. Until DOD establishes a more integrated approach to weapon system acquisition, it will continue to struggle to effectively prioritize warfighting needs, make informed trade-offs, and achieve a balanced mix of weapon systems that are affordable, feasible, and provide the best value to the warfighter.

While DOD recently reported that the JROC is doing more to seek out and consider input from the COCOMs through regular trips and meetings to discuss capability needs and resourcing issues, we found that many of the COCOMs still do not believe their needs—reflected through the IPL process—are sufficiently addressed through DOD's requirements process. In order to grant the COCOMs more influence in identifying requirements, DOD should consider providing the COCOMs with additional resources to establish robust analytical capabilities for identifying and assessing their capability needs. In addition, DOD and the Joint Staff should ensure the JROC gives equal consideration to COCOM needs.

Dr. GANSLER. As Secretary Gates has stressed, we need a better "balance" between likely warfighter needs and resource allocations. Today, the budgets are unbalanced in the direction of potential, future peer competitors.

Dr. KAMINSKI. The success is mixed. Warfighters are often very able to address their immediate needs, but addressing future needs can be challenging. Warfighters also need to be open to new conops—new approaches to performing their mission that can be derived from new, enabling technologies. Similarly, developers and cost estimators are more able to address near-term estimates involving technologies that are mature and familiar, and less able to do so with future technologies that are less mature and less familiar. Matching needs and resources must be a continuing, iterative process. This process must have a solid foundation in systems engineering, and the systems engineering must in turn have some foundation in M&S which is validated by building and testing. Effective value proposition assessments will occur only with skilled, trained, and experienced personnel from requirements and acquisition communities working together within a systems engineering framework to refine needs and solutions.

Mr. ADOLPH. I don't have the background or experience to respond to this question.

#### TECHNOLOGICAL CHANGE AND WEAPONS SYSTEMS

20. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, one of the challenges we face with new technology and the rapid advancement of technology is the desire to outfit our military men and women with the latest and most advanced equipment. While we all want to provide our military with the latest advances in technology, I worry that as technology changes we are in an ever state of trying to upgrade a system while it is in development. How can we best handle constant technology changes for weapons systems that take years to develop and deliver?

Mr. SULLIVAN. First, technology development must be placed on the critical path of any new acquisition program. Technology development requires trial and error, discovery, and invention, which should all be done in a S&T environment before technologies are brought onto programs. Second, GAO has found that successful commercial companies use an evolutionary or incremental approach that reduces development risks and enables quicker delivery of products to the customer. These commercial companies have implemented an evolutionary approach by establishing time-phased plans to develop a new product in increments (5 years or less) based on technologies and resources achievable now and later. They set requirements for products that require only technologies that they know will work, and wait to put more risky technologies on future increments once their risks have been diminished. An open architecture approach to development is also important so that product components, such as technologies, can be upgraded or added in subsequent product development increments, without having to do a major redesign of the product.

Historically, DOD's approach to developing new weapon systems often attempts to satisfy the full capability in a single step, "big-bang" approach regardless of the design complexity or the maturity of the technologies. Under this approach, the warfighter can wait over a decade to receive any new capabilities and by the time the capabilities are delivered, they may be out of date. Implementing knowledge-based evolutionary acquisition practices—where individual program increments are defined on the basis of mature technologies and a feasible design that incorporates an open architecture approach—would allow DOD to more effectively manage technology changes in acquisition programs. Shorter, more manageable development cycles would also provide the warfighter with useful technologies quicker and provide more confidence that technologies can be developed within program cost estimates.

Dr. GANSLER. See my answer to question #13.

Dr. KAMINSKI. I have always found that the mark of a good program manager is a large lower right hand desk drawer. In this drawer are placed all the ideas for incorporation of new technology advancements until the first version of the system is fielded. At that time the drawer is opened, and representatives from the requirements and acquisition communities meet and apply systems engineering tools and techniques to assess shortfalls in the fielded system, evolving needs, and evolving technologies to examine value propositions and decide what to incorporate in the next block of that fielded system.

Mr. ADOLPH. With platforms and major systems being procured less frequently and taking many years in development, there is often a tendency to over-reach since another opportunity to provide advanced technology to the warfighter may not occur for many years. The first, and most, beneficial action would be to work toward shortening the acquisition cycle. For various reasons, the acquisition cycle has become overly extended, due in part, as discussed in my response to question #13, to initiating acquisition programs based on immature technologies. This trend must be reversed. Recommendations have been made repeatedly in numerous studies that would result in a shortened cycle.

