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ADDRESSING COST GROWTH OF MAJOR DEPARTMENT OF DEFENSE WEAPONS SYSTEMS

HEARING

BEFORE THE

FEDERAL FINANCIAL MANAGEMENT, GOVERNMENT INFORMATION, FEDERAL SERVICES, AND INTERNATIONAL SECURITY SUBCOMMITTEE

OF THE

COMMITTEE ON HOMELAND SECURITY AND GOVERNMENTAL AFFAIRS UNITED STATES SENATE

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ADDRESSING COST GROWTH OF MAJOR DEPARTMENT OF DEFENSE WEAPONS SYSTEMS

THURSDAY, SEPTEMBER 25, 2008

U.S. SENATE,
SUBCOMMITTEE ON FEDERAL FINANCIAL MANAGEMENT,
GOVERNMENT INFORMATION, FEDERAL SERVICE,
AND INTERNATIONAL SECURITY,
OF THE COMMITTEE ON HOMELAND SECURITY
AND GOVERNMENTAL AFFAIRS,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:32 p.m., in room SD–342, Dirksen Senate Office Building, Hon. Thomas R. Carper, Chairman of the Subcommittee, presiding.

Present: Senators Carper and Coburn.

OPENING STATEMENT OF SENATOR CARPER

Senator CARPER. The Subcommittee will come to order. Dr. Coburn, how are you?

Senator COBURN. I am fine. Glad to be with you.

Senator CARPER. Good. I am glad to be with you. I just checked in with the cloakroom to see if we are going to have any votes during your testimony, Dr. Finley, or the testimony of the second panel. It looks like we will not.

Senator COBURN. I would advise the Chairman that I am going to be on the floor at about 3:50 p.m., so I will be leaving.

Senator CARPER. Fair enough. But we are looking forward to this hearing. We appreciate the willingness of our Subcommittee to address the cost growth of major Department of Defense weapons systems. Currently, the financial strain on our country and our government is daunting, and government must watch every dollar that we spend and stretch those dollars that we do collect from taxpayers.

That challenge has gotten even tougher and the road steeper with the President's proposed bailout that we are chewing on literally as we speak.

More and more families every day lose their homes as a result of foreclosures, and their neighbors face devaluation of homes in their neighborhoods. More Americans are losing their jobs as unemployment rates are at their highest level in some 5 years. I do not know what the unemployment rate is like in your State, but we are up to almost 5 percent, which for Delaware is very high.

The cost of food and gas has skyrocketed over the last year or so, making it harder for Americans to fill up their tank and fill up their stomachs at the same time. And just last week, some of our Nation's oldest financial institutions folded, warning of a potential stock market crash and threatening the security of retirement investments for millions of Americans.

Given the times that we live in, every dollar that the government, our government, spends inefficiently is a dollar that is not spent to help the American taxpayer deal with these financial strains in their lives.

This Subcommittee tries to examine every aspect, but a lot of the aspects of the Federal Government to better ensure that our spending is working for Americans and not against them. This means that we need to look to see if the Department of Defense—where some of the most costly items in the Federal budget reside—is also spending taxpayer dollars efficiently.

Some of us may remember that at this time last year we actually looked at a very small part of the Defense budget, and we investigated whether or not we were achieving strategic airlift, our ability to move troops and cargo over long distances by air in a cost-effective way, and at the time we held a hearing to decide whether efforts to modernize our largest airlifter, the C–5 Galaxy, remained a cost-effective way to meet our strategic airlift needs. And we learned that there were ways to reduce the cost of modernizing our C–5 fleet. And I am happy to say that Under Secretary of Defense John Young, whom I think Dr. Finley reports to and serves with, was a key player in helping to enact those cost reductions and provide more cost-effective airlift. It turns out we can modernize two or three C–5Bs for roughly the cost of buying one brand-new C–17, and each C–5B carries about twice as much as a C–17. C–17s are great planes, but when you have C–5s that you can modernize for that kind of cost, we decided it would be cost-effective to do that.

But one year later, we are here to apply the process of identifying and enacting cost reductions on a broader scale.

This hearing will examine the cost growth of some of the Department's largest weapons systems and some of the problems the Department has had with delivering these systems on time and under budget. And this hearing could not have come any sooner.

Last April, the Government Accountability Office released its annual assessment of the DOD's major acquisition program and revealed that the cost overruns on the Department's 95 largest acquisition programs have now amounted to some $295 billion over their original program estimates, putting the sum total of these acquisition costs at $1.6 trillion. And as we can see on the chart to our left.[1]

In 2000, 75 programs were picked by GAO, I guess, as major defense acquisition programs; next year, 91; next year—what does that say?—95 in a cost overrun situation. The dollars were most interesting. There was not a great growth in the number of programs over that 7-year period, although there is some significant growth. But the thing that really caught my eye is the amount that these

[1] The chart appears in the Appendix on page 53.

programs that are over budget had grown from $42 billion in 2000 to some $295 billion in 2007.

I am not good enough in math on my feet, but if we were to run that out for another 10 or 20 years, that would really be startling. But it has caught my eye, and it sure did Dr. Coburn's as well.

