

**GAO**

Report to the Subcommittee on  
Readiness and Management Support,  
Committee on Armed Services,  
U.S. Senate

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November 2005

# BEST PRACTICES

## Better Support of Weapon System Program Managers Needed to Improve Outcomes





Highlights of [GAO-06-110](#), a report to the Subcommittee on Readiness and Management Support, Committee on Armed Services, U.S. Senate

## Why GAO Did This Study

The Department of Defense (DOD) relies on a relatively small cadre of officials to develop and deliver weapon systems. In view of the importance of DOD's investment in weapon systems, we have undertaken an extensive body of work that examines DOD's acquisition issues from a perspective that draws lessons learned from the best commercial product development efforts to see if they apply to weapon system acquisitions. In response to a request from the Chairman and Ranking Minority Member of the Subcommittee on Readiness and Management Support, Senate Committee on Armed Services, this report assesses (1) how successful commercial companies position their program managers, (2) how DOD positions its program managers, and (3) underlying reasons for the differences. In compiling this report, GAO conducted a survey of program managers. See [GAO-06-112SP](#).

## What GAO Recommends

GAO recommends the Secretary of Defense develop an investment strategy to prioritize needed capabilities; require senior stakeholders to formally commit to business cases for new weapon system developments; and develop a process to instill and sustain accountability for successful program outcomes. DOD agreed with our recommendations.

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[www.gao.gov/cgi-bin/getrpt?GAO-06-112SP](http://www.gao.gov/cgi-bin/getrpt?GAO-06-112SP)

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

## BEST PRACTICES

# Better Support of Weapon System Program Managers Needed to Improve Outcomes

## What GAO Found

U.S. weapons are among the best in the world, but the programs to acquire them often take significantly longer and cost more money than promised and often deliver fewer quantities and capabilities than planned. It is not unusual for estimates of time and money to be off by 20 to 50 percent. When costs and schedules increase, quantities are cut, and the value for the warfighter—as well as the value of the investment dollar—is reduced.

When we examined private sector companies that developed complex and technical products similar to DOD, we found that their success hinged on the tone set by leadership and disciplined, knowledge-based processes for product development and execution. More specifically, long before the initiation of a new program, senior company leaders made critical investment decisions about the firm's mix of products so that they could commit to programs they determined best fit within their overall goals. These decisions considered long-term needs versus wants as well as affordability and sustainability. Once high level investment decisions were made, senior leaders ensured that programs did not begin unless they had a business case that made sure resources were in-hand to execute the program—that is, time, technology, money, and people. Once a business case was established, senior leaders tasked program managers with executing that business case for each new product from initiation to delivery, but required their program managers to use a knowledge-based product development process that demanded appropriate demonstrations of technology, designs, and processes at critical junctures. The program manager was empowered to execute the business case, but also held accountable for delivering the right product at the right time for the right cost. Requiring the program manager to stay throughout the length of a project was a principal means of enforcing accountability. Overall, by providing the right foundation and support for program managers, the companies we visited were able to consistently deliver quality products within targets, and in turn, transform themselves into highly competitive organizations.

DOD program managers are put in a very different situation. DOD leadership rarely separates long-term wants from needs based on credible, future threats. As a result, DOD starts many more programs than it can afford—creating a competition for funds that pressures program managers to produce optimistic cost estimates and to overpromise capabilities. Moreover, our work has shown that DOD allows programs to begin without establishing a formal business case. And once they begin, requirements and funding change over time. In fact, program managers personally consider requirements and funding instability—which occur throughout the program—to be their biggest obstacles to success. Program managers also believe that they are not sufficiently empowered to execute their programs, and that because much remains outside of their span of control, they cannot be held accountable.

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### Abbreviations

DAWIA	Defense Acquisition Workforce Improvement Act
DOD	Department of Defense
OSD	Office of the Secretary of Defense
PEO	program executive officer

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November 30, 2005

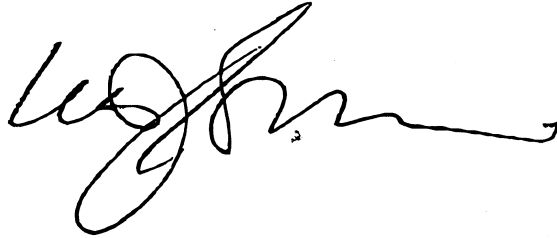
The Honorable John Ensign  
Chairman  
The Honorable Daniel K. Akaka  
Ranking Minority Member  
Subcommittee on Readiness and Management Support  
Committee on Armed Services  
United States Senate

As you requested, this report examines how program managers in the Department of Defense are supported and how they are held accountable for program outcomes. It compares department policies and practices to those of leading commercial companies we visited and discusses actions DOD could take to improve the accountability of program managers and provide them with timely support as they manage the development of complex systems. We make recommendations to the Secretary of Defense to (1) develop an investment strategy to prioritize needed capabilities, (2) require, for each new program, that senior level stakeholders formally commit to a business case for program approval at the start of a new program, and (3) implement a process to instill and sustain accountability for successful program outcomes.

We are sending copies of this report to the Secretary of Defense; the Secretary of the Army; the Secretary of the Navy; the Secretary of the Air Force; the Director, Missile Defense Agency; the Director of the Office of Management and Budget; and interested congressional committees. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at <http://www.gao.gov>.

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If you have any questions regarding this report, please call me at (202) 512-4841. Staff acknowledgements are listed in appendix II.

A handwritten signature in black ink, appearing to read 'Michael J. Sullivan', with a stylized flourish at the end.

Michael J. Sullivan  
Director, Acquisition and  
Sourcing Management

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# Executive Summary

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## Purpose

The Department of Defense (DOD) plans to increase its investment in the research, development, and procurement of new weapon systems from \$144 billion in fiscal year 2005 to \$185 billion in fiscal year 2009. U.S. weapons are among the best in the world, but the programs to acquire them often take significantly longer and cost more money than promised and often deliver fewer quantities and other capabilities than planned. It is not unusual for estimates of time and money to be off by 20 to 50 percent. When costs and schedules increase, quantities are cut, and the value for the warfighter—as well as the value of the investment dollar—is reduced.

In view of the importance of DOD's investment in weapon systems, we have undertaken an extensive body of work that examines DOD's acquisition issues from a different, more cross-cutting perspective—one that draws lessons learned from the best commercial product development efforts to see if they apply to weapon system acquisitions. In response to a request from the Chairman and Ranking Minority Member of the Subcommittee on Readiness and Management Support, Senate Committee on Armed Services, this report assesses (1) how successful commercial companies position their program managers, (2) how DOD positions its program managers, and (3) underlying reasons for the differences.

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## Background

DOD relies on a relatively small cadre of military and civilian officials—known as program managers—to lead the development and delivery of its weapon systems. The responsibility placed on this group is enormous. The systems that program managers are responsible for range from highly complex and sophisticated aircraft, missile interceptors, submarines, and space-based sensors, to new communication and ground control systems that support and interconnect this equipment, to smaller, less complex systems that support the warfighter. In these times of asymmetric threats and netcentricity, individual weapon system investments are getting larger and more complex. The development process itself is very challenging as many systems require successful management and coordination of a broad array of military service and DOD officials, outside suppliers, internal and external oversight entities, as well as technical, business, contracting, and management expertise. Moreover, in many cases, weapon systems are also expected to incorporate technologies that push the state-of-the-art while operating in harsh and even untested environments—adding daunting technical challenges to the already existing business, management, and logistical challenges. Lastly, GAO has reported many of the business processes that support weapons development—strategic planning and budgeting, human capital management, infrastructure, financial



management, information technology, and contracting—are beset with pervasive, decades-old management problems, which include outdated organizational structures, systems, and processes.<sup>1</sup>

Weapon system program managers are the central executors of the acquisition process. They are responsible for all aspects of development and delivery of a new system and for assuring that systems are high quality, affordable, supportable, and effective. In carrying out this responsibility, they are also responsible for balancing factors that influence cost, schedule, and performance. DOD employs about 729 program managers to run its weapons programs. Both military officers and civilians serve as program managers, but the majority is from the military. DOD's program managers typically report to program executive officers (PEO) who are charged with overseeing the execution of a portfolio of related systems. PEOs, in turn, typically report to a military service acquisition executive, who reports to a service secretary, or for some programs, the PEO reports to the Defense Acquisition Executive.

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## Results in Brief

Program managers from the leading companies we spoke with believed that two critical enablers—(1) support from top leadership and (2) disciplined, knowledge-based processes for product development execution—empowered them to succeed in delivering new products when needed within cost, quality, and performance targets originally set by the company. Long before the initiation of a new product development, senior company leaders make critical strategic investment decisions about the firm's mix of products and the return on investment they may yield. Once high-level investment decisions were made, senior leaders ensured that programs did not begin unless they had a business case that demonstrated the program was aligned with the company's goals and that resources were in-hand to execute the program—that is, time, technology, money, and people. Once a business case was established, senior leaders tasked program managers with executing that business case for each new product from initiation to delivery, but required their program managers to use a knowledge-based product development process that demanded appropriate demonstrations of technology, designs, and processes at critical junctures. The program manager was empowered to execute the

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<sup>1</sup> *Defense Management: Key Elements Needed to Successfully Transform DOD Business Operations*, GAO-05-629T (Washington, D.C.: April 28, 2005) and *High-Risk Series: An Update*, GAO-05-207 (Washington, D.C.: January 2005).

business case, but also held accountable for delivering the right product at the right time for the right cost. Throughout execution, company senior leaders supported their program managers by encouraging open and honest communication and continually assured that the right levels of resources and management attention were available for the project.

While DOD has taken action in recent years to better position programs for success, it puts its program managers in a very different situation. Program managers themselves believe that rather than making strategic investment decisions, DOD starts more programs than it can afford and rarely prioritizes them for funding purposes. The result is a competition for funds that creates pressures to produce optimistic cost and schedule estimates and to overpromise capability. Our own work has shown that many programs begin without a business case, that is, without adequate knowledge about technology, time, and cost and without demonstrating that the program itself is the optimal approach for achieving a needed capability. Moreover, once programs begin, the program manager is not empowered to execute the program. In particular, program managers cannot veto new requirements, control funding, or control staff. In fact, program managers personally consider requirements and funding instability to be their biggest obstacles to success. Program managers also believe that they are not sufficiently supported once programs begin. In fact, they must continually advocate for their programs in order to sustain support. Our past reports also show that programs are incentivized to suppress bad news and to continually produce optimistic estimates—largely due to continual funding competition.

Many of these differences can be attributed to how success is defined within the commercial and DOD environment. Success for the commercial world is straightforward and simple: maximize profit. In turn, this means selling products to customers at the right price, the right time, and the right cost. With this imperative in hand, companies have no choice but to adopt processes and cultures that emphasize basing decisions on knowledge, reducing risks prior to undertaking new efforts, producing realistic cost and schedule estimates, and assuring consistency and quality pervade all efforts. At first glance, DOD's definition of success is very similar: deliver capability to the warfighter at the right price, the right time, and the right cost. But, for various reasons, it is clear that the implied definition for success is to attract funds for new programs and to keep funds for ongoing programs. While the annual appropriations process and the wide variety of mission demands placed on DOD contribute to this condition, DOD has made matters worse by not making hard tradeoff decisions to ensure it does not pursue more programs than it can afford.

Once attracting funds becomes “success,” harmful practices emerge. For example, it is not in a program manager’s interest to develop accurate estimates of cost, schedule, and technology readiness, because honest assessments could result in lost funding. Delayed testing becomes preferred over early testing because that will keep “bad news” at bay. In turn, knowing data being reported to them may not be reliable, senior leaders believe they cannot trust it and must instill multiple oversight mechanisms. Any attempts to improve policy and processes eventually succumb to funding competition because no one wants to risk loss of support.

We are making recommendations to DOD to better position program managers for success. These recommendations focus on what is needed to be done to provide the strategic leadership needed to provide the right foundation for starting programs, ensure an executable business case is delivered to program managers, and to hold program managers accountable for successful outcomes. It is important to note that the success of all of our recommendations hinge on DOD’s ability to instill more discipline and leadership over the investment process. After a review of a draft of this report, DOD concurred with our recommendations and provided some additional comments. The full text of DOD’s comments may be found in appendix I.

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**Best Practice:  
Corporate Leadership  
and Disciplined,  
Knowledge-Based  
Processes Are Critical  
to Program Manager  
Success**

At all of the companies we visited, support for program managers began well before they were assigned to a new product development effort—with high-level strategic planning and investment decisions and concerted efforts to make sure that any new initiative the company undertook was achievable within the time and money and other resources the company had available. Technology development and program advocacy were also generally kept out of a program manager’s domain. Once new efforts got off the ground, program managers were empowered to manage resources, encouraged to bring up problems and propose solutions, and consult with senior leaders without fear of losing their support. At the same time, however, they were expected to base their decisions on hard data and to assure the right knowledge was in-hand before proceeding into the next phases of development. They were also held accountable for their choices, though companies generally found that with good pre-program decisions, a good launch, a sound, disciplined process for execution, and continued support, there was little need to punish or remove their program managers. Ultimately, as long as a program manager could deliver the right product at the right time for the right cost, he was incentivized to do so without interference from above.

According to commercial program managers we spoke with, the most critical support factors included the following:

- **Investment strategies.** Each of the companies we visited followed a rigorous process to forecast market needs against company resources, economic trends, available technologies, and its own strategic vision. These exercises culminated in short- and long-term investment strategies that provided program managers with confidence that the company was committed to their particular program and showed them where the project fit within overall corporate goals.
- **Evolutionary development.** All of the companies followed an incremental path toward meeting market needs rather than attempting to satisfy all needs in a single step. This provided program managers with more achievable requirements, which, in turn, facilitated shorter cycle times. With shorter cycle times, the companies could ensure both program managers and senior leaders stayed with programs throughout the duration.
- **Matching requirements to resources.** Once specific product concepts were identified, the companies worked vigorously to close gaps between requirements/customer needs, and resources—time, money, and technology. In effect, this took the investment strategy down to a project level, assuring that the program manager would be well positioned to execute within cost and schedule.
- **Matching the right people to the program.** All of the companies we visited took steps to ensure that they assigned the right people to the right programs. These included long term efforts to train and groom technical staff into program managers, mentoring on the part of senior leaders with program management experience, handpicking program managers based on their expertise and experience, and supporting program managers with teams of highly qualified functional and technical experts.
- **Knowledge-driven development decisions.** Once a new product development began, program managers and senior leaders used quantifiable data and demonstrable knowledge to make go/no-go decisions. These covered critical program facets such as cost, schedule, technology readiness, design readiness, production readiness, relationships with suppliers, etc. Development was not allowed to proceed until certain thresholds were met, for example, a high percentage of engineering drawings completed or production processes under statistical control. Development processes were also continually tailored based on lessons learned. Program managers themselves placed high value on these

requirements, as they ensured programs were well positioned to move into subsequent phases and were less likely to encounter disruptive problems.