One approach to a shortened cycle for large programs would be to incorporate new technologies in "block upgrades." This approach has been successful for many defense systems, sometimes as a result of necessity and sometimes as preplanned improvements. The latter approach has been implemented on many aircraft programs where planned multi-staged improvement programs are executed at regular intervals. Strategies such as spiral acquisition and pre-planned product improvement have been pursued with various degrees of success. If too many new technologies are incorporated into a system, the risk is compounded by the complex task of integrating advanced technologies with sometimes insufficient technical maturity. These risks may be mitigated through disciplined processes to properly evaluate technology maturity, larger investments in technical domain expertise as well as in systems engineering. More emphasis should also be placed on analysis of alternatives, to include an OSD-level review. Designs that support "plug and play," e.g. standard interfaces are also a partial solution. Producing the technology and integrating it into the logistics system as well as training maintenance personnel, et cetera, can still be challenges if the technology has never been deployed to the warfighter. (See also my response to question #13.)

#### ACQUISITION PERSONNEL

21. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, a consistent theme throughout the hearing was the insufficiency of the current acquisition workforce. What would your recommendation be for increasing the number of Active Duty billets specifically for acquisition?

Mr. SULLIVAN. Although we did not examine DOD's decisionmaking process for using military versus civilian personnel, we recently reported that DOD lacks critical Department-wide information to determine the sufficiency of its acquisition workforce to meet its mission needs. We recommended that DOD identify the number and skill sets of its total acquisition workforce—including civilian, military, and contractor personnel—and conduct analyses using this information to inform acquisition workforce decisions regarding the appropriate mix of civilian, military, and contractor personnel. We are encouraged by the Department's recent announcement that it plans to significantly increase the size of DOD's acquisition workforce by converting 11,000 contractors and hiring an additional 9,000 government acquisition professionals by 2015—beginning with 4,100 in fiscal year 2010.

Dr. GANSLER. In the Commission I chaired (the "Commission on Army Acquisition and Program Management in Expeditionary Operations") we stressed that it is not just numbers that matter, but rank as well as experience. The senior military acquisition positions should be staffed with General Officers that have extensive acquisition experience. As to numbers, we should at least get back the 25 percent that Congress mandated be cut in fiscal year 1996 (which, across the DOD acquisition workforce, military and civilian, is approximately 50,000 additions—of which perhaps 20 percent are military).

Dr. KAMINSKI. Numbers alone aren't the answer. We need an appropriate mix of quality and quantity. We need personnel able to provide early and continuing systems engineering and closely-coupled development planning. We need: a) sufficient personnel (in both government and industry) with adequate education, training and domain experience (this includes personnel in requirements development as well as in acquisition); and b) sufficient front end investment in the tools necessary to understand the key tradeoffs in cost/schedule/performance, and to identify and address the key risks in a systematic manner.

Mr. ADOLPH. As a minimum, the government acquisition workforce, which includes military and civilian personnel, should be increased to the levels that existed in the mid-1990s prior to the congressional and Service reductions. The military/civilian acquisition position mix should be left to the individual Services as each is procuring different commodities, and has a different philosophy regarding a career military acquisition workforce. As I noted in my opening statement, during a time of increased programmatic and technical complexity, there has been a loss of a large number of the most experienced management and technical personnel, without an adequate replacement pipeline. Solutions to the acquisition problems must begin with reconstituting a trained and experienced government workforce, which includes programs managers, domain subject matter experts as well as systems engineers, contracts personnel, testers and evaluators.

22. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, to ensure we get the quality and expertise we require, how do you recommend we recruit and retain this force?

Mr. SULLIVAN. DOD has just announced plans to substantially increase its in-house acquisition workforce over the next few years. Our recent report on DOD's acquisition workforce included practices of leading companies that could provide insights for DOD as it moves forward to hire and retain these employees. We found, for example, that the companies employed a variety of recruitment and retention initiatives. More importantly, some companies assessed their efforts at filling workforce gaps by tracking data on specific recruiting and retention metrics. One company assessed the quality of their hiring sources by assessing the performance of new hires over their first 2 years.