During a Senate Armed Services Committee hearing on this same topic, the Chairman, our friend Carl Levin, outlined what the Department of Defense could have bought with that same $295 billion, and I want to take it just a little bit further and ask what the Federal Government, not just the Department of Defense, but what the Federal Government could have done with that money.

And right behind Dr. Coburn, we can get an idea. We could pay for the Iraq war through the spring of next year worth $85 billion, and we would still have plenty left over. We could fix all the levees in New Orleans for $10 billion. We could go on to create the Apollo program to help our auto companies kick our addiction to foreign oil. We could pay for the SCHIP program for 5 years. We would still have money left over to provide universal preschool for the next 10 years, expand our Army divisions for the next 10 years by two divisions, and that is about 40,000 troops, I believe; and then meet our nationwide demand for passenger rail corridors, another $60 billion. And that would add up to $295 billion. That is a lot of stuff that we could do. I think for the most part really good stuff. And we cannot do it because we do not have the money. As it turns out, we do not have this $295 billion either, but we are going to turn around to borrow it from other countries around the world.

Some young students were in the other day, and they asked me about printing money. They said, "When the Government runs out of money, do you just print it?" I said, "No. We borrow it." We borrow it from people around the world. And the unfortunate thing about that is that sometimes it puts us at their mercy, especially on foreign policy issues. When you are borrowing a lot of money from a country like China, the question is: Do we do the same thing in our foreign policy that otherwise we would do if we did not owe them all that money? It reduces our options.

Let me say that, clearly, we could have tackled a bunch of major problems with this money that our country faced, but we do not have these funds. And I wish DOD had used these funds to buy the silver bullet that would help us to secure Iraq, defeat al Qaeda, the Taliban operating in Afghanistan and along the borders with Afghanistan, but we do not.

However, that is for another hearing altogether, and maybe we will have a chance to consider those issues then. But we are not here to look at what we might have spent this money on, what we could have spent this money on. We are here to look at flaws in the defense acquisition system which has led to our collective wallets being about $295 billion lighter.

When the Senate Armed Services Committee looked at this back in June, Chairman Levin and the GAO identified four factors that they believe were most important in leading to this situation: First, unrealistic cost and schedule estimates; second, unrealistic performance expectations; third, advancing the program with immature technologies; and, fourth, changing program requirements during development.

The goal of this hearing is to further investigate how these four factors produced the situation we are in today, which I believe is untenable, and our witnesses are going to help us address these factors and how we can plug the holes in the inefficient acquisition process.

I am delighted to be here with Dr. Coburn.

OPENING STATEMENT OF SENATOR COBURN

Senator COBURN. Well, first of all, let me thank all of our witnesses for being here and to relay on behalf of the Chairman and myself that we do appreciate your public service. We understand oftentimes you are unappreciated, and so we plan on having a fairly frank discussion today with you about what we see as a commentary to what Senator Carper mentioned.

We have enumerated powers in the Constitution, and a lot of the problems that we are facing today financially have to do with the fact that the Congress got outside of those and did not manage them and did not oversight them and did not regulate them. And so we see problems. However, the subject we are going to be talking about is very specifically enumerated within the Constitution, and that is the defense of this country. And when we look and see what has happened in procurement, this is not a new problem.

As a matter of fact, if you go back to the first ships George Washington ordered, they had a significant problem with cost overrun and delay. They started with six ships and went to two. So this is a pretty longstanding problem. But I think it has very good relevance that we have never addressed the real issues.

One of the things that I hope that we will cover—and I know Dr. Finley has, and I know GAO has—is there are tremendous incentives to underestimate the cost so you can get a program started. And, some unique contracting can take care of that. If you underestimate the cost, you pay for it. There is a penalty to the contractor who underestimates the cost. That will stop some of that. That is not hard to do. That is done in business all the time.

Second is research and development, having the contract and having the cost overrun ought to be borne by the developer of it, which would, therefore, reflect in the higher up-front cost estimate rather than a low-cost estimate knowing that they are going to get remunerated for it.

Sometimes we hear, well, it is the shrinkage in the number of contractors that has increased the cost. But we had these same problems 30 years ago, and we had three times as many contractors. So what we are talking about is not anything that is really new.

Sometimes we hear the fact that, well—and we know, I recognize this is a problem, the acquisition force and the retirement dates and the decrease versus what we would like to see, except we had a full-fledged acquisition force during the Cold War, and we had the same problem.

So some of the reasons that we put forward for why we are having a problem today, they do not pass the muster of history. They do not answer the question. The real problem is underestimate, lack of contractor accountability in cost sharing and risk sharing, and then the real major problem is called "requirement creep."

And so when you combine lack of proper incentives to get the right prices combined with requirement creep, you are going to have a disaster. And the Defense Department, unfortunately, is not the only Department in the Federal Government that has that problem. But if we do not get a hold of it, the problems that we are facing in the future are going to be horrendous.