- **Empowerment.** At all the companies we visited, program managers were empowered to make decisions as to whether programs were ready to move forward and to resolve problems and implement solutions. They could redirect available funding, if needed. They could change team members. Prior to development, they often had a say in what requirements they would be handed.
- **Accountability.** With authority, came accountability. Program managers at all of the companies we visited were held accountable for their choices. To assure accountability, senior leaders set goals that were clear to the entire project team and provided incentives for program managers and others to meet those goals.
- **Tenure.** All of the companies we visited required that program managers stay on until the end of the program. This was a primary means of assuring accountability.
- **Continued senior leadership.** In addition to empowering them, program managers credited senior leaders with other vital levels of support. Namely, senior leaders' commitment to their programs were unwavering, they trusted their program managers, they encouraged them to share bad news, and they encouraged collaboration and communication. At the end of the day, it was the senior leaders' job to anticipate and remove obstacles and provide the right levels of support so that the path was cleared for the program manager to execute the program.

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## DOD: Critical Support Factors Are Missing

At DOD, program managers are not put in a position to deliver a product within estimates, nor are they held accountable when there are failures to deliver products within estimates. While senior leaders work hard to develop a short- and long-term vision for the defense of the United States, these visions are rarely translated into realistic investment strategies that assure the right mix of programs is being pursued. Moreover, while recognized in policy as a best practice, DOD does not always make sure that there is a business case for new initiatives. Lastly, program managers are not empowered to execute programs once they begin or held accountable when programs get off track.

The primary problem, according to many program managers and verified by GAO's work, is that DOD starts more programs than it can afford and does not prioritize programs for funding. This creates an environment

where programs must continually compete for funding. Before programs are even started, advocates are incentivized to underestimate both cost and schedule and overpromise capability.

A second problem is that gaps between resources and requirements are not closed before or even during program development. For example, we have reported that DOD allows many programs to go forward without knowing whether critical technologies—such as satellite’s main sensor, a fighter aircraft’s stealth technology, a new tank’s networking capability—can work as intended. Invariably, when programs start with such unknowns, they spend a great deal of time and money later on fixing technical glitches while simultaneously trying to get other program aspects on track. One reason programs begin with immature technologies is that program advocates are rushed to start the acquisition program because it assures at least an initial commitment of funding. Compounding this problem is the fact that acquisition programs tend to attract funds over other activities, including science and technology efforts that ultimately support acquisition. As a result, program managers are incentivized to take on tasks that really should be accomplished within a laboratory environment, where it is easier and cheaper to discover and address technical problems.

A third problem is that program managers themselves are not empowered to execute their programs. First, they have little control over funding and they cannot count on funding to be stable. When funding is taken away, program managers often find themselves in a negative spiral of funding-related problems—particularly because they’ve already made commitments to contractors based on certain anticipated levels of funding. Second, they cannot veto new requirements. Faced with long development life cycles and promising technology advances, users often ask for new or better capabilities as a program proceeds forward. Program managers themselves are not always empowered to say “no” to demands that may overly stretch their programs, and few senior leaders above them have been willing to. In addition, program managers have little authority over staffing and the ability to shift funds within the program. With so much outside their span of control, program managers say that DOD is unable to hold them accountable when programs get off track. Another reason that it is difficult to hold program managers accountable is that their tenure is relatively short. The problems being encountered today may well be the result of a poor decision made years ago by another program manager.

DOD has tried to improve its processes and policies to better position programs for success. For example, policies embrace the concept of closing gaps between requirements and resources before launching new programs, and DOD is making changes to requirements setting and funding processes in an attempt to strengthen investment decisions. At this point, however, program managers do not see trade-offs being made in the front-end of product development that would ensure DOD could fully commit to their programs and allow program managers themselves to focus solely on executing their programs. The level of trust, collaboration and communication is low, while the level of oversight and second guessing is high.

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## Differences in Incentives Contribute to Differences in Support for Program Managers

Differences between how program managers are supported and held accountable are rooted in differences in incentives and resulting behaviors. This begins with the definition of success. The commercial firms we studied concluded their survival hinged on their ability to increase their market share, which, in turn, meant developing higher quality products, at the lowest possible price, and delivering them in a timely fashion—preferably before their competitors could do the same. This imperative meant that they had no choice but to narrow the gap between requirements and resources in a manner that not only ensured they met their market targets, but did so in a manner that consumed resources fairly efficiently. It also meant that they had no choice but to fully support the development effort, instill strategic planning and prioritization, work collaboratively, follow a knowledge-based process that makes product development manageable, and, ultimately, make everyone accountable for success. Ultimately, the companies developed processes that embodied these tenets for success. At the strategic level, these include accurate, strategic planning and prioritization to ensure the right mix of products are pursued and strong systems engineering to help them establish a realistic business case. At the tactical level, companies developed development processes that required certain thresholds of knowledge to be gained before a decision to proceed forward is made.

In theory, DOD's success likewise hinges on its ability to deliver high-quality weapons to the warfighter in a timely fashion. But in practice, success is defined as the ability of a program to win support and attract funds. Of course, there are reasons for this disconnect. Corporate revenue is generated by customer sales while DOD's funding is dependent on annual appropriations. Corporations go out of business when their product development efforts do not succeed; DOD does not. Selling products to customers is the single focus of a private-sector company

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while DOD is charged with a myriad of important missions—each of which also competes for budget share. Nevertheless, these conditions create a vastly different set of processes and behaviors affecting program managers. Program managers are incentivized, for example, to be optimistic and suppress bad news because doing otherwise could result in a loss of support and funding and further damage their program. In short, unknowns become acceptable and desirable rather than unacceptable as they are in the corporate environment. And accountability becomes much more difficult to define.



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# Chapter 1: Introduction

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DOD plans to spend about \$1.3 trillion for its major programs between 2005 and 2009 and increase its investment in research and development during that period by about 28 percent—from \$144 billion to \$185 billion. Although DOD's weapons are widely regarded as unrivaled in superiority, DOD has not received a predictable return on investment in major weapon systems acquisitions. For decades, many of DOD's weapon systems acquisitions have experienced large cost increases and extended schedules, which, in turn, have jeopardized performance and, more broadly, undermined DOD's buying power.

To help better position DOD to successfully field weapons, we have undertaken a body of work over the past decade that has examined lessons learned from the best commercial product development efforts to see if they can be applied to DOD weapon system development. Leading commercial firms have developed increasingly sophisticated products in significantly less time and at lower costs. Our previous best practices reports<sup>1</sup> have examined such topics as matching resources with requirements, controlling total ownership costs, effective use of testing, and product development. This report examines the program manager's role and the mechanisms that DOD and leading commercial companies use to position program managers for success and hold them accountable. As the central executor of the acquisition process, DOD depends on its program managers to efficiently and effectively run its large range of complex weapon systems acquisitions.

The challenge that program managers now face is massive. Weapon systems themselves are becoming increasingly sophisticated and interdependent and, therefore, more complicated and difficult to develop. At the same time, however, DOD is faced with threats that are constantly evolving, requiring quicker development cycles and more flexibility within weapons programs. Moreover, many of the business processes that support weapons development—strategic planning and budgeting, human capital management, infrastructure, financial management, information technology, and contracting—are beset with pervasive, decades-old management problems, including outdated organizational structures, systems, and processes. In fact, these areas—along with weapons system acquisitions—are on GAO's high-risk list of major government programs and operations. Lastly, while DOD plans to considerably ramp up weapons system spending in the next 5 years in an effort to dramatically transform

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<sup>1</sup> A complete list of best practices reports is at the end of this report.

how it carries out its military operations, it is likely to face considerable pressure to reduce its investment in new weapons as the nation addresses long-term fiscal imbalances.

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## Long-Standing Problems Hamper Weapons Systems Acquisitions

While DOD's acquisition process has produced weapons that are among the best in the world, it also consistently yields undesirable consequences—such as cost increases, late deliveries to the warfighter, and performance shortfalls. Such problems have been highlighted, for example, in our past reviews of DOD's F/A-22 Raptor, Space-Based Infrared System, Airborne Laser, the Joint Strike Fighter, and other programs. Our past work has found that problems occur because DOD's weapon programs do not capture early on the requisite knowledge that is needed to efficiently and effectively manage program risks. For example, programs move forward with unrealistic cost and schedule estimates, lack clearly defined and stable requirements, use immature technologies to launch the product development, and fail to solidify design and manufacturing processes at appropriate junctures in development.

When costs and schedules increase, quantities are cut and the value for the warfighter, as well as the value of the investment dollar, is reduced. Moreover, in these times of asymmetric threats and netcentricity, individual weapon system investments are getting larger and more complex. Just 4 years ago, the top five weapon systems cost about \$281 billion; today, in the same base year dollars, the top five weapon systems cost about \$521 billion.<sup>2</sup> If these megasystems are managed with traditional margins of error, the financial consequences—particularly the ripple effects on other programs—can be dire.

DOD has long recognized such problems and initiated numerous improvement efforts. In fact, between 1949 and 1986 five commissions studied issues such as cycle time and cost increases as well as the acquisition workforce. DOD has also undertaken a number of acquisition reforms. Specifically, DOD has restructured its acquisition policy to incorporate attributes of a knowledge-based acquisition model and has reemphasized the discipline of systems engineering. In addition, DOD

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<sup>2</sup> These figures represent the costs for the top five weapon systems in 2001 and the top five in 2005. For 2001, these systems were F/A-22 Raptor, DDG-51 Guided Missile Destroyer, Virginia Class Submarine, C-17 Globemaster III, and the F/A 18 E/F, Naval Strike Fighter. The 2005 systems include the Joint Strike Fighter, Future Combat System, F/A-22 Raptor, DDG-51 Guided Missile Destroyer, and the Virginia Class Submarine.

recently introduced new policies to strengthen its budgeting and requirements determination processes in order to plan and manage systems based on joint warfighting capabilities. While these policy changes are positive steps, we recently testified that implementation in individual programs has not occurred because of inherent funding, management, and cultural factors that lead managers to develop business cases for new programs that overpromise on cost, delivery, and performance of weapon systems.

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## DOD Program Managers Are Central Executors of the Acquisition Process

DOD relies on a cadre of military and civilian officials—known as program managers—to lead the development and delivery of hundreds of weapon systems and subsystems. The services report a combined total of 729 program managers currently executing programs at all acquisition category levels. The systems that program managers are responsible for range from highly sophisticated air, land, sea, and space-based systems to smaller, less complex communications or support equipment that interconnects or supports larger systems. Program managers are responsible for assuring that these systems are reliable, affordable, supportable, and effective. They carry out multiple roles and responsibilities and are expected to have a working knowledge in such diverse areas as contracting, budgeting, systems engineering, and testing.

DOD classifies its acquisition programs into categories based upon a number of factors such as their size, cost, complexity and importance. The largest, most complex and expensive programs generally fall under the responsibility of the Under Secretary of Defense (Acquisition, Technology and Logistics) while less complex and risky programs are overseen by the service or component acquisition executive. Table 1 provides more details.

**Table 1: Acquisition Categories**

Acquisition category	Definition	Program examples
Category I	Research, development, test, and evaluation > \$365M Procurement > \$2.19B  Milestone decision authority: 1D: Under Secretary of Defense (Acquisition, Technology and Logistics) 1C: Service Acquisition Executive	Future Combat System DD(X) Destroyer B-1 Aircraft
Category II	Research, development, test, and evaluation > \$140M Procurement > \$660M  Milestone decision authority: Service or Component Acquisition Executive	All Source Analysis System KC-130J Aircraft Joint Surveillance and Target Attack Radar System
Category III	No fiscal criteria	10k W Auxiliary Power Unit Assault Breaching Vehicle C-5 Avionics
Category IV	No fiscal criteria (Navy and Marine Corps only)	C-130 Night Vision Lighting Advanced Recovery Control System

Source: GAO.

Note: Category I systems are referred to as “programs” and smaller related subsystems are called “projects” or “products.” For example, the Air Force’s B-1 aircraft system—a category IC program—includes category II and III projects that may have a designated manager. Category 1D and 1C programs are distinguished by their milestone decision authority.

Program managers typically supervise a large staff of engineers, contracting personnel, logisticians, business, financial, and administrative personnel. The number of people assigned to program offices varies widely and depends on factors such as the complexity of the system, the category level, and the availability of staff. For example, the Joint Strike Fighter, a category ID program, is managing the development of three configurations of a new aircraft for the Navy, Marines and Air Force, and currently has about 200 government and international personnel assigned. By contrast the Light Utility Helicopter, a category II project relying largely on commercial off-the-shelf components, has a staff of 34.

To successfully deliver a weapon system to the user, program managers must also work with a range of individuals outside their sphere of influence such as those charged with independent cost estimating, testing, funding, writing requirements, security, and ensuring interoperability.

Simultaneously, the program manager is responsible for overseeing, integrating, and evaluating the defense contractor's work as the development progresses. Moreover, some program managers lead international teams. For example, the Joint Strike Fighter Program Office, in addition to the military, civilian, and contract team members, has eight international partners and approximately 40 international team members.

The majority of DOD program managers for category I programs are military officers at the rank of colonel or (Navy) captain. Subsystem program managers are usually lower in rank and report directly to the system program manager. DOD also employs civilian program managers, usually GS-15s for its category I programs. As a rule, program managers report to a Program Executive Officer—a civilian at the senior executive level or military officer at the general officer rank—who typically manages a portfolio of related weapon systems. However, some program executive officers are responsible for a single large program, such as the Joint Strike Fighter or the F-22 aircraft. One level up from the program executive officer is the Service Acquisition Executive, a civilian (often a political appointee) who reports to the service Secretary. Programs classified as a category ID report through the defense acquisition executive, Undersecretary of Defense (Acquisition, Technology and Logistics), as their milestone decision authority.

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## Legislation to Improve Program Manager Proficiency

Program manager training and tenure is now governed by legislation known as the Defense Acquisition Workforce Improvement Act (DAWIA),<sup>3</sup> enacted in 1990 after studies showed that a key problem affecting acquisitions was that program managers did not stay in their positions long enough to be accountable for outcomes and that many simply lacked the training and experience needed to assume their leadership roles. Congress amended the law in the fiscal year 2004 and 2005 defense authorization acts to allow the Secretary of Defense more flexibility to tailor tenure, experience, and education qualifications for program managers.

The act specifically created a formal acquisition corps and defined educational, experience, and tenure criteria needed for key positions, including program managers as well as contracting officers and others involved in the acquisition process. The act also provided for the

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<sup>3</sup> 10 U.S.C. § 1701 *et seq.* (P.L. 101-510, Div. A, Title XII (November 5, 1990)).

establishment of a defense acquisition university to provide educational development and training for acquisition personnel. Under DOD regulations program managers are required to attend training and meet course requirements through the university in order to meet certification requirements for the program management track.