Dr. GANSLER. Promotion potential and acquisition-experienced leaders are the keys to recruiting, developing, and retaining top acquisition personnel.

Dr. KAMINSKI. You are quite right in noting that we must address retention as well as recruitment to build the requisite work force. We want people who want to make a difference. When we recruit these people, we must expect that we won't keep them if they can't see that they in fact are making a difference. Excessive (and growing) time from program initiation to fielding is a big problem for young people who want to see the impact of their work. As this time increases from a few years to 15 years or more, it undermines the entire acquisition process by causing key participants to "lose the recipe", and lose a sense of accountability as well as a sense of being able to make a difference. When new capabilities are developed and fielded in 5 years, engineers, managers, testers, cost analysts, et cetera, are able to benefit from and apply the experience gained from a previous program or program phase. They can also see the results of their decisions and be held accountable. We can also meaningfully employ past performance of the contractor as a factor in the award of future programs—an important factor in incentivizing contractor perform-

ance. This all changes dramatically when the time extends to 15 years, and we have five roll-overs of management, engineers, cost analysts, and commercial technology during this time period. This long and growing time period is a result of the inflexibility inherent in our entire system of requirements development, budgeting, and acquisition, and it creates a vicious cycle in which it further exacerbates the contributors above, and they in turn further increase the time and cost growth. We see the result when we must discard our current acquisition system in order to deal with urgent needs and field systems such as MRAP and jammers to counter IEDs by forming and using rapid reaction organizations. This cycle must be broken by attacking the root causes.

Mr. ADOLPH. When the acquisition workforce reductions were made in the late 1990s, they were implemented by encouraging early retirements as well as hiring freezes, which often lasted for years. As a consequence of the latter, the pipeline of new civilian employees was shut off, and today there are large gaps in experience as well as inadequate numbers of personnel. Some Service test organizations are aggressively addressing these issues and have more insight into what works in today's environment than I do. Based on my past experience, initial hiring, particularly for positions at remote test locations, is the biggest challenge. It requires aggressive recruiting at universities, along with co-op programs. The challenge of the work environment and the learning experiences, dealing with the latest technologies, combined with well-funded full-time advanced degree educational opportunities (with associated follow-on career commitments), are powerful positive retention forces after people are brought on board. On-the-job learning experiences have been diminished in some test organizations, where government personnel have been relegated to less challenging supporting functions.

23. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, what can we do in the meantime to handle the personnel shortage since it will take many years to develop the level of expertise required for proper acquisition reform?

Mr. SULLIVAN. As we recently reported in our review of DOD's acquisition workforce management, DOD is currently implementing initiatives aimed at improving the capacity of its acquisition workforce using the newly established Acquisition Workforce Development Fund. These efforts are focused in three key areas: (1) recruiting and retention; (2) training and development; and (3) retention and recognition. DOD has also recently announced plans for significantly increasing its in-house acquisition workforce over the next few years. While DOD integrates these additional employees into its acquisition workforce, the Department can also leverage the experience and knowledge of its current workforce. DOD can take steps to retain experienced personnel to aide in the development of newer staff and to ensure it maintains and transfers key institutional knowledge.

Dr. GANSLER. To fill the gap, while developing a new group, I would bring into the government some middle and senior people from industry; and I would use contractors (with experience, but without conflicts) to fill the rest of the slots.

Dr. KAMINSKI. We can begin to hire people with education in engineering and systems engineering. We can send our current personnel back to universities to enhance their education. We can send our current personnel to industry to gain domain experience. We can bring back retirees on a part time basis to provide mentoring to our new hires and help them gain domain experience. We need to do all of these.

Mr. ADOLPH. During the period when the normal pipeline is being replenished, Centers of Excellence must be created in selected test and acquisition engineering support organizations, with a focus on technical domain subject matter expertise. These cadres of expertise will provide the basic oversight functions such as those I outlined in my answer to question #16. The first step is to provide oversight in key technical disciplines at key programmatic times, e.g., RFP preparation, source selection, TEMP preparation, test reporting to support program reviews; transitioning to more active, continuous involvement as the workforce increases. The Services may be reluctant to take this approach. These Service cadres can also be augmented by subject matter experts from FFRDCs. The use of red teaming by outside experts (e.g., cross-Service, FFRDCs, and SETAs) should also be employed to provide the requisite expertise, as well as a measure of independence which is too often lacking in government program office-centric reviews.