There are three progressive certification levels: basic, intermediate, and advanced. Program managers of major defense acquisition programs are required to have Level 3 certification, which requires four years of acquisition experience and an advanced level Defense Acquisition University course in program management. DOD prefers that individuals with Level 3 certification have a Master's degree in engineering, systems acquisition management, or business administration, and complete additional external coursework in relevant fields.

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## Objectives, Scope, and Methodology

The Chairman and the Ranking Member, Subcommittee on Readiness and Management Support, Senate Committee on Armed Services, requested that we examine best practices and DOD procedures for factors that affect program manager effectiveness. Our overall objectives for this report were to (1) identify best practices that have enabled organizations to successfully position their program managers for success, (2) identify DOD practices for supporting program managers and holding them accountable, and (3) compare and contrast DOD and commercial practices in order to identify possible improvements to DOD practices.

To identify the best practices and processes that commercial companies employ to position their program managers for success, we used a case study methodology. We selected companies that, like DOD, research, develop, and field products, using program managers as the central executors of the programs. Selection of the companies was also based upon recognition by the American Productivity and Quality Center and the Project Management Institute and the recommendations of experts. Below are descriptions of the three companies that are specifically featured in this report.

- Toyota Motor Manufacturing of North America, Inc.  
Toyota Motor Manufacturing of North America, Inc., the third largest automobile producer in the world and the fifth largest industrial company in the world, designs, manufactures, and markets cars, trucks, and buses worldwide. In 2005, the company reported total net sales of \$172.7 billion. We met with individuals involved with the development of the 2005 Toyota

Avalon, a full-size sedan, at Toyota Motor Manufacturing in Erlanger, Kentucky.

- **Siemens Medical Solutions USA, Inc.**  
Siemens Medical Solutions is one of the world's largest suppliers in the healthcare industry. Siemens Medical manufactures and markets a wide range of medical equipment, including magnetic resonance imaging systems, radiation therapy equipment, ultrasound equipment, and patient monitoring systems. We met with individuals from the Angiography, Cardiology, and Neurology business unit, located in Hoffman Estates, Illinois.
- **Motorola, Inc.**  
Motorola is a Fortune 100 global communications leader that provides seamless mobility products and solutions across broadband, embedded systems and wireless networks. Seamless mobility harnesses the power of technology convergence and enables smarter, faster, cost-effective, flexible communication in homes, autos, workplaces and all spaces in between. Motorola had sales of \$31.3 billion in 2004. We visited its offices in Arlington Heights, Illinois, and discussed program management practices and processes with representatives from the Networks sector.

In addition to the three companies featured in this report, we visited two additional successful firms to assess whether they employed similar processes and practices for program management. These include Molson Coors Brewing Company and Wells Fargo. Both companies have undertaken projects that reflect some of the complexity and challenges that a DOD weapon systems program would face. For example, we met with managers of a Molson project intended to automate day-to-day marketing operations for digital assets. We also met with Wells Fargo officials who developed an electronic imaging process for paperless check clearance. At both companies, we also discussed broader corporate investment processes that supported these particular internal projects as well as the companies' main service lines.

For each of the five companies, we interviewed senior management officials and program managers to gather consistent information about processes, practices, and metrics the companies use to support program managers and hold them accountable. In addition to the case studies, we synthesized information from GAO's past best practices work about product development.

We also examined key best practices studies related to program management, including studies from organizations such as the Project Management Institute and the American Productivity and Quality Center. Moreover, we relied on our previous best practice studies, which have examined incentives and pressures affecting weapon system programs, the optimal levels of knowledge needed to successfully execute programs, and complementary management practices and processes that have helped commercial and DOD programs to reduce costs and cycle time.

In order to determine DOD practices for supporting program managers and holding them accountable, we conducted five separate focus groups between July and October 2004. Each group was composed of project managers from one of the services or the Missile Defense Agency. A total of 28 acquisition category I program managers representing a range of DOD programs were identified by their respective services for the meetings held in separate locations in Huntsville, Ala.; El Segundo, Calif.; Dayton, Ohio; Arlington, Va.; and Ft. Belvoir, Va. For each focus group, the facilitators introduced discussion topics to discover how program managers define success, as well as what they are accountable for and how they are held accountable. In addition, participants were asked to discuss how program managers are supported and what obstacles they encounter in performing their duties.

We analyzed the content of focus group transcripts and used the themes we identified to design a survey to gather information about acquisition category I and II program managers' perceptions about factors that assist or block their success and to more clearly define other issues in the DOD acquisition process that affect program manager effectiveness. We elicited input from several experts—retired program managers, active-duty members with program management experience, and senior acquisition officials who reviewed the questions and provided feedback on the draft survey.

We pretested the survey with five program managers. During the pretest we asked the program managers questions to determine whether (1) the survey questions were clear, (2) the terms used were precise, (3) the questionnaire placed an undue burden on the respondents, and (4) the questions were unbiased. We then incorporated their comments into the survey, finalized the questions, and sent the web-based survey to acquisition category I and II program managers. We selected the category I and II program managers because they manage the more complex and expensive programs. We identified the program managers through consultation with each of the services. The survey consisted of open-



ended and close-ended questions concerning support for program managers and how they are held accountable for program outcomes. Originally we e-mailed 237 program managers but later determined that 52 should not be included because they managed programs other than acquisition category I and II. Of the 185 remaining program managers, we received completed surveys from 69 percent.

The surveys were conducted using self-administered electronic questionnaires posted on the World Wide Web. We sent e-mail notifications to all acquisition category I and II program managers on April 12, 2005. We then sent each potential respondent a unique password and username by e-mail to ensure that only members of the target population could participate in the survey. To encourage respondents to complete the questionnaire, we began sending e-mail messages to prompt each nonrespondent between April 26, 2005 and May 19, 2005. Additionally, the team contacted nonrespondents through telephone calls between May 31, 2005 and July 12, 2005. We closed the survey on July 19, 2005.

In this report we discuss some of the results obtained from the survey. A more complete tabulation of survey questions together with tables indicating the levels of response can be found on our Web site at [GAO-06-112SP](#). The survey contained close-ended questions and open-ended questions. We conducted a content analysis of the open-ended questions and constructed tables showing the results of the analysis arranged into broad categories. Some of the respondents to our survey provided more than one answer to the open-ended questions. All responses that indicated equally important factors were tabulated in the appropriate categories. However, because some respondents provided more than one answer, the percentages may add up to more than 100 percent of respondents. The web-based report does not contain all the results from the survey. For example, we do not report responses for questions about demographics, some open-ended questions, or questions with high item nonresponse rates.

In addition to the focus groups and survey, we conducted in-depth interviews with individual program managers, program executive officers from across the services, as well as program managers from Boeing and Lockheed Martin for two major weapon systems. To further assess the conditions and environment program managers were operating in, we relied on previous GAO reports. For example, we relied on a recent study of space acquisition problems that incorporated interviews of more than 40 individuals, including experienced program managers, program

executive officials, officials responsible for science and technology activities, and former and current officials within the Office of Secretary of Defense who have specific responsibility for space system oversight or more general weapon system oversight.

To further determine relevant DOD policies and practices, we analyzed documents describing the roles and responsibilities of program managers, acquisition force career management, promotion rates, performance reporting, and training requirements. Moreover, we analyzed relevant legislation and the DOD 5000 series of directives and instructions. We also interviewed career acquisition service officials, Defense Acquisition University course managers, and the Director of Training. We reviewed studies from the Rand Corporation, the Center for Strategic and International Studies, and the Defense Science Board, among others, on weapons system program management and acquisition issues as well as studies performed by past commissions focused on acquisition reform.

We conducted our review between April 2004 and November 2005 in accordance with generally accepted government auditing standards.

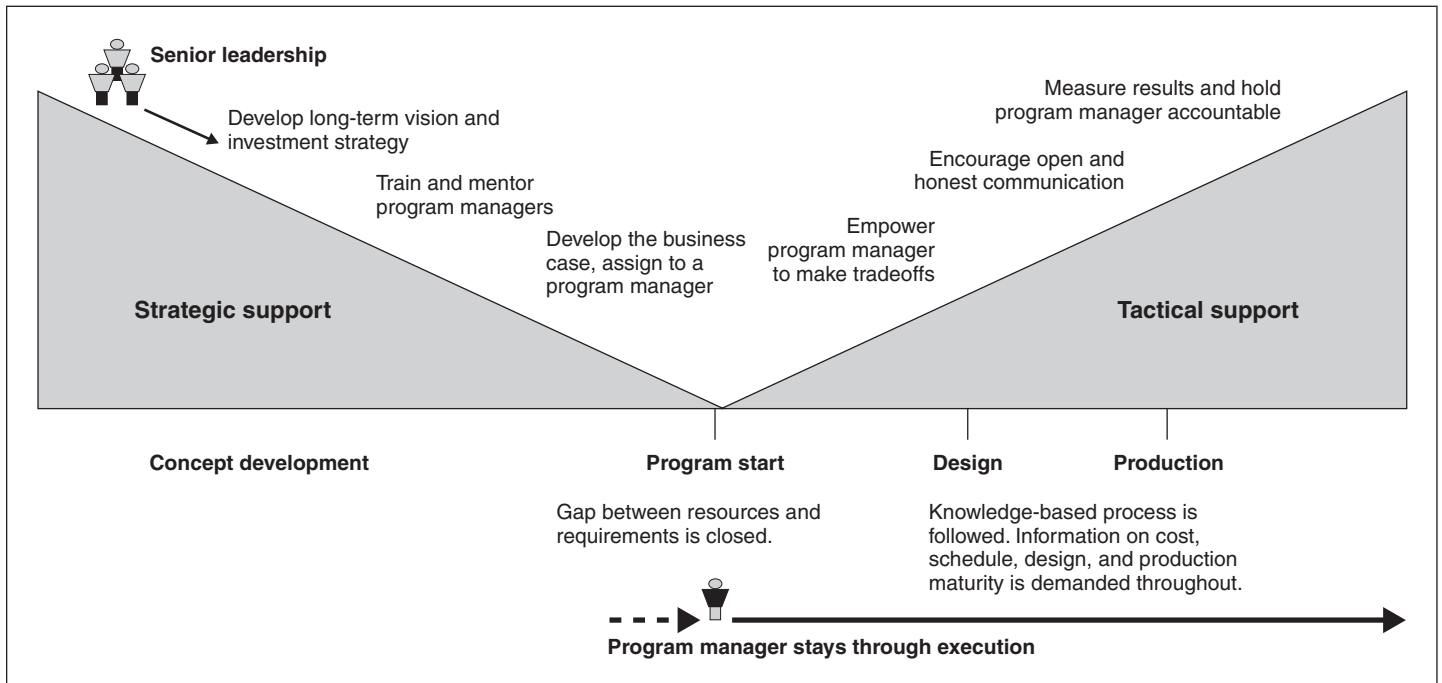
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# Chapter 2: Senior Leader Support and Disciplined Knowledge-Based Processes Are Critical Enablers for Program Managers

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Program managers from the leading companies we spoke with believed that two critical enablers—(1) support from top leadership and (2) disciplined, knowledge-based processes for strategic investment, program selection, and product development execution—empowered them to succeed in delivering new products when needed within cost, quality, and performance targets originally set by the company. At all of the companies we visited, corporate leadership began at a strategic level, long before the initiation of a new product development, with senior company leaders making critical strategic investment decisions about the firm’s mix of products and the return on investment they may yield. Once high-level investment decisions were made, senior leaders assured that new programs did not begin until there was a business case for them—meaning there was assurance that the program fit in with the corporation’s goals and investment strategy and that there were resources available to execute the program. Once a business case had been made, senior leaders selected and tasked program managers with executing the program. They also required the program managers to use a knowledge-based product development process that demanded appropriate demonstrations of technology, designs, and processes at critical junctures. They also empowered program managers as appropriate to execute the program and held them accountable for delivering the program within estimates. While they were empowered to execute the program, program managers were still supported by senior leaders, who encouraged open and honest communication and continually assured that the right levels of resources and management attention were available for the project. Figure 1 maps critical support and accountability factors.

**Figure 1: Critical Support and Accountability Factors**



Source: GAO.

## Senior Leadership Provides Program Managers with a Strong Foundation for Success

At each of the companies we visited, senior leaders invested a great deal of time and effort positioning new development efforts for success. Before even considering initiating a new project, senior leaders made high level trade-off decisions between their long-term corporate goals, projected resources, market needs, and alternative ways of meeting those needs. These efforts culminated in investment strategies that assured that the company could fully commit to any product development effort it pursued. With a broad strategy in place, senior leaders would then begin concept development for potential new products, analyzing proposed products in terms of what requirements could be achieved today versus future versions of the product and what resources would be needed—not just in terms of cost, but in terms of technologies, time, and people. Once a specific concept was selected, senior leaders would follow rigorous systems engineering processes to narrow the gap between requirements and resources to a point where they were assured that they were pursuing a product that would meet market needs and could be developed within cost and schedule goals. The end point of this process was a sound business case that senior leaders could then hand off to a program

manager—who was then empowered to deliver the product on time and within cost. Program managers themselves highly valued this support because it ensured the companies were committed to their particular efforts, reduced the level of unknowns that they were facing, and kept them focused solely on executing their programs. Put more simply, they believed senior leaders consistently provided a sound foundation on which they could launch their programs.

The most critical characteristics of the strategic leadership provided include the following:

- **Investment strategies.** Because there are more product ideas than there is funding to pursue them, the commercial companies we visited used a knowledge-based process to make decisions about which product development efforts to invest in. They began by developing an investment strategy that supports a corporate vision. For the most profitable mix of new products, companies analyzed factors such as customer needs, available technology, and available resources. Companies ensured that decisions to start new product developments fit within the investment strategy. The investment strategy determined project priority as well as providing a basis for trade-off decisions against competing projects. Program managers found their company's use of investment strategies helpful because it gave them confidence that their project had commitment from their organization and from their top leaders and managers and clearly identified where their project stood within the company's overall investment portfolio and funding priorities.
- **Evolutionary development.** All of the companies generally followed an evolutionary path toward meeting market needs rather than attempting to satisfy all needs in a single step. In effect, the companies evolved products, continuously improving their performance as new technologies and methods allow. These evolutionary improvements to products eventually result in full desired capability, but in multiple steps, delivering enhanced capability to the customer more quickly through a series of interim products. For example, the 2005 Avalon involved redesign of about 60 per cent of the vehicle, but component sections such as the electronics and such features as the keyless ignition system and the reclining rear seat were either developed by suppliers or had been used on the Lexus. By using this method, the company changed the Avalon's overall design and functionality by increments. In more strategic investment planning, Toyota maintains an ongoing research into such technology areas as alternative fueled automobiles and environmental implications of automotive developments that will feed into its long-term planning. Our previous work has found that this approach reduces the amount of risk in the

development of each increment, facilitating greater success in meeting cost, schedule, and performance requirements. The approach permits program managers to focus more on design and manufacturing with a limited array of new content and technologies in a program. It also ensures that the company has the requisite knowledge for a product's design before investing in the development of manufacturing processes and facilities. Conversely, our past work has found that organizations that set exceedingly high technology advancement goals invariably spend more time and money than anticipated trying to address technology-related challenges amid other product development activities, including design and production stabilization.