## MANDATORY PROCEDURES FOR MAJOR DEFENSE ACQUISITION PROGRAMS

24. Senator BEN NELSON. Mr. Sullivan, Dr. Gansler, Dr. Kaminski, and Mr. Adolph, what oversight and reporting mechanisms do you recommend we establish to ensure the Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) meet warfighter requirements while eliminating redundancy and wasteful spending?

Mr. SULLIVAN. DOD has recently revised its acquisition policy in ways intended to provide key Department leaders with the knowledge needed to make informed decisions before a program starts and to maintain disciplined development once it begins. The revised policy recommends the completion of key systems engineering activities before the start of development, requires early prototyping, establishes review boards to identify and mitigate technical risks, and implements early milestone reviews. If implemented, these policy changes could help programs replace risk with knowledge, thereby increasing the chances of developing weapon systems within cost and schedule targets while meeting user needs. To achieve improved outcomes in acquisition programs, DOD must ensure its policy changes are consistently implemented and reflected in decisions on individual programs. However, DOD could do more by requiring new programs to have manageable development cycles and establish knowledge-based cost and schedule estimates. Limiting the length of development cycles would make it easier to more accurately estimate costs, predict future funding needs, effectively allocate resources, and hold decision makers accountable.

The acquisition reform legislation recently proposed by the Senate Armed Services Committee should also help achieve further improvements. Provisions increasing the emphasis on systems engineering, requiring early preliminary design reviews, and strengthening independent cost estimates and technology readiness assessments should make the critical front end of the acquisition process more disciplined. Establishing a termination criterion for critical cost breaches could help prevent the acceptance of unrealistic cost estimates at program initiation. In addition, having greater COCOM involvement in determining requirements and greater consultation between the requirements, budget, and acquisition processes could help improve DOD's efforts to balance its portfolio of weapon system programs.

While policy revisions and legislation may lead to improvements, they will not be effective without changes to DOD's overall acquisition environment and the incentives that drive the behavior of its decisionmakers, the military Services, program managers, and the defense industry. Changing the environment will require strong leadership and accountability within the Department.

Dr. GANSLER. I believe we currently have enough oversight and reporting mechanisms for MDAPs (and more would only slow the system down even more). The critical need is to use these mechanisms more effectively—with experienced personnel (who know what to look for, and what questions to ask).

Dr. KAMINSKI. We first need to realize that "one size does not fit all." For example, programs dealing with countering IEDs need cycle times measured in weeks, while a next generation bomber program must plan for fielding and support cycles measured in years.

In most cases today the program manager's authority is diffused by many levels of oversight in both the Department and in Congress, and the financial and performance constraints imposed do not allow sufficient freedom of action to apply informed judgment in a timely manner. Flexibility is further limited by application of a "one-size-fits-all" approach imposed by the DOD 5000 system, and the oversight practiced by the DOD and Congress. A program manager needs the freedom to tailor the acquisition approach to the problem, to ensure that the program response time will fall within the response time of the threat, and to apply a variety of tools and techniques (such as the use of prototypes, competitive prototypes, M&S, critical subsystem and component demonstration). For this to work, we need program managers with the education, training, and domain experience needed to enable timely responses and excellent judgment relevant to the domain. They need the flexibility to apply their expertise.

Mr. ADOLPH. I believe the current oversight and reporting mechanisms, when combined with the changes in the proposed legislation, will provide adequate direction and guidance for the acquisition process. The key is putting more discipline in every step of the process by the Services and OSD. This was achieved in numerous past successful programs in the 1960s, 1970s, and 1980s without being overly bureaucratic. One impediment is the recent trend towards contractual vehicles which relieve development contractors of reporting requirements, including regular status reports on costs and technical performance. The government must have continued access to cost and performance data to provide effective oversight.

Most of the basic policies and directives for the acquisition process represent best practices based on decades of experience. The fundamental problem is a lack of ade-

quate discipline throughout the process. This begins with proper definition of operational requirements at the outset of a program and stating those requirements in terms that are reasonable and quantifiable for design and test purposes. Another major issue is the lack of adequate technology maturity (See my response to question #13.)