- **Matching of Requirements and Resources.** The companies we visited were able to achieve their overall investment goals by matching requirements to resources—that is time, money, technology, and people—before undertaking a new development effort. Any gaps that existed were relatively small, and it was the program manager's job to quickly close them as development began. More specifically:
  - The companies had already extensively researched and defined requirements to ensure that they are achievable given available resources before initiating new efforts.
  - Technologies were mature at the start of a program, that is, they had been proven to work as intended. More ambitious technology development efforts were assigned to corporate research departments until they were ready to be added to future generations (increments) of the product. In rare instances when less mature technologies were being pursued, the company accepted the additional risk and planned for it.
  - Companies committed to fully fund projects before they began. Not one of the program managers we spoke with mentioned funding as a problem at the beginning of a development effort and throughout. Funding was a given once senior leaders had committed to their project.
  - Systems engineering was typically used to close gaps between resources and requirements before launching the development process. As our previous work has shown, requirements analysis, the first phase of any robust systems engineering regimen, is a process that enables the product developer to translate customer wants into specific product features for which requisite technological, software, engineering, and production capabilities can be identified. Once these

are identified, a developer can assess its own capabilities to determine if gaps exist, and then analyze and resolve them through investments, alternate designs, and, ultimately, trade-offs. The companies we visited allowed their engineers to analyze and weigh-in on the customers needs as determined by its marketers.

Our previous best practice work has consistently found the practice of matching requirements and resources prior to initiating a new program to be a hallmark for successful companies. Simply put, we have found that when wants and resources are matched before a product development is started, the development is more likely to meet performance, cost, and schedule objectives. When this match does not take place at the start of a program, programs typically encounter problems such as increased costs, schedule delays, and performance shortfalls as they try to meet requirements during product development. Program managers we spoke with for this review specifically cited this process as an enabler for their own success because it ensured they were in a good position to commit to cost and schedule estimates that were attainable, and it did not require them to perform “heroic” efforts to overcome problems resulting from large gaps between wants and resources, such as technology challenges or funding shortages.

In addition to these critical strategic enablers, program managers at the companies also stated that senior leaders made concerted efforts to match program manager skills and experience to appropriate projects and to train and mentor program managers. In selecting program managers themselves, the companies placed high value on strong leadership qualities, including decision making skills, diplomacy, communication skills, ability to motivate others, and integrity, as well as how individual personalities fit with the job or team. Most of the program managers we spoke with had been groomed for their positions through formal training on budgeting, scheduling, and regulatory compliance and other aspects of program management; informal mentoring by senior executives or experienced program managers; and by being placed in positions that gradually increased their management responsibilities. In addition, many of the program managers we spoke with also possessed considerable technical experience. In fact, they often started at the company as engineers. The companies we visited were similarly deliberate in developing and deploying teams of functional experts to support a program manager. In some cases, the teams reported directly to the program manager. In others, they reported to their respective home units and worked collaboratively with the program managers. In either case, the program managers themselves valued the support they were getting from

these teams—particularly because they enabled the program manager to employ a broad array of expertise from day-one of the development effort and to facilitate an exchange of ideas. The program managers we spoke with believed that their functional teams were also highly skilled—to the point where they could easily delegate major tasks.

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### **Strategic Leadership at Toyota and Siemens Medical**

Strategic leadership for the development of Toyota’s Avalon luxury sedan ties back to conscious decisions made by senior leaders in Japan when they built a Toyota facility in the United States 25 years ago. To assure that the vehicles could be made to the same levels of quality as those in Japan, Toyota replicated its manufacturing facilities, used Japanese suppliers, and sent its managers to the United States to supervise development. As U.S. employees gained experience and demonstrated their capability, the reliance on Japanese suppliers and personnel gradually decreased. A second step Toyota took was to replicate its training and mentoring of program managers—pairing them with more experienced chief engineers, who oversee long-term planning across projects, and even bringing them to Japan to study how Toyota approached development.

To support all of its new development efforts, senior leaders have developed an overall strategic plan—which takes a long- and short-term investment perspective. Over the long run, the plan envisions the company achieving significant advancements in capabilities, such as alternatively fueled engines, through incremental improvements to technologies. Over the short run, a specific vehicle development program uses a marketing analysis about features customers desire in new models; and the staff determines whether a market exists for a certain type of product at a certain price. In establishing a business case for the Avalon, Toyota embarked on a formal concept development effort, which was led by a chief engineer. The chief engineer, a high-level executive, was largely responsible for setting the vision for the new Avalon, securing resources needed for development effort prior to initiating the development program, and working with representatives from its sales division to make sure that the design and technologies being pursued still fit within market needs—not just in terms of cost, but in terms of vehicle features. A variety of functional experts were consulted during this phase, though the chief engineer had the most formal authority over concept development. At the conclusion of this effort, Toyota decided to take on a very extensive redesign of the Avalon but also set a goal bringing the vehicle to market in only 18 months. Redesign features included a reinforced body, improvements to the engine and to the braking system, as well as features customers desired such as a keyless ignition system and reclining rear



seats. Toyota leadership also decided to include mature technologies, often borrowed from other vehicle lines, or purchased from outsider suppliers. Once the design was approved, day to day project management shifted to the Chief Production Engineer, whose responsibility it was to see the vehicle through production to distribution.

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**Figure 2: 2005 Toyota Avalon**



Source: Toyota Motor Manufacturing North America.

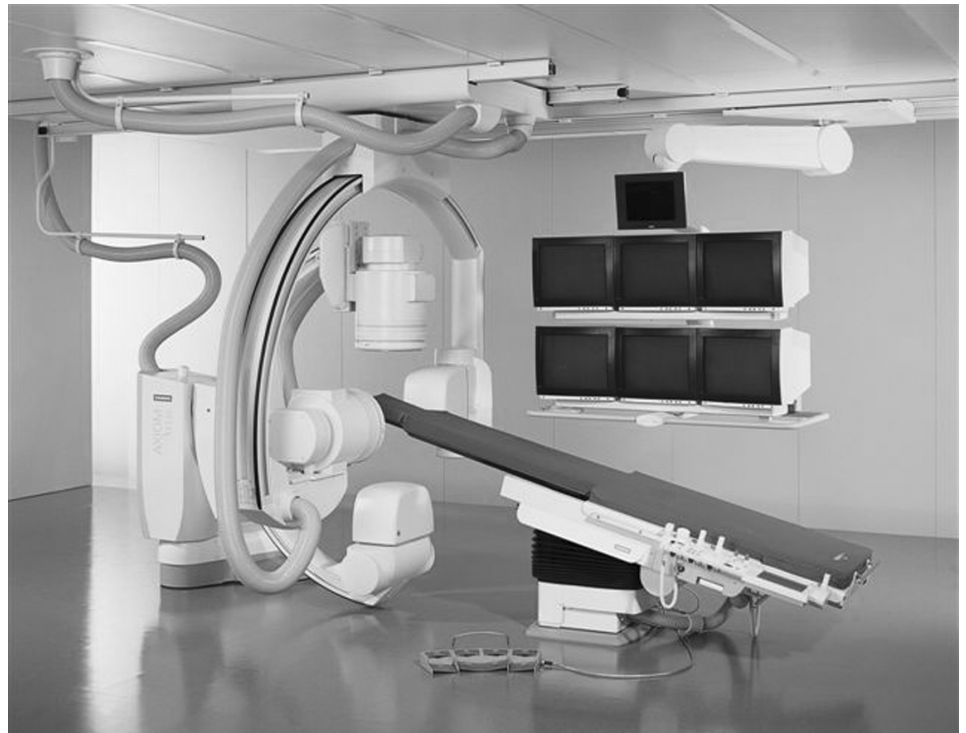
Corporate leadership at Siemens Medical took a similar shape in the development of new medical equipment. For example, senior leaders developed an overall investment strategy, based largely on researching their customers' technology needs as well as their own technology readiness, the direction their competitors were going in, economic trends, and projected manpower resources. From these assessments, a team within Siemens developed a portfolio of potential new projects to pursue, which upper management then prioritized based on their potential profit, how they fit in with corporate goals and projected resources. Ultimately, senior leaders produce a short-term (1 year) investment plan as well as a longer-term (3 to 5 year) plan. Once a specific project is selected, Siemens employs systems engineering practices to narrow down the gap between customer requirements and resources—working with both business and technical managers. A “product manager” is charged with making trade-offs between requirements, schedule, and cost prior to initiating product development and is held accountable for systems engineering decisions made to level requirements with resources for the business case. This

person sits at a relatively high level within the company and possesses marketing and business expertise. A “project manager” who reports to the product manager is ultimately assigned to execute the business case, but he or she plays a role in the concept development by participating in trade-off decisions and raising concerns about how decisions can be executed.

At Siemens Medical, many project managers begin by serving as the technical leader working with three to five people in systems engineering or another technical area of a project. As the technical team lead, they gain experience with scheduling, communicating, and managing people. Over time the individual is given more responsibilities such as becoming a subsystem project leader; as the manager gains experience, he or she transitions to handling cross-functional areas including business, budgeting, staffing, technology, and testing.

Siemens Medical project managers are also given formal training, including courses on regulatory and quality requirements as well as courses that help program managers learn about their management styles. In addition, Siemens ensures that project managers are well-trained on risk management so that they can identify and mitigate potential risks at the beginning of the project. Also, since project managers function within a centralized project management department, they are mentored both by the head of the department and by their peers.

**Figure 3: Siemens Bi-Plane AXIOM Artis**



Source: SMS-AX copyright August 2005, Siemens Medical Solutions, Inc.

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## Knowledge-Based Process Followed to Execute Programs

Once a new development effort began, program managers were empowered to execute the business case and were held accountable for doing so. At all of the companies we visited, program managers believed that following a disciplined, knowledge-based development process and continued support from senior leaders were essential to their success. The process itself was typically characterized by a series of gates or milestone decisions, which demanded programs assess readiness and remaining risk within key sectors of the program as well as overall cost and schedule issues, and it required go/no-go decisions to be made fairly quickly. The most important aspect of the process, in the view of the program managers, was that it empowered them to make decisions about design and manufacturing trade-offs, supplier base, staffing on the program team, etc.—as long as they were within the parameters of the original business case. At the same time, the process held program managers accountable and set clear goals and incentives.

Common critical characteristics of the knowledge-based process followed to execute programs include the following:

- **Knowledge-driven development decisions.** Once a new product development began, program managers and senior leaders used quantifiable data and demonstrable knowledge to make go/no-go decisions. These covered critical facets of the program such as cost, schedule, technology readiness, design readiness, production readiness, and relationships with suppliers. Development was not allowed to proceed until certain thresholds were met, for example, a high proportion of engineering drawings completed or production processes under statistical control. Program managers themselves placed high value on these requirements, as it ensured they were well positioned to move into subsequent phases and were less likely to encounter disruptive problems.
- **Empowerment for program managers to make decisions.** At all the companies we visited, program managers were empowered to make decisions on the direction of the program and to resolve problems and implement solutions. They could make trade-offs among schedule, cost, and performance features, as long as they stayed within the confines of the original business case. When the business case changed, senior leaders were brought in for consultation—at this point, they could become responsible for trade-off decisions.
- **Accountability.** Program managers at all the companies we visited were held accountable for their choices. Sometimes this accountability was shared with the program team and/or senior leaders. Sometimes, it resided solely with the program manager on the belief that company had provided the necessary levels of support. In all cases, the process itself clearly spelled out what the program manager was accountable for—the specific cost, performance, schedule, and other goals that needed to be achieved.
- **Tenure.** To further ensure accountability, program managers were also required to stay with a project to its end. Sometimes senior leaders were also required to stay. At the same time, program managers were incentivized to succeed. If they met or exceeded their goals, they received substantial bonuses and/or salary increases. Awards could also be obtained if the company as a whole met larger objectives. In all cases, companies refrained from removing a program manager in the midst of a program. Instead, they chose first to assess whether more support was needed in terms of resources for the program or support and training for the program manager.

Other important aspects within the development process included the following:

- Common templates and tools to support data gathering and analysis. These tools included databases of demonstrated, historical cost, schedule, quality, test, and performance data that helped program managers produce metrics as well as standard forms and guidance for conducting the meetings. Program managers valued these tools because they greatly reduced the time needed to prepare for milestone meetings. In all cases, program managers did not believe they were spending time collecting data that was valuable to senior management but not to them.
- Common processes that supported product development. The companies generally found that requiring program managers to employ similar risk management, project management, requirements approval, testing, quality management, problem resolution, and other processes enabled them to add additional discipline and consistency to product development. Some companies were certified by professional organizations as achieving the highest level of proficiency within supporting development processes. For example, Motorola was certified as a level 5 software development organization by Carnegie Mellon's Software Engineering Institute.
- Lessons learned. All of the companies we visited continually refined and enhanced their development process via some sort of lessons-learned process. The program managers themselves placed a great deal of value on these processes—as they were seen as the primary means for learning how to tailor the process to better fit a project and to prevent the same mistakes from recurring.

Program managers also cited flexibility as an enabling quality of their processes. All of the companies allowed their processes to be tailored as needed. Milestones that were deemed unnecessary could be dropped. More often, however, additional meetings were added to gain consensus on how to address particular problems. Another enabling factor was that their processes ensured decisionmakers were not flooded with data. Often, program teams boiled down data into one or two pages, using simple metrics depicting status and risk on critical facets of the program such as cost, schedule, technology readiness, design readiness, and production readiness. Program managers valued the process of translating detailed data into higher level metrics because it required them to think about their programs in more strategic terms and focus on the highest problem areas.

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## **Knowledge-Based Development at Motorola and Toyota**

Motorola's development process is comprised of 16 milestones or "gates"—the first five of which pertain to processes employed to develop a product concept and the business case. Eleven gates comprise the execution of the business case, from project initiation, to systems requirements definition, design readiness, testing, controlled introduction, and then full deployment. Each gate demands an array of indicators on status and progress, including resources, cost, scope, risk, and schedule. A centralized database helps program managers produce this data and allows users to obtain data at any time and at any level of detail that they need. For meetings themselves, program managers are required to produce a set of "vital few" performance measures relating to cost, quality, program status, and customer satisfaction. At the gates themselves, program managers discuss the status of the program with senior leaders, but they are ultimately responsible for making decisions on whether to proceed to the next phase. In the past, program managers did not have this responsibility and acted more as an administrator than a leader, according to senior executives. With less responsibility and accountability, programs were not managed as well—often employing disjointed management processes with less attention to efficiency and effectiveness. By increasing program manager's ownership and accountability over the project, senior leaders found that they were more incentivized to meet and exceed cost, schedule, and performance goals. To support this change, the company also adopted common supporting processes, including configuration management, design, training, testing, defect prevention, quality management, supplier management, and system upgrades. The common processes assured program managers employed the same set of quality controls and that deployed tools and guidance enabled program managers to reduce cycle times as well as to produce better and more consistent management data.