There have been some problems with military specifications and standards in the past, in that they were not properly tailored to the system to be procured. However, these standards have evolved and were updated over decades and were, for the most part, excellent compendiums of best practices and lessons learned. If properly used, they provide guidance for system development to ensure a systematic and disciplined approach. Proper application of these guidance documents also ensures that problems, which are a normal part of any complex high technology development, are identified early. Many of these documents have been allowed to atrophy over the last several years or have been eliminated. Previously eliminated specifications and standards should be selectively updated and reinstated, while retaining the option to use commercial specifications and standards when available, provided the latter adequately address the requisite military performance and suitability requirements in the intended operating environment. Finally, the most important ingredient remains a capable and experienced government acquisition workforce with equally capable leaders, who remain on the job long enough to realize the consequences of their programmatic decisions.

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QUESTIONS SUBMITTED BY SENATOR DAVID VITTER

PERSONNEL IN ACQUISITION REFORM

25. Senator VITTER. Dr. Gansler, a recurring message from the panel is the importance of improving the quality and experience of personnel in acquisition reform, and I'm glad that Chairman Levin and Ranking Member McCain included section 206 in their acquisition reform bill to reward excellence. This section requires the establishment of a program recognizing excellent performance and the award of cash bonuses. However, it was stated that cash isn't necessarily the greatest incentive for encouraging excellence, and making a difference is the best incentive. In your opinion, what can DOD implement in an excellence program to demonstrate improvements so that personnel can track and actually see their work reflected in tangible results to provide and maintain motivation?

Dr. GANSLER. Combining appropriate metrics with rewards for success (including recognition, and even token financial rewards) are desirable—but the managers must be allowed to have sufficient flexibility to exercise their judgment, if they are to succeed.

26. Senator VITTER. Dr. Gansler, how much of the problem in attracting the right quantity of qualified acquisition personnel is a product of the overall Federal employee hiring rules established by Office of Personnel Management (OPM) or the specific rules established by DOD?

Dr. GANSLER. The DOD must be able to compete with industry for “the best and brightest.” The process must be flexible and fast—yet fair. Salary will not be the driver (government jobs offer the rewards) but the process can be neither bureaucratic nor political.

27. Senator VITTER. Dr. Gansler, last year, Congress authorized \$300 million to rebuild the acquisition workforce. Do you believe this is sufficient?

Dr. GANSLER. It is an important start, and will likely need to be continued for a few years.

28. Senator VITTER. Dr. Gansler, cost overruns were endemic in the 1980s and 1990s when the acquisition workforce was robust. Is it likely then that adding more people will solve the problem of cost overruns?

Dr. GANSLER. As I noted in question #21, numbers alone are not the answer, senior and experienced people with an improved acquisition process (as covered in my answers above—especially numbers 1, 8, and 13).

29. Senator VITTER. Dr. Gansler, it seems that there is a problem with keeping quality program managers in their roles for an extended period of time. How can we ensure continuity at these positions?

Dr. GANSLER. Goldwater-Nichols intended the program managers to remain at least through the next milestone. In the Packard Commission we emphasized that

they be allowed to be promoted in place (so that the extended period is a reward, not a career-limiting assignment).

#### FUNDING FOR DEVELOPMENTAL TESTING

30. Senator VITTER. Mr. Adolph, to what extent does a lack of funding for developmental testing (DT) early in a program's schedule result in cost increases and delays later in its schedule?

Mr. ADOLPH. The lack of adequate funding for DT has a major adverse impact on developmental cost and schedule. There are numerous issues relating to DT funding. The weapons timelines for RDT&E continue to increase, driven by inadequate resourcing of the entire developmental process as well as the inclusion of immature technologies in systems. Inadequate funding of DT, which includes the number of test assets, results in delayed identification and correction of problems, many of which are a normal part of a high-technology developmental program. Late identification results in more difficulty and expense involved in fixes. Most recent programs have had an inadequate number of assets to execute a robust DT program in a timely manner. When there are an inadequate number of test assets, the DT program is drastically impacted, often for months, when a test vehicle must be laid up for a retrofit. By the time a program reaches the full-scale platform test phase, there is a huge cadre of test and test support personnel who cannot be efficiently used whenever a test program comes to a halt. The fixed cost of maintaining this cadre often exceeds the incremental variable costs of conducting test missions. Another factor in efficient testing is the availability of adequate test personnel and test facilities. The latter includes physical test support facilities and assets, instrumentation, and data processing (see also my response to question #17). Numerous developmental programs have been delayed because of the lack of adequate facilities, capacity, and people to accomplish the basic data processing tasks quickly, as well as inadequate number of domain subject matter experts to analyze test results. This is exacerbated when earlier involvement by DT&E and OT&E personnel is limited by a lack of sufficient experienced personnel. Commercial programs routinely resource facilities and personnel to conduct testing on a multiple shift basis during critical phases of the developmental process.

#### COMPETITIVE PROTOTYPING

31. Senator VITTER. Dr. Kaminski, how much can competitive prototyping help in identifying the best product for warfighters?

Dr. KAMINSKI. Competitive prototyping is one arrow in our quiver of tools and techniques in development planning. Not all prototyping needs to be competitive. Prototyping should not be limited to the full system level. There are cases where prototyping is best applied only to address major platform integration risk areas, or to critical subsystems. Again, I don't believe there is a "one-size-fits-all" solution to prototyping. But I do believe that at a big picture level we are not doing enough prototyping in our development planning. Reducing risk and developing domain expertise require that we build things. M&S are of great value, and so are our computer based analysis and design tools, but all of my experience tells me that we need to build and test on a continuing basis to make mistakes, learn from those mistakes, and apply that learning in the development of new capabilities.

32. Senator VITTER. Dr. Kaminski, the F-16 program, lauded by many as an example of how to acquire a capability, was competed to the point where the Air Force actually flew competing planes before deciding on which defense contractor won the award. Why have we gotten so far away from that?

Dr. KAMINSKI. We haven't completely departed from that approach. We did something very similar in the JSF program. But I agree that we are not doing enough. We can do quite a bit more. I believe we can do so without increasing costs by spending money upfront to reduce or avoid the cost of significant overruns later.

#### JOINT REQUIREMENTS OVERSIGHT COUNCIL

33. Senator VITTER. Mr. Sullivan, the Vice Chiefs have important jobs internally managing their respective Services. Do you believe that JROC should instead be staffed with independent personnel who are not advocates for a particular Service?

Mr. SULLIVAN. GAO has found DOD's requirements process to be too Service-centric. The needs of the COCOMs should be given greater consideration. There are a number of ways the requirements setting process might be changed to address this

issue. For example, the combatant commanders might supplant the Service Vice Chiefs role in the process or might be given an equal say in the process. Several outside reviews have suggested such solutions:

- The Beyond Goldwater-Nichols study team recommended a more “joint” JROC in which the Service Vices are replaced by COCOM Deputies and civilians responsible for requirements policy.
- The Defense Acquisition Performance Panel (DAPA) recommended replacing the current requirements setting process with a combatant commander-led requirements process in which the Services and defense agencies compete to provide solutions. Each of the combatant commanders would be tasked to prepare extended planning annexes to each of their operational and contingency plans (to be updated on a 2-year cycle) that would provide a 15-year forecast of both capability gaps and excesses relative to mission requirements.
- Some members of the Defense Science Board Summer Study on Transformation felt that the requirements process continues to be dominated by the force providers and the Joint Staff and that COCOM needs are underrepresented. They proposed making the COCOMs more equal partners with the force providers from the beginning of the process, particularly when identifying capabilities needed to carry out the Department’s operational missions.

We believe that these proposals deserve further consideration as a means to help improve the Department’s ability to balance joint warfighting needs.

34. Senator VITTER. Mr. Sullivan, should we have a new, independent JROC that could hear all advocates for all programs and then recommend continuation or elimination of the program based on current and likely future threats to the United States?

Mr. SULLIVAN. Because many major defense acquisition programs have ambitious and lengthy product developments—in some cases, delivery of a weapon system to the warfighter takes as long as 15 years—there can be a significant amount of time that elapses between JROC reviews and changes in the threat environment can occur. Before a major weapon program is approved to begin system development, the JROC must validate the capabilities to be developed, including the system’s key performance parameters. The JROC also validates the production elements of a program before it is approved to start production. For programs that have lengthy development cycles, more frequent reviews may be necessary to assess whether programs are worth continuing in light of current and likely future threats. In prior work we have conducted on how successful companies manage their portfolios of product development efforts, we found that the companies revisit their investment decisions at multiple stages throughout product development to ensure products are still of high value.