Toyota's process is comprised of eight key milestones—starting with a lessons-learned gate. At this point, senior leaders and project teams formally review what worked well and not so-well in the prior development effort and assess whether the process needs to be tailored as a result. The Avalon program manager told us that these "reflections" are not taken lightly; they are developed through a very detailed and soul-searching process during which people have to openly admit errors and inadequacies so that better processes and procedures can be devised. The next gate, "image" represents the process by which the chief engineer derives the business case. Once he is done, direct supervision of the project is transferred to a "chief production engineer," who is charged with its execution of the business case although the chief engineer continues to be involved in the development. The next few milestones

come as the car is designed, prototyped, tested, and put through quality assurance. The last milestone, the production stage also contains a customer feedback phase, which is used to refine the next development effort.

Within the business case itself, Toyota places highest importance on schedule because a number other vehicle development efforts are dependent on the same resources and staff being used by the current effort. As a result, the chief production engineer is more inclined to make trade-offs that favor schedule over other factors. At each milestone meeting, the chief production engineer reviews the status of the program with senior leaders, focusing first on what problems are occurring and what his solutions are for overcoming them. The meeting itself employs streamlined reporting with simple indicators of remaining risk on critical facets of the program—specifically, a circle, meaning low remaining risk and okay to proceed; a triangle, meaning there are problems but they can be fixed, or an “x,” meaning there is a problem without a solution. The chief production engineer is responsible for making decisions as to how to proceed at these milestones, unless there is a problem that significantly affects the business case. If so, senior leaders become more involved in the decision-making rather than simply advising the chief production engineer.

While the Toyota process only employs eight formal milestones, the chief production engineer actually involves functional experts, senior executives, and other stakeholders in frequent meetings to make tactical decisions about the program. For example, the Avalon chief production engineer told us that he held “obeya” (literally “big room,” signifying that all inputs are desired) meetings twice a week, which involved all functional areas as well as “namewashi” (literally binding the roots together, signifying gathering facts and moving toward a decision) meetings before a formal milestone meeting—at which functional officials consulted with each other to identify problems and develop potential solutions that would be presented to senior leaders at the milestone. Overall, the accountability for meeting the Avalon program’s goals was shared between the chief production engineer, the functional team, and senior executives. At Toyota, senior leaders assume that the processes they have in place will work, and if the process is not delivering a suitable quality outcome, then it was the shared responsibility of managers and staff to resolve the issue. If performance issues arose, senior leaders attempted to address them first through training, mentoring, and additional support, rather than removing the program manager.

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## Continued Senior Leadership during Product Development Further Enabled Success

Empowering program managers to make decisions in executing the business case was seen as the most significant type of support provided by senior leaders. But program managers themselves pointed to other types of support that made it easier for them to succeed. Primarily, senior leaders did the following:

- Provided unwavering commitment to the development effort. At all the firms we visited, senior leaders were champions of the project throughout its life and fully committed to supporting it. When significant problems arose that jeopardized the business case, they found ways to address those problems, rather than rejecting the program in favor of another one.
- Trusted their program managers. Senior leaders trusted the information being provided by the program manager as well as his or her expertise. This reduced the need for instilling additional layers of oversight that could slow down the program. At the same time, however, senior leaders took personal responsibility for assuring their program managers had the knowledge and capability needed to succeed—in some cases, by personally mentoring them for a long period of time.
- Encouraged program managers to share bad news. Senior leaders went out of their way to encourage program managers to share problems. In fact, program managers were often expected to discuss problems before anything else at key milestones. And, in some cases, program managers were evaluated based on their ability to identify and share problems. At the same time, senior leaders expected their program managers to come up with solutions—to take ownership over their efforts.
- Encouraged collaboration and communication. Senior leaders spent a great deal of time breaking down stovepipes and other barriers to sharing information. The Avalon chief production engineer, in fact, told us that Toyota's development processes alone were much like other automobile manufacturers he had worked for. What separated Toyota from the others was its emphasis on open information exchange, cooperation, and collaboration. He believed that this was the key enabler for Toyota's superior systems integration.



**Figure 4: Best Practice Roles, Responsibilities, and Behaviors of Senior Managers**

- Senior management must strongly commit to new products and product development.
- New product metrics (e.g., percentage of sales or profits) should be an explicit part of senior management's personal and annual objectives.
- Senior management must understand the new product development process and particularly their own role and responsibilities in the process.
- Senior management ideally should be engaged in the design of the organization's new product process.
- Senior management must provide strong support, empowerment, and authority to the people working on new product projects.
- Senior management should be involved in go/no go and spending decisions for new products.
- Senior management should insist on measuring new product results each year (e.g., percentage of sales or profits achieved, percentage of success compared to failures, and on-time performance).
- Senior management should not micromanage new product projects and leave the day-to-day activities and decisions in a new product project to the project's leader and team.

Source: Improving New Product Development Performance and Practices. APQC copyright 2003.

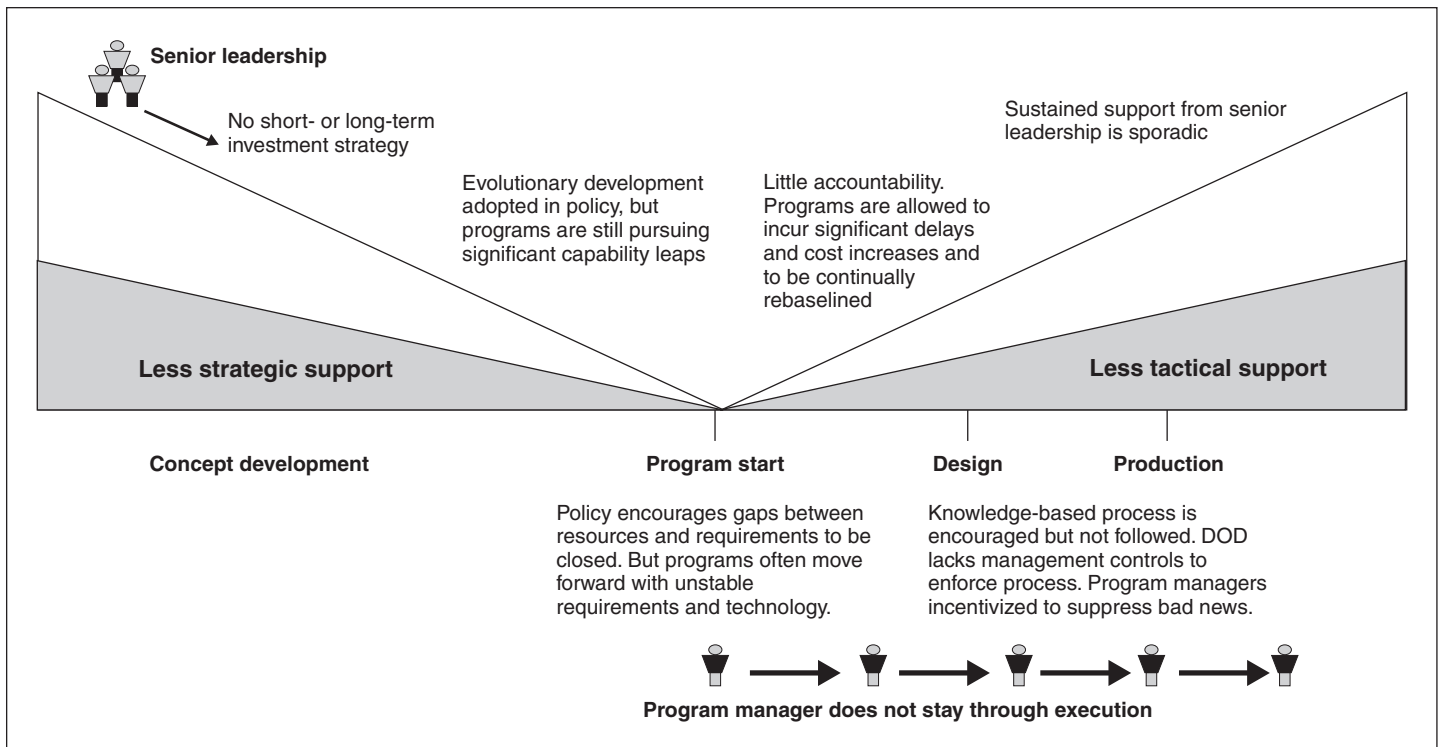
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# Chapter 3: DOD Is Not Supporting Its Program Managers Effectively

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While DOD's leadership has taken action in recent years it hopes will better position programs and improve planning and budgeting, it is still not effectively positioning or supporting program managers for success. For example, rather than making strategic investment decisions, DOD starts more programs than it can afford and rarely prioritizes them for funding purposes. The result is a competition for funds that creates pressures to produce optimistic cost and schedule estimates and to overpromise capability. Moreover, our work has shown that DOD often starts programs without establishing a business case. Specifically, technologies are not always mature at start, requirements are not fully defined, and cost and schedule estimates are not always realistic. In addition, program managers are not empowered to execute programs. They cannot veto requirements and they do not control funding or other resources. In fact, program managers who responded to our survey personally consider requirements and funding instability to be their biggest obstacles to success. Program managers also believe that they are not sufficiently supported once programs begin. In particular, they believe that program decisions are based on funding needs of other programs rather than demonstrable knowledge; they lack tools needed to enable them to provide leadership consistent with cost, schedule and performance information; they are not trusted; they are not encouraged to share bad news; and they must continually advocate for their programs in order to sustain commitment.

Figure 5: Breakdowns in Support and Accountability Factors



Source: GAO.

## Senior Leadership Does Not Provide a Strong Foundation for Success

According to program managers we interviewed as well as comments to our survey and our past reviews, senior leadership within DOD does not provide a strong foundation for success. While DOD is adept at developing long-term visions and strategic plans, it does not develop realistic, integrated investment strategies for weapons acquisitions to carry out these plans. Instead, more programs are started than can be funded and too many programs must compete for funding, which, in turn, creates incentives to produce overly optimistic estimates and to overpromise capability. Moreover, when faced with a lower budget, program managers believe that senior executives within the Office of the Secretary of Defense (OSD) and the services would rather make across-the-board cuts to a span of programs rather than hard decisions as to which ones to keep and which ones to cancel or cut back. Our work continues to show that, while DOD has adopted evolutionary development in its policies, programs are being encouraged to pursue significant leaps in capability. In addition, DOD's policy now encourages programs to match resources to

requirements before program initiation, but program managers reported in our survey that requirements and funding are not stabilized and were the biggest obstacles to their success. Further, while program managers believe their training has been adequate, they also believe that mentoring has been uneven and that they could benefit with tours of duty inside the Pentagon, for example, in offices that oversee budget or financial management. Table 2 highlights differences between strategic senior leadership support within the commercial companies we visited and DOD.

**Table 2: Are Best Practices Present in DOD?**

Best practices	DOD
Develop long-term vision and investment strategy	DOD has long-term vision, but not an investment strategy. Lack of investment strategy has created competition for funding and spurred low cost-estimating, optimistic schedules, and suppression of bad news.
Adopt evolutionary path toward meeting customer needs	DOD has adopted evolutionary development in policy but not in practice.
Match requirements and resources before starting new product development	DOD has encouraged achieving match in policy but not in practice. Requirements are not stable; funding commitments are not enforced; key technologies are not matured before development. Requirements and funding are biggest obstacles in view of program managers.

Source: GAO.

## Investment Strategy and Evolutionary Development

DOD is attempting to address some of the problems identified, but it is too early to determine how effective its solutions are. For example, it is implementing a new requirements setting processes—known as the Joint Capabilities Integration and Development System—in an attempt to bring more discipline to investment decisions. The system is organized around key functional concepts and areas, such as command and control, force application, battlespace awareness, and focused logistics. For each area, boards of high-ranking military and civilian officials identify long-term joint needs and make high-level trade-offs on how those needs should be met. Once specific programs are proposed, the process is designed to encourage a more evolutionary approach by allowing requirements setters the flexibility to define requirements in terms of capabilities as well as to defer final requirements formulation to later in the development process. DOD has also been attempting to implement complementary planning and budgeting processes—for example, by asking the military services to plan budgets around guidance that takes a joint perspective and by taking a

portfolio planning approach. However, there is no evidence to date that shows these enhancements are providing DOD with a sound investment strategy as well as the right controls for enforcing that strategy.

While some program managers we spoke with believed the process' focus on capabilities versus requirements promised more flexibility, program managers comments to our survey show that they also still widely believed that they were operating in an environment where there was unfair competition for funding. Figure 6 highlights specific views.

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**Figure 6: Highlights of Program Manager Comments Regarding Competition for Funding**

- OSD staff has reduced funding without any understanding or appreciation for program impacts. It appears that the staff makes arbitrary cuts.
- OSD has a very near-term execution year focus, resulting in great instability. In reality, it should provide much more strategic vectors for the Department instead of short-term adjustments to fix more tactical-level funding needs.
- My experience is that the [service] and OSD typically cut programs to pay top down bills.
- There is no such thing as funding stability in DOD. Funding reductions and program stretchouts are the norm due to top down fiscal bills that occur during the execution year. The Pentagon must pay the bills, therefore it takes funds from the programs, thereby contributing to program stretchout, cost increases, inefficiencies, etc.
- Unstable funding results in pressure to do aggressive things in order to minimize the impact of budget cuts on schedule and performance. I believe this has been a major factor in recent...program execution problems.
- Our product is considered a support function. When funding gets tight, we have been considered a bill payer for others, even if it has "broken" our program.

Source: GAO survey.

DOD has also adopted policies that encourage evolutionary development.<sup>1</sup> However, our reviews continue to find that programs are still pursuing

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<sup>1</sup> DOD Directive 5000.1, the Defense Acquisition System (May 2003) and DOD Instruction 5000.2 Operation of the Defense Acquisition System (May 2003). The directive establishes evolutionary acquisition strategies as the preferred approach to satisfying DOD's operational needs. The directive also requires program managers to provide knowledge about key aspects of a system at key points in the acquisition process. The instruction implements the policy and establishes detailed policy for evolutionary acquisition.

significant leaps in capabilities. For example, we reported this year<sup>2</sup> that the Joint Strike Fighter acquisition strategy was striving to achieve the ultimate fighter capability within a single product development increment, and that it had bypassed early opportunities to trade or defer to later increments those features and capabilities that could not be readily met. We also testified<sup>3</sup> that while DOD's space acquisition policy states its preference for evolutionary development, programs still attempt to achieve significant leaps in one step.

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## Matching Resources to Requirements

In recent years, DOD has changed its acquisition policy to encourage decisionmakers to match requirements to resources before starting a new program. For example, the policy specifically encourages that technologies be demonstrated in a relevant environment before being included in a program; that a full funding commitment be made to a program before it is started and that requirements be informed by the systems engineering process. Concurrently, DOD's new requirements process is designed to instill more discipline during initial requirements development and postpone final determination of requirements to assure that requirements being set are achievable.

In practice, however, our work has shown that there are still significant gaps between requirements and technology resources when programs begin. Our most recent annual assessment of major weapon systems programs,<sup>4</sup> for example, showed that only 15 percent of the programs we reviewed began development having demonstrated that all of their technologies were mature. More often than not, programs had to worry about maturing technologies well into system development, when they should have focused on maturing system design and preparing for production. These assessments also show that programs that started development with mature technologies experienced lower development and unit cost increases than those programs that started with immature technologies. Table 3 provides some examples.

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<sup>2</sup> *Tactical Aircraft: Opportunity to Reduce Risks in the Joint Strike Fighter Program with Different Acquisition Strategy*, [GAO-05-271](#) (Washington, D.C.: March 15, 2005).

<sup>3</sup> *Space Acquisitions: Stronger Development Practices and Investment Planning Needed to Address Continuing Problems*, [GAO-05-891T](#), (Washington, D.C.: July 12, 2005).

<sup>4</sup> *Defense Acquisitions: Assessments of Selected Major Weapon Programs*, [GAO-05-301](#) (Washington, D.C.: March 31, 2005).

**Table 3: Technology Maturity and Program Outcomes**

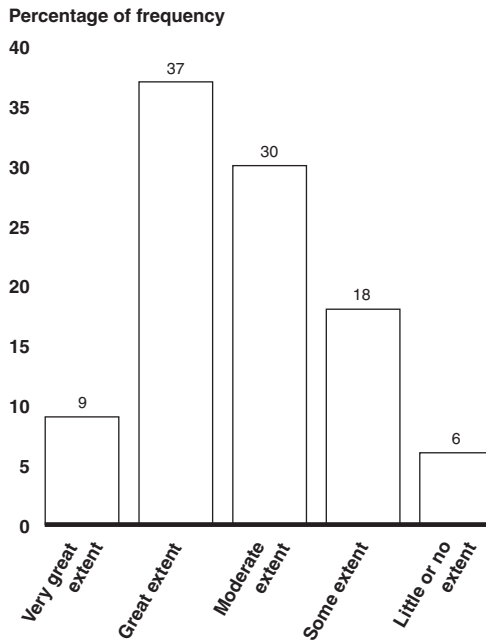
<b>Program</b>	<b>Percent increase in R&amp;D (first full estimate to latest estimate)</b>	<b>Percent of critical technologies and associated maturity level at development start</b>
Advanced Threat Infrared Countermeasures/Common Missile Warning System	5.6	50 % (3 of 6) at 6 or higher
C-5 Reliability Enhancement and Reengining Program	2.1	100 % (11 of 11) at 6 or higher
DD(X) Destroyer	417.3	25 % (3 of 12) at 6 or higher
Future Combat System	50.8	32 % (17 of 52) at 6 or higher
Joint Strike Fighter	30.1	25 % (2 of 8) at 6 or higher

Source: GAO.

Note: Technology readiness level of 7 or higher at program launch is considered best practice; a technology readiness level of 6 or higher is DOD standard.

Although the majority of respondents to our survey believed that the initial baselines of their programs were reasonable, a significant group, about 24 percent of program managers, responded that their program parameters were not reasonable at the start and 45 program managers responded that their program had been re-baselined one or more times for cost and schedule increases; 18 percent said one or more key technologies fell below a readiness level of 7, which is proven to work in an operational environment. They also noted that the most frequently missing critical skill was systems engineering—a key function for matching requirements to the technologies needed and for providing reasonable baselines at the beginning of development. In addition, in written comments and individual interviews, program managers noted pressure to agree to cost commitments that could be attained only if programs enjoyed higher-level support. They also noted that requirements were often not fully defined at the onset of a program, and many also pointed out that users and stakeholders often did not stick to the agreements they made when programs were launched, especially if technologies did not mature as planned.

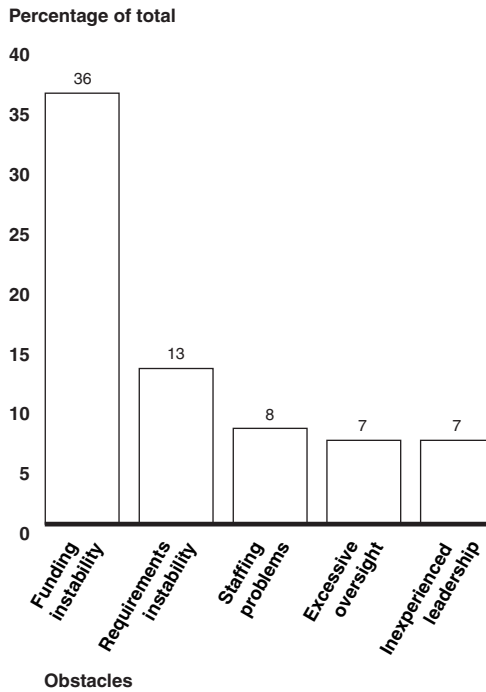
**Figure 7: To What Extent Were the Parameters of Your Program Reasonable at Program Start?**



Source: GAO survey.



Figure 8: How Program Managers Responded to an Open-ended Question on What Were the Biggest Obstacles They Faced



Source: GAO survey.

Program managers' views were mixed when it came to whether human capital resources were well matched to new programs. They cited major improvements in DOD's training programs and credited cross-functional teams as a valuable resource. They also generally believed they personally had the right mix of experience and training to do their jobs well. Ninety-four percent of the program managers responding to our survey reported that they had been certified at the highest level for program management by DOD's Defense Acquisition University. More than 80 percent also believed they had adequate training in the areas of systems engineering, business processes, contracting, management, program representation, cost control, and planning and budgeting. Slightly less, about 76 percent, believed they had enough leadership training. In addition, about 92 percent said that they believed that their service consistently assigned people with the skills and experience to be effective program managers.

At the same time, however, program managers comments and interviews with program executive officers pointed to critical skill shortages for staff that support them—including program management, systems engineering,

cost estimating, and software development. Some of these officials attributed the shortages to shifts in emphasis from oversight to insight of contractor operations. Lastly, in their written comments, about 18 percent of program managers who provided written comments cited shortcomings in their career path, such as lack of opportunities at the general officer level and requirements to move often as a disincentive; 13 percent cited the lack of financial incentives. Some program managers also noted that DOD loses opportunities to retain valuable experience, merely because there are no formal incentives for military officers to stay on as program managers after they are eligible for retirement. Civilians in program management also cited a lack of career opportunities; one problem cited was having to find their next job in contrast to military program managers, whose subsequent job is presented to them.

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## Execution in DOD Does Not Provide Adequate Support and Accountability

According to program managers and our past reviews, the execution process does not provide adequate support and accountability. In particular, knowledge-based development processes are not employed, program managers are not empowered to execute, and they are not held accountable for delivering programs within targets.

More specifically, DOD has encouraged following knowledge-based development processes in its acquisition policy but not always in practice. The acquisition process itself mirrors many aspects of the commercial companies. For example, it requires a variety of senior, functional, and program-level personnel to come together, assess progress, identify problems, and make go/no-go decisions at key points in development. It encourages oversight personnel to base these decisions on quantifiable data and demonstrated knowledge. To enhance product development, DOD has also been attempting to adopt and improve policies in areas such as software development and systems engineering.

However, program managers who responded to our survey believe that the acquisition process does not enable them to succeed because it does not empower them to make decisions on whether the program is ready to proceed forward or even to make relatively small trade-offs between resources and requirements as unexpected problems are encountered. Program managers assert that they are also not able to make shifts within personnel to respond to changes affecting the program. At the same time, program managers commented that requirements continue to be added as the program progresses and funding instability continues throughout. These two factors alone cause the greatest disruption to programs, according to program managers. Compounding this problem is the fact

that because acquisition programs tend to attract funds over other activities, including science and technology efforts that ultimately support acquisition, program managers are incentivized to take on tasks that really should be accomplished within a laboratory environment, where it is easier and cheaper to discover and address technical problems.

With many factors out of their span of control, program managers in our focus groups also commented that it was difficult to hold them accountable for mistakes. In addition, in their written comments to the survey, many program managers expressed frustration with the time required of them to answer continual demands for information from oversight officials—many of which did not seem to add value. Some program managers in fact estimated that they spent more than 50 percent of their time producing and tailoring and explaining status information to others.

More broadly, in interviews and written comments, many program managers and program executive officials said that did not believe that DOD's acquisition process really supported or enabled them. Instead, they viewed the process as cumbersome and the information produced as non-strategic. When strategic plans or useful analyses were produced, they were done so apart from the acquisition process.

Our own reviews have pointed to a number of structural problems with the acquisition process.<sup>5</sup> In particular, while DOD's acquisition policy has embraced best practice criteria for making decisions, it does not yet have the necessary controls to ensure knowledge is used for decision-making purposes. As a result, programs can move forward into design, integration, and production phases without demonstrating that they are ready to. Without a means to ensure programs and senior managers are adhering to the process, the process itself can become an empty exercise—and, in the view of program managers, a time-consuming one.

Table 4 highlights differences between DOD and commercial knowledge-based development support and accountability factors—collectively from the perspective of program managers, our past reports, and observations we made during the course of the review.

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<sup>5</sup> *Defense Acquisitions: DOD's Revised Policy Emphasizes Best Practices but More Controls Are Needed*, [GAO-04-53](#) (Washington, D.C.: Nov. 17, 2003).

**Table 4: Are Best Practices Present in DOD?**

Best practices	DOD
Base decisions on quantifiable data and demonstrated knowledge	DOD policy encourages decisions to be based on quantifiable data and demonstrated knowledge, but not happening in practice.
Empower program managers to make decisions	Program managers say they are not empowered in the same way as commercial companies. They do not control resources. They do not have authority to move programs to next phases.
Hold program managers accountable	Difficult to enforce accountability.
Program managers stay through execution	Tenure has been lengthened, but program managers generally do not stay after 3 to 4 years.

Source: GAO.

## Data Supporting Oversight and Management Decisions

We reported that while DOD’s acquisition policy has embraced best practice criteria for making decisions, it does not yet have the necessary controls to ensure demonstrable data is used for decision-making purposes. We recommended that DOD assure that program launch decisions capture knowledge about cost and schedule estimates based on analysis from a preliminary design using systems engineering tools. In transitioning from system integration to system demonstration, we 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. And in transition to production, we recommended that DOD capture knowledge about production and availability of representative prototypes along with statistical process control data.

We recommended adopting these controls because, in our view, they would help set program managers up for success by (1) empowering them with demonstrated knowledge as they move toward production and (2) bringing accountability to their positions and making the business case more understandable. Without these types of controls, the process can become an empty and time-consuming exercise in the view of program managers. At present, our reports continue to show that programs are allowed to proceed without really showing that they are ready to. In our most recent annual assessment of major weapon systems, for example, only 42 percent of programs had achieved design stability at design review and almost none of the programs in production or nearing production

planned to assure production reliability through statistical control of key processes.

Our survey also indicated that a relatively small percentage of programs used knowledge indicators that successful commercial companies use. For example, in responding to our survey, only 32 percent of program managers 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.

In our survey and interviews, program managers and program executive officers also frequently commented that they spend too much time preparing data for oversight purposes that is not strategic or very useful to them. In fact, more than 90 percent of survey respondents 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. In addition, program managers told us that they do not have standard tools for preparing program-status data. Instead, they must hand-tailor data to the requester's particular demands for format and level of detail. The Air Force was cited by some program managers as taking initiative in developing a database (known as the System Management Analysis Reporting Tool) that could save time in answering internal oversight demands for data, but they also wanted to be able to use such a tool to answer outside demands. While program managers said they were spending a great deal of time reporting on program status to outsiders, some program executive officers and program managers also commented that they had to separately produce data, analyses, and strategic plans for their own purposes in order to keep their programs on track—the types of plans and analyses that they used were simply not called for by the process itself. One program executive officer said that he used three documents, the approved program baseline, the acquisition strategy, and the test plan to evaluate the program manager's plans—all of these documents and many more are required under current acquisition planning—but these were of most significance. In addition the executive officer held a one-day review per quarter with each program manager and reviewed metrics such as earned value, use of award fee, contract growth, and schedule variation.

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## Program Manager Authority

In several key areas, program managers said that they do not have the necessary authority to overcome obstacles and make trade-offs to achieve program goals. About 60 percent of the program managers that responded to our survey said that program managers should have more authority to manage their programs—particularly when it comes to funding, deciding when programs are ready to proceed to the next phase, and shifting staff. In interviews and written comments, some program managers commented that they were seeking the ability to make relatively small trade-offs—for example, moving a staff member from one section of a program to another and shifting a small amount of funds from procurement accounts to research and development accounts, while others advocated for greater authority, as long as their program stayed on track. In addition, program managers often commented that they should have a larger role in requirements decisions that are made after a program is started—specifically, the ability to veto new requirements that would put too much strain on the program. A few program managers we interviewed, however, believed that they did have sufficient authority and that many program managers have not learned how to exercise it or are risk averse. Others commented that program managers were simply not allowed by senior managers to exercise their authority. At the same time, program executive officers, who manage a set of programs, commented in interviews that they also lacked authority over simple matters such as moving staff or shifting small amounts of funds. Lastly, in our focus groups and in written comments, program managers who specifically worked for the Missile Defense Agency indicated that they did have authority to make trade-offs among cost, schedule, and performance and to set requirements for the business case. They found that this authority alone greatly separated their current positions from past program manager positions and consistently cited it as a major enabler.

Table 5 shows how program managers answered survey questions regarding the types of formal and information authority they have. Figure 9 highlights comments that were provided by program managers.

**Table 5: Program Manager Views on Formal vs. Informal Authority**

<b>In percent</b>			
<b>Type of authority</b>	<b>I have formal authority<sup>a</sup></b>	<b>I have informal authority</b>	<b>No authority</b>
Developing program requirements	10	82	7
Changes in program requirements	13	85	2
Flexibility within program to reallocate funding	81	15	5
Developing technology	42	45	9
Setting testing requirements	48	49	2
Selecting contractor sources	48	33	11
Administering contracts	60	37	3
Addressing difficulties to meet requirements	66	31	2

Source: GAO.

<sup>a</sup>Note: Numbers may not total 100 percent due to rounding.