35. Senator VITTER. Mr. Sullivan, should the Services be required to budget their programs to the cost estimates provided by a new Director of Independent Cost Assessment?

Mr. SULLIVAN. Budgeting programs to an independent cost estimate would be an improvement, however, for cost estimates to be effective they must be based on a high degree of knowledge about requirements, technology, design, and manufacturing.

A reliable cost estimate helps ensure a program’s projected funding needs are adequate to execute the program. Less than a quarter of the 48 programs in GAO’s annual assessment of weapon system programs that provided data used the estimate made by DOD’s Cost Analysis Improvement Group (CAIG) as a basis for the program’s baseline, while almost 70 percent of the programs used the program office or Service cost estimate. While cost estimates from the CAIG can underestimate a program’s costs by billions of dollars, GAO has previously found that these independent estimates generally underestimate costs by a smaller amount than program office and Service estimates.

Cost estimates are inaccurate in part because they are based on limited knowledge about the requirements, technologies, design maturity, and the time and funding needed to execute a program. GAO has found, for example, that program Cost Analysis Requirements Documents—used to build the program cost estimate—often lack sufficient detail about planned program content for developing sound cost estimates. Without this knowledge, cost estimators must rely heavily on parametric analysis and assumptions about system requirements, technology, and design maturity, and the time and funding needed. The assumptions used in developing esti-

mates also tend to be overly optimistic. Furthermore, cost estimates that lack knowledge and rely on assumptions have inherently high levels of risk and uncertainty that are not typically communicated to decision makers.

36. Senator VITTER. Mr. Sullivan, with the annual Selected Acquisition Reports and current Nunn-McCurdy reporting requirements, is Congress suffering from a lack of oversight and reports from DOD?

Mr. SULLIVAN. In terms of the reports it receives from DOD, Congress is suffering from a lack of insight into the risks on programs that could lead to cost, schedule, and performance shortfalls. The Selected Acquisition Reports and Nunn-McCurdy reporting that Congress gets from DOD on its major defense acquisition programs primarily report on program outcomes to date—including quantitative measures of cost, schedule, and performance over time. While these are useful indicators of the health of acquisition programs and whether they are meeting their intended goals, they have limited predictive value. DOD could improve the information it provides to Congress by reporting on knowledge metrics that evaluate whether programs have attained certain levels of technology, design, and manufacturing knowledge by key points in the acquisition process. This reporting would facilitate the identification of potential problems that could lead to cost, schedule, and performance shortfalls before they occur.

37. Senator VITTER. Mr. Sullivan, is there any credence to the concern that program managers have “too many” reports to file and are not focusing on managing their programs?

Mr. SULLIVAN. Oversight and reporting requirements need to be evaluated both from the perspective of the time they take and the value they provide. In the past, we have reported on concerns in both of those areas. In a November 2005 report, we reported that program managers and program executive officers commented that they spend too much time producing data that is not strategic or very useful to them. In fact, more than 90 percent of 126 respondents to our survey of program managers said that they spent either a moderate, great, or very great extent of their time representing their program to outsiders and developing and generating information about program progress.

We have also found that the reporting that is done does not include key information that decisionmakers need to decide if a program is ready to proceed into the next phase of the acquisition process. For example, in transitioning from system integration to system demonstration, we have recommended that DOD ensure the capture of knowledge about the completion of engineering drawings; completion of subsystem and system design reviews; agreement from all stakeholders that the drawings are complete; and identification of critical manufacturing processes, among other indicators. In the transition to production, we recommended that DOD capture knowledge about production and availability of representative prototypes along with statistical process control data. Our 2005 report indicated that a relatively small percentage of programs used these knowledge indicators. For example, only 32 percent of 126 program managers who responded to our survey said they used design drawing completion extensively to measure design maturity; only 26 percent said they used production process controls to a great extent. Even fewer program managers reported that their immediate supervisor used these measures extensively to evaluate progress. Broader use and reporting of these types of metrics would help decisionmakers gauge progress and ensure that programs managers are: (1) conducting activities to capture relevant product development knowledge; (2) providing evidence that this knowledge has been captured; and (3) holding decision reviews to determine that the requisite knowledge has been captured before proceeding to the next phase of the acquisition process.

[Whereupon, at 11:52 a.m., the committee adjourned.]