**Figure 9: Highlights of Program Manager Comments on What Types of Authority They Need**

- Program managers need to have more ability to control their funding in order to make more efficient system and production trade-offs. Program managers also need more ability to work with the warfighter to pursue moderate or even high risk strategies when the payoff for the warfighter warrants such a change. Program managers also need the ability to directly interface with OSD and with Congress and should not be restricted through service staffs in order to facilitate communications.
- Program managers should be able to select and award most contracts versus going to the PEO or service acquisition executive for a decision.
- I believe program managers should be allowed to spend small amounts of underrun as they see fit for their program. Too often, any underrun is taken to pay for other programs.
- [We need] more authority to budget for and manage management reserves. The [planning and budgeting] process is too slow to react to new funding requirements to mitigate program risks.
- In the current environment, we do not control the numbers of military, civilian, or contractor personnel that work in the program office. We do not have the authority to hire and fire personnel, or to seat personnel in our office space. We do not have the authority to get adequate tools for our people to do their work, such as computers, printers, copiers, telephones, etc.
- Once appropriated by Congress, program managers should have more flexibility to transfer between program elements and budget accounts, and also the service and major commands should have less ability to remove funds that are being properly executed in order to transfer them to other programs.
- Program managers should be given authority to move funds between colors of money. Colors of money greatly reduce the flexibility that program managers often need to make tradeoffs within their programs.
- [We need authority] to be able to fire or replace people immediately or affect their bonus.
- [We need authority] to give monetary awards to support professionals.
- The key is not more authority; it is allowing program managers to fully exercise the authority they already have. No program manager minds reasonable oversight, but the current level of oversight is unreasonable.

Source: GAO survey.

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## Accountability

Program manager views with regard to accountability are mixed. In our interviews and our focus groups, many program managers stated they personally held themselves accountable; however, many also commented that it is difficult to be accountable when so much is outside their span of



control. During our focus groups, program managers cited sporadic instances when program managers were removed from their positions or forced to retire. They also cited instances when a program manager was promoted, even though the program was experiencing difficulties. In their written comments for our survey, program managers often commented that it was a disincentive that senior leaders who were impacting their program negatively were not being held accountable.

We observed some key differences between the commercial companies we visited and DOD when it comes to accountability.

- Commercial companies make it very clear who is accountable on a program and for what. Goals that must be achieved are clearly spelled out and understood by the entire program team. In DOD, it is not always clear who is responsible. Moreover, the expectations set for program managers by their supervisors may not necessarily match up with the goals of their program—particularly when the program manager is a military officer who reports to both a PEO and another commanding official.
- Program managers and senior managers in the commercial sector are required to stay with programs until they are done; at DOD they are not.
- Program managers in the commercial sector are incentivized to stay with programs and be accountable for them—principally through empowerment and financial incentives, but also through their desire to help the company achieve its goals. At DOD, program managers strongly asserted that they are incentivized to help the warfighter, but few said they were incentivized by financial or promotion incentives or by empowerment.

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## Senior Leader Support during Execution

In commenting on senior leader support during program execution, program managers had mixed views on whether they received sustained commitment from their program executive officers, but widely believed that they did not receive sustained commitment from other senior leaders and stakeholders—unless their programs enjoyed priority and support from very high level officials, Congress, or the President. More often than not, programs struggled to compete for funding and were continually beset by changing demands from users. Others noted that while DOD is emphasizing jointness in programs more and more, collaboration among senior leaders needed to achieve jointness is not always happening. Some program managers lamented that they felt they were not respected in DOD, while others believed their service was taking some positive actions

to put program managers on a par with military officers in operational positions.

Program managers were also troubled by constant demands for information for oversight purposes as well as interruptions from stakeholders (for example, in department-wide budget or testing offices) that seemed to be non value-added. As we noted earlier, over 90 percent of the survey respondents 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.

Several program managers also cited reluctance on the part of senior managers to hear bad news. Our past reviews have similarly noted that the overall competition for funding in DOD spurs program managers to suppress bad news because it can result in funding cuts.

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# Chapter 4: Basic Incentives Drive Differences in How Program Managers Are Supported and Held Accountable

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Differences between DOD and leading companies in how program managers are supported and held accountable are rooted in differences in incentives and resulting behaviors. This begins with the definition of success. The commercial firms we studied concluded their survival hinged on their ability to increase their market share, which, in turn, meant developing higher-quality products, at the lowest possible price, and delivering them in a timely fashion—preferably before their competitors could do the same. This imperative meant that they had no choice but to narrow the gap between requirements and resources in a manner that not only ensured they met their market targets, but did so in a manner that consumed resources efficiently. It also meant that they had no choice but to fully support the development effort, to instill strategic planning and prioritization, to work collaboratively, to follow a knowledge-based process that makes product development manageable, and ultimately, assign accountability to all involved for success or failure. In theory, DOD's success likewise hinges on its ability to deliver high quality weapons to the warfighter in a timely fashion. But in practice, the implied definition of success is the ability of a program to win support and attract funds. Of course, there are reasons for this disconnect. Corporate revenue is generated by customer sales while DOD's funding is dependent on annual appropriations. Corporations go out of business when their product development efforts do not succeed; DOD does not. Selling products to customers is the single focus of a private-sector company while DOD is charged with a myriad of important missions—each of which also competes for budget share. As a result, program managers are incentivized to overpromise on performance because it makes their program stand out from others. They are incentivized to underestimate cost and schedule and to suppress bad news because doing otherwise could result in a loss of support and funding and further damage their program. In short, unknowns become acceptable and desirable rather than unacceptable as they are in the corporate environment. And accountability becomes much more difficult to define.

**Figure 10: Key Differences in Definition of Success and Resulting Behaviors**

	<b>Commercial companies</b>	<b>DOD</b>
Success	Sale to customer.	Attracting funds.
Means to success	Strategic planning/prioritizing.  Realism and candor.  Early testing.  Early redlights, greenlights based on demonstration.  Collaboration and trust.  Senior leaders are program advocates. Corporate research departments are technology developers. Program manager is executor.  Single program manager is accountable for delivery.	Competition for funds.  Optimism and unknowns.  Late testing.  Early greenlights; late redlights.  Oversight and distrust.  Program manager is often the advocate, technology developer, and executor.  Multiple program managers are accountable for continuation.

Source: GAO.

## Definition of Success

Success for the commercial world is straightforward and simple: maximize profit. In turn, this means selling products to customers at the right price, right time, and right cost. Each of the commercial companies we visited enjoyed success to this end, but at some point in time, as competitors made gains, markets tightened, and the pace of technology changes grew faster, they realized they needed to do more to be successful. Toyota decided it needed to expand its role in the world market place and this need persisted as competition grew stronger over the years. For Siemens this realization came in the 1990s—when Siemens Medical Division took a hard look at its profitability for its medical devices and for Motorola in the 1980’s when it began losing market share for its communication devices. To turn themselves around, all three companies chose not to depend on technology breakthroughs or exotic marketing, but rather to improve their position by looking inward at how they approached development. Each found that there was room for improvement, starting with corporate cultures and ending with processes and controls. In Toyota’s case, emphasis was largely placed on collaboration and consistency. In Siemens case, emphasis was placed on quality, particularly because its medical products come under extensive Food and Drug Administration regulations. For Motorola, emphasis was placed on empowerment and

commonality, particularly in the processes that support product development like software development.

At DOD, success is often formally defined in similar terms as the commercial world: deliver high quality products to customers (the warfighter) at the right time and the right cost. Virtually all program managers we spoke with first defined success in terms of enabling warfighters and doing so in a timely and cost-efficient manner. But when the point was pursued further, it became clear that the implied definition for success in DOD is attracting funds for new programs, and keeping funds for ongoing programs. Program managers themselves say they spend enormous amounts of time retaining support for their efforts and that their focus is largely on keeping funds stable. They also observe that DOD starts more programs than it can afford to begin with, which merely sets the stage for competition and resulting behaviors. As noted earlier, there are factors that contribute to how success is defined in practice, including the fact that DOD depends on annual appropriations and it must fund a wide variety of missions beyond weapon systems development. However, according to program managers, the willingness to make trade-off decisions alone, would help DOD mitigate these circumstances.

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## Means for Success

Regardless of where they placed greatest emphasis, each company we studied adopted processes and support mechanisms that emphasized the following:

- risk reduction,
- knowledge-based decisionmaking,
- discipline,
- collaboration,
- trust,
- commitment,
- consistency,
- realism, and
- accountability.

Such characteristics were seen as absolutely essential to gaining strength in the market place. With limited opportunities to invest in new product development efforts, companies understand it is essential, for example, that they know they are pursuing efforts that will optimize profits. Therefore, estimates of costs and technology maturity must be accurate and they must be used for making decisions. Consistency and discipline are integral to assuring that successful efforts can be repeated. Ultimately,

these characteristics translate into processes that help companies develop products quicker, cheaper, and better. At the strategic level, processes include accurate, strategic planning and prioritization to ensure the right mix of products are pursued; investment strategies that prioritize projects for funding; and strong systems engineering to help them establish a realistic business case that levels market needs with available resources prior to beginning a product development. At the tactical level, this includes knowledge-based developments that center on designing and manufacturing products that will sell well enough to make an acceptable profit. This combination of focused leadership and disciplined processes promotes positive behaviors, such as an insistence that technology development take place separately from product development programs and trade-offs between requirements and resources be made before beginning a program; it promotes an atmosphere of early candor and openness from everyone as to potential program risks; and underscores the need for realistic, knowledge-based cost and schedule estimates to support full funding decisions; and the ability to test early, allowing “red lights” for problems that must be proven solved before they can be changed to “green lights.”

Once attracting and sustaining funds becomes a part of the definition of success, as it is at DOD, different values and behaviors emerge. For example, it is not necessarily in a program manager’s interest to develop accurate estimates of cost, schedule, and technology readiness, because honest assessments could result in lost funding. Delayed testing becomes preferred over early testing since that will keep “bad news” at bay.

Ultimately, no matter how well-intentioned or what improvements are made, DOD’s processes and support mechanisms eventually play into funding competition. On paper, the requirements process may emphasize realism and the importance of incremental development, but in practice, it consistently encourages programs to promise performance features that significantly distinguish them from other systems. Likewise, changes may be made to make the funding process more strategic, but because there are still many programs competing for funds, it encourages cost and schedule estimates to be comparatively soft with little benefit from systems engineering tradeoffs. By favoring acquisition programs over science and technology efforts, the funding process also encourages programs to take on technology development that should be carried out in research labs. Lastly, the acquisition process may adopt world-class criteria for making decisions, but because it is much easier to attract funds for a formal weapons program than funds for the exercise of gaining knowledge about technologies, the process encourages programs to move

forward despite risks with the assumption that programs can resolve technical, design, or production “glitches” later on. Significant unknowns are accepted in this environment. Delivering a product late and over cost does not necessarily threaten program success. The cumulative effect of these pressures is unpredictable cost and schedule estimates at the outset of a program that are breached, sometimes very significantly, by the time the weapon system is fielded.

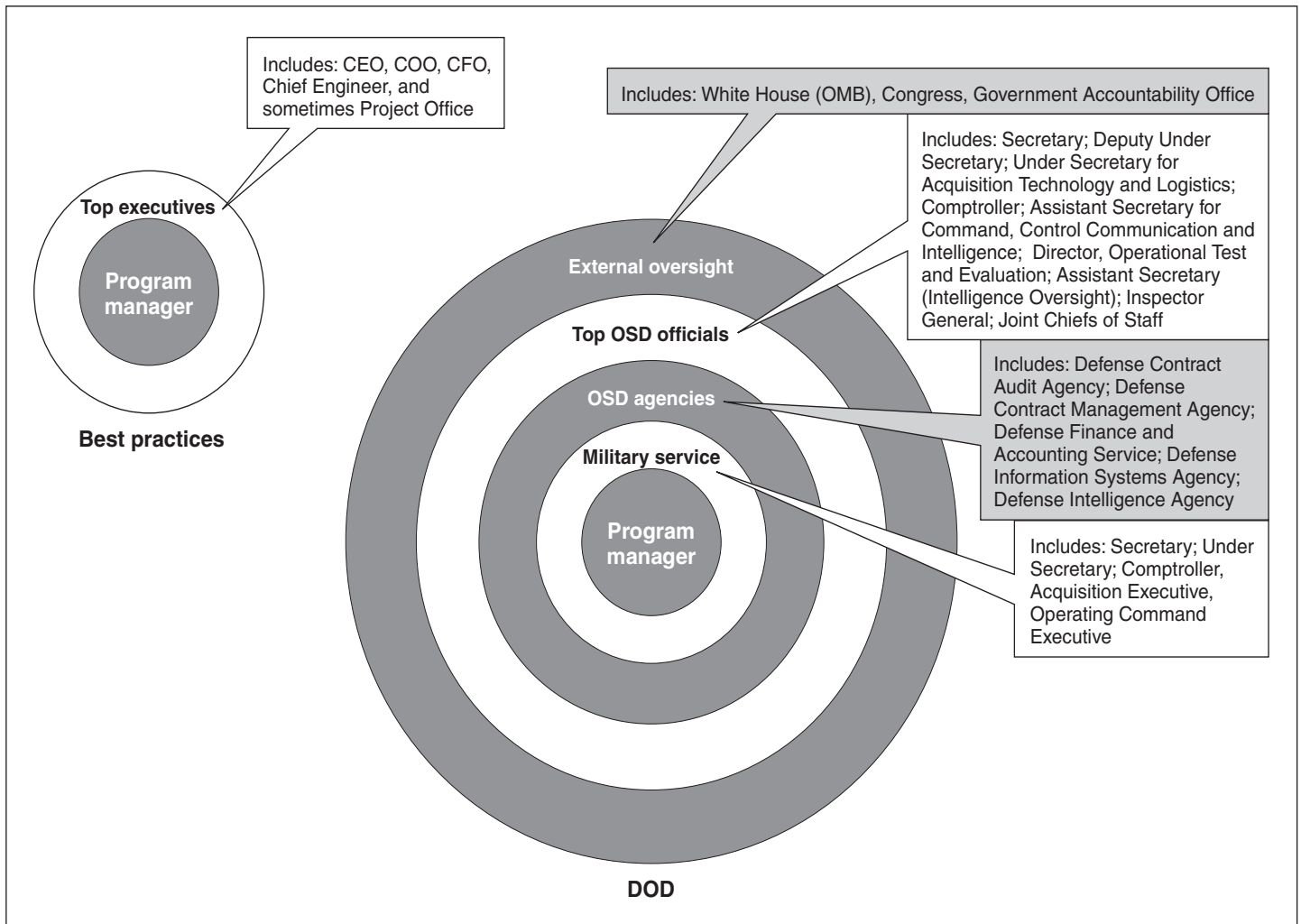
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## **Other Differences Put Additional Pressures on DOD Program Managers**

There are other environmental differences that put additional pressures on program managers within DOD. They include layers of internal and external oversight that come with DOD’s stewardship responsibilities, personnel rules that make it more difficult to manage human capital and hold people accountable, laws and regulations that place additional constraints on an acquisition, and the mere size and scope of DOD, which adds significant challenges to communicating and collaborating effectively.

For example, as shown below, commercial companies we visited tended to have fairly streamlined oversight. No matter what level the program manager resided, they had access to top executives who were empowered to help them make go/no-go decisions. In addition to this structure, the companies were governed by a degree of oversight from shareholders, but this was not actualized in day-to-day management of program development activities. At DOD, by contrast, program managers operate under many layers of oversight—both internally and externally. These include Congress, the President, the Secretary of Defense, a myriad of functional agencies as well as the military services—all of whom have a say in DOD’s overall budget as well as funding for specific programs. Moreover, within these confines, leaders at all levels shift frequently. Much of this oversight is necessary for carrying out stewardship responsibilities for public money, but studies conducted by a variety of commissions assessing acquisition problems through the years have consistently found that there are opportunities to reduce oversight layers and streamline oversight processes and protect programs from frequent leadership changes. Program managers themselves understood the need for oversight, but found that responding to oversight demands was taking too much of their time. They also identified opportunities to make it easier to work within this environment, including development of databases to support internal and external oversight requests, empowering program managers for more day-to-day decisions, and making stakeholders more accountable.

**Figure 11: Commercial vs. DOD Oversight Environments**



Source: GAO.

Program managers also cited several trends that have increased pressures that they face. These include DOD’s movement toward developing more technical complex families of weapon systems as one package (system of systems), which they believe vastly increases management challenges and makes it more difficult to oversee contractors and DOD’s reduction in acquisition workforces over the past decade, which has made it more difficult to carry out day-to-day responsibilities and retain technical and business expertise. Overall, however, program managers themselves



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**Chapter 4: Basic Incentives Drive Differences  
in How Program Managers Are Supported and  
Held Accountable**

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consistently attribute their problems to competition for funding over these other factors.

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# Chapter 5: Conclusions and Recommendations

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Like the commercial world, DOD has a mandate to deliver high-quality products to its customers, at the right time, and the right price. Quality and time are especially critical to maintain DOD's superiority over others, to counter quickly changing threats, and to better protect and enable the warfighter. Cost is critical given DOD's stewardship over taxpayer money, long-term budget forecasts which indicate that the nation will not be able to sustain its current level of investment in weapon systems, and DOD's desire to dramatically transform the way it conducts military operations. At this time, however, DOD is not positioned to deliver high quality products in a timely and cost-efficient fashion. It is not unusual to see cost increases that add up to tens of millions of dollars, schedule delays that add up to years, and large and expensive programs to be continually rebaselined. Recognizing this dilemma, DOD has tried to embrace best practices in its policies, instill more discipline in requirements setting, strengthen training for program managers and has lengthened program manager tenures. It has also reorganized offices that support and oversee programs, required programs to use independent cost estimates and systems engineering, and it has alternately relaxed and strengthened oversight over contractors in an effort to extract better performance from them. Yet despite these and many other actions, programs are still running over cost and over schedule and, in some cases, changes have merely added tasks for program managers while adding no value.

Our work shows that this condition will likely persist until DOD provides a better foundation on which program managers can launch programs and more consistent and steadfast support once it commits to programs. At the core of this solution is developing and enforcing an investment strategy that prioritizes programs based on customer needs and DOD's long term vision and reduces the burden of advocacy on the part of the program manager. DOD will always be facing funding uncertainties due to the environment it operates in. But it has an opportunity to greatly mitigate the risks that come with this environment by separating long-term wants from needs, matching them up against what technologies are available today, tomorrow, and decades from now, as well as being realistic in determining what resources can be counted on. Without an investment strategy, all other improvements will likely succumb to the negative incentives and behaviors that come with continual competition for funding. With an investment strategy, senior leaders will be better positioned to formally commit to a business case that assures new programs fit in with priorities, that they begin with adequate knowledge about technology, time, and cost, and that they will follow a knowledge-based approach as they move into design and production. Another core enabler for improving program managers' chances for success lies in leadership's ability to implement evolutionary, incremental acquisition

programs that have limited cycle times from beginning to delivery of the weapon system. This allows DOD to align program managers' tenures to delivery dates, thereby substantially increasing accountability for successful outcomes.

Once senior leaders do their part—by providing program managers with an executable business case and committing their full support to a program—they can begin to empower program managers more and hold them accountable. By embracing a model for supporting program managers that incorporates all these elements, DOD can achieve the same outcomes for its weapons programs as other high-performing organizations.

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## Recommendations for Executive Action

We recommend that the Secretary of Defense take the following actions to ensure program managers are well positioned to successfully execute and be held accountable for weapon acquisitions:

- DOD should develop an investment strategy that, at a minimum,
  - determines the priority order of needed capabilities with a corollary assessment of the resources, that is dollars, technologies, time and people needed to achieve these capabilities. The remaining capabilities should be set out separately as desirable, resources permitting.
  - lays out incremental product development programs for achieving desired capabilities, and
  - establishes controls to ensure that requirements, funding, and acquisition processes will work together so that DOD will sustain its commitment to its priority programs.

As DOD works to develop the strategy, it should take an interim step by identifying priorities for programs that are already past milestone B (the formal start of development). Once the strategy is complete, it should be used by the Office of the Secretary of Defense to prepare and assess annual budget proposals as well as to balance funding between science and technology efforts and acquisition efforts to ensure that robust technology development efforts are conducted, but outside the acquisition program until reaching maturity.

- For each new major weapons program, require that senior-level officials from the requirements, science and technology, program management, testing communities as well as the Office of the Comptroller formally commit to a business case prior to approving a program at milestone B. At a minimum, the business case should demonstrate that

- a requirement exists that warrants a materiel solution consistent with national military strategy,
  - an independent analysis of alternatives has been conducted
  - the developer has the requisite technical knowledge to meet the requirement,
  - the developer has a knowledge-based product development and production plan that will attain high levels of design and production maturity,
  - reasonable estimates have been developed to execute the product development and production plan, and
  - funding is available to execute the plan.
- Develop and implement a process to instill and sustain accountability for successful program outcomes. At a minimum, this should consider
    - matching program manager tenure with delivery of a product or for system design and demonstration,
    - tailoring career paths and performance management systems to incentivize longer tenures,
    - empowering program managers to execute their programs, including an examination of whether and how much additional authority can be provided over funding, staffing, and approving requirements proposed after milestone B,
    - developing and providing automated tools to enhance management and oversight as well as to reduce time required to prepare status information.

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## Agency Comments and Our Evaluation

In commenting on a draft of our report, DOD's Acting Director for Procurement and Acquisition Policy concurred with our recommendations. In doing so, DOD asserted it was already taking actions to address our recommendations, notably by reviewing its overall approach to acquisition governance and investment decisionmaking as part of its Quadrennial Defense Review due in February 2006 and identifying ways to more effectively implement existing policies. DOD also stated it intended to develop a plan to address challenges in acquisition manpower including program manager tenure and career path and it intends to enhance its information management systems to facilitate oversight and management decisions. As underscored in our report, DOD has attempted similar efforts in the past—that is, reviewed its approach to governance and investment decisions and policies—without achieving significant improvements. This is because DOD has not assured such actions were executed in tandem with (1) instilling more leadership and discipline in investment decisionmaking, in both the short and long term

and (2) instilling accountability—by requiring key senior officials to sign a business case, based on systems engineering knowledge, prior to every new acquisition as well as by matching program managers' tenure to cycle time. Therefore, in pursuing the actions it identifies in its response to our report, we believe that DOD should address the important questions of who should be held accountable for acquisition decisions; how much deviation from the original business case is allowed before it is no longer considered valid and the investment reconsidered; and what is the penalty when investments do not result in meeting promised warfighter needs.

The full text of the department's response is in appendix I.

# Appendix I: Comments from the Department of Defense



ACQUISITION  
TECHNOLOGY  
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NOV 22 2005

DPAP/PAIC

Mr. Michael Sullivan  
Director, Acquisition and Sourcing Management  
U.S. Government Accountability Office  
441 G Street, N.W.  
Washington, D.C. 20548

Dear Mr. Sullivan:

This is the Department of Defense response to the GAO draft report, 'BEST PRACTICES: Better Support of Weapon System Program Managers Needed to Improve Outcomes,' dated October 21, 2005, (GAO Code 120320/GAO-06-110). I concur with the recommendations in the report and have provided some amplifying discussion.

Sincerely,

Domenic Cipicchio  
Acting Director, Defense Procurement  
and Acquisition Policy

Attachment:  
As stated



GAO DRAFT REPORT - DATED OCTOBER 21, 2005  
GAO CODE 120320/GAO-06-110

“BEST PRACTICES: BETTER SUPPORT OF WEAPON SYSTEM PROGRAM  
MANAGERS NEEDED TO IMPROVE OUTCOMES”

DEPARTMENT OF DEFENSE COMMENTS  
TO THE RECOMMENDATIONS

**RECOMMENDATION 1:** The GAO recommended that the Secretary of Defense direct the DoD to develop an investment strategy that at a minimum,

- determines the priority order of needed capabilities with a corollary assessment of the resources, that is dollars, technologies, time and people needed to achieve these capabilities. The remaining capabilities should be set out separately as desirable, resources permitting.
- lays out incremental product development programs for achieving desired capabilities, and
- establishes controls to ensure that requirements, funding, and acquisition processes will work together so that DoD will sustain its commitment to its priority programs.

Also, as DoD works to develop the strategy, it should take an interim step by identifying priorities for programs that are already past milestone B. Once the strategy is complete, it should be used by the Office of the Secretary of Defense to prepare and assess annual budget proposals as well as to balance funding between science and technology efforts and acquisition efforts to ensure that robust technology development efforts are conducted, but outside the acquisition program until reaching maturity. (p. 61/GAO Draft Report)

**DOD RESPONSE: Concur**

DoD is currently reviewing its overall approach to department acquisition governance with the objective of (1) refining the mechanism for prioritizing materiel acquisition proposals and improving the alignment between corporate commitment and associated resource allocation; (2) effectively implementing existing evolutionary acquisition policy; (3) ensuring that current statutory and regulatory controls operate effectively; and (4) creating a more complementary relationship between technology development and acquisition. The ongoing Quadrennial Defense Review (QDR) and related efforts will address these issues. The QDR will be completed in February 2006. Subsequently, DoD will develop an implementation plan and schedule for actions that will address these issues.

**RECOMMENDATION 2:** The GAO recommended that the Secretary of Defense, for each new weapons program, require that senior-level officials from the requirements, science and technology, program management, testing communities as well as the Office of the Comptroller formally commit to a business case prior to approving a program at milestone B. At a minimum, the business case should demonstrate that

- a requirement exists that warrants a materiel solution consistent with national military strategy,
- an independent analysis of alternatives has been conducted
- the developer has the requisite technical knowledge to meet the requirement,
- the developer has a knowledge-based product development and production plan that will attain high levels of design and protection maturity,
- reasonable estimates have been developed to execute the product development and production plan, and
- funding is available to execute the plan. (pages 61 & 62/GAO Draft Report)

**DOD RESPONSE: Concur**

Current DoD policy requires a number of criteria to be met before a program may be formally initiated. These include: (1) a Joint Requirements Oversight Council validated requirement that is consistent with national military strategy; (2) an Analysis of Alternatives that has been completed and assessed; (3) evidence of technology maturity that has been independently assessed; (4) an approved acquisition strategy; (5) an approved acquisition program baseline; (6) a completed, independent cost estimate; and (7) full-funding. Mechanisms to improve the effectiveness of these policies are being considered as part of the QDR.

**RECOMMENDATION 3:** The GAO recommended that the Secretary of Defense direct the DoD to develop and implement a process to instill and sustain accountability for successful program outcomes. At a minimum, this should consider

- matching program manager tenure with delivery of a product or for system design and demonstration,
- tailoring career paths and performance management systems to incentivize longer tenures,
- empowering program managers to execute their programs, including an examination of whether and how much additional authority can be provided over funding, staffing, and approving requirements proposed after milestone B,
- developing and providing automated tools to enhance management and oversight as well as to reduce time required to prepare status information, (p. 62/GAO Draft Report)



**DOD RESPONSE: Concur**

DoD is currently engaged in the development of a manpower strategy designed to satisfy our current and future acquisition manpower challenges. That strategy will be comprehensive, and consider such issues as program manager tenure and career paths. This strategy will be developed by the end of FY 2006. In addition the department is considering policy designed to reduce requirements growth after program initiation and, is in the process of developing a transparent and efficient information management system intended to provide management with accurate and current program information.

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# Appendix II: GAO Staff Acknowledgments

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# Related GAO Products

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*DOD Acquisition Outcomes: A Case for Change.* [GAO-06-257T](#). Washington, D.C.: November 15, 2005.

*Defense Acquisitions: Stronger Management Practices Are Needed to Improve DOD's Software-Intensive Weapon Acquisitions.* [GAO-04-393](#). Washington, D.C.: March 1, 2004.

*Best Practices: Setting Requirements Differently Could Reduce Weapon Systems' Total Ownership Costs.* [GAO-03-57](#). Washington, D.C.: February 11, 2003

*Best Practices: Capturing Design and Manufacturing Knowledge Early Improves Acquisition Outcomes.* [GAO-02-701](#). Washington, D.C.: July 15, 2002.

*Defense Acquisitions: DOD Faces Challenges in Implementing Best Practices.* [GAO-02-469T](#). Washington, D.C.: February 27, 2002.

*Best Practices: Better Matching of Needs and Resources Will Lead to Better Weapon System Outcomes.* [GAO-01-288](#). Washington, D.C.: March 8, 2001.

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*Defense Acquisition: Employing Best Practices Can Shape Better Weapon System Decisions.* [GAO/T-NSIAD-00-137](#). Washington, D.C.: April 26, 2000.

*Best Practices: DOD Training Can Do More to Help Weapon System Programs Implement Best Practices.* [GAO/NSIAD-99-206](#). Washington, D.C.: August 16, 1999.

*Best Practices: Better Management of Technology Development Can Improve Weapon System Outcomes.* [GAO/NSIAD-99-162](#). Washington, D.C.: July 30, 1999.

*Defense Acquisitions: Best Commercial Practices Can Improve Program Outcomes.* [GAO/T-NSIAD-99-116](#). Washington, D.C.: March 17, 1999.

*Defense Acquisition: Improved Program Outcomes Are Possible.* [GAO/T-NSIAD-98-123](#). Washington, D.C.: March 17, 1998.

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**Related GAO Products**

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*Best Practices: DOD Can Help Suppliers Contribute More to Weapon System Programs.* [GAO/NSIAD-98-87](#). Washington, D.C.: March 17, 1998.

*Best Practices: Successful Application to Weapon Acquisition Requires Changes in DOD's Environment.* [GAO/NSIAD-98-56](#). Washington, D.C.: February 24, 1998.

*Best Practices: Commercial Quality Assurance Practices Offer Improvements for DOD.* [GAO/NSIAD-96-162](#). Washington, D.C.: August 26, 1996.

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