The latest estimate on Medicare and Medicaid is $100 trillion unfunded liability. I do not see a way out of this unless we really markedly change things.

So I look forward to our testimony. I believe a lot of what GAO has reported is right. But the answers on what the problems are, the answers in addressing those markedly having an increase in the realistic cost when we start a program rather than kidding ourselves so we can get it started and have it within our budget, hoping the money is on the come and that we will catch up with it, is really fooling ourselves. And in the long run, it fools the Defense Department, because you end up getting less of what you wanted and not as effective a component as what you wanted, and so I look forward to the testimony of Dr. Finley, as well as our other witnesses, and I hope that we can together, Senator Carper and I can bring to bear some common-sense solutions to this in the next defense appropriations, defense authorization bill so that we start changing the incentives.

With that, I thank you, Mr. Chairman.

Senator CARPER. You bet. Thank you.

Jim Finley is the Deputy Under Secretary of Defense at the Department of Defense. He is responsible for advising—I almost said "advertising," but he is responsible for advising the Secretary of Defense and the Under Secretary of Defense for Acquisition, Technology, and Logistics on matters relating to acquisition and the integration and protection of technology. Prior to joining the Department of Defense in his current position, Dr. Finley spent over 30 years in the private sector and held a variety of operational management positions with General Electric, with Singer, United Technologies, and General Dynamics.

And we are delighted that you—in addition to doing all those things, you managed to take out time in your life to serve our country, and you have been in this job for what, a couple years?

Mr. FINLEY. Thirty-one months.

Senator CARPER. Thirty-one, OK. And does it seem like 31 years?

Mr. FINLEY. No, sir. Every day seems awesome.

Senator CARPER. Oh, that is great. Well, we are glad you are doing it, and we are delighted that you are here today.

Your entire statement will be made part of the record, and we would ask that you summarize as you see appropriate. Thanks for joining us.

TESTIMONY OF HON. JAMES I. FINLEY,[1] DEPUTY UNDER SECRETARY OF DEFENSE FOR ACQUISITION AND TECHNOLOGY, U.S. DEPARTMENT OF DEFENSE

Mr. FINLEY. Thank you. Let me start off by, first of all, saying that I completely agree with your opening remarks and the focus of keeping our eyes very sharp on the taxpayers' dollars, serving our country and our national security. It is the highest on our radar screen.

Chairman Carper, Senator Coburn, and distinguished members—who will hopefully yet appear.

Senator CARPER. Some are coming.

Mr. FINLEY. Thank you for the opportunity to appear before you today to discuss the Department's policies and practices in the acquisition and technology of major acquisition systems. I will also discuss the GAO report entitled "Defense Acquisitions, Assessments of Selected Weapon Programs." I am fully committed to acquisition excellence and the restoration of the confidence in our leadership for our acquisition system.

The history of acquisition reform for the Department of Defense covers more than 60 years and over 128 studies on waste, fraud, and abuse. At the time of my confirmation hearing, February 2006, the consensus seemed to be that the DOD acquisition process was broken.

After my first 90 days in office where I listened, discussed, and reflected on the leadership perspectives of Congress, industry, and DOD military and civilian personnel, my opinion was that the acquisition process was not broken. We quickly moved to recruit and fill key positions. We eliminated a layer of management to tighten communication. We aligned the organization for better accountability and improved efficiency and effectiveness.

My perspectives and actions coming from industry with over 30 years of experience in aerospace and defense have been shaped utilizing that experience to help hold together the acquisition workforce and leverage existing and new acquisition reform and transformation initiatives. We have added oversight discipline into the process to ensure that the basic blocking and tackling in executing the acquisition process is being done. We have gained insight to help scale and tailor processes where and when needed, to implement changes with a sense of urgency that streamline and simplify the processes.

We established three overarching goals: One, to reduce our cycle times; two, to increase competition; and, three, to broaden communications—up, down, and across the DOD and with Congress, industry, academia, and our coalition partners. We developed a 3-year plan, established our vision and strategy, and implemented goals and initiatives with a sense of urgency. Today, we are 31 months into implementing that plan.

We are striving for acquisition excellence with a vision that starts with leadership and ends with predictable performance. Our strategy reshapes the enterprise to accelerate lasting change. We deployed a broad set of objectives by using short- and long-term initiatives. Those objectives include enabling decisionmaking for bal-

[1] The prepared statement of Mr. Finley appears in the Appendix on page 35.

ancing the program and portfolio trade space with the convergence of affordability, schedule, and performance needs; getting programs started right with improved up-front planning and utilization of risk management, competitive prototyping, technology and manufacturing readiness metrics, early integration and tests; collectively providing a basis for cost realism prior to major acquisition decisions.

Improving process efficiency with a focus on tailored, agile, open, and transparent communications; checks and balances that utilize Lean Six Sigma methodology, objective incentive fee criteria, systems engineering across the acquisition landscape, and conducting preliminary design reviews prior to milestone B.

Providing program stability with program management tenure, organizational empowerment, stable funding, integrated master schedules, and Configuration Steering Boards.

These objectives and initiatives are also applied to Nunn-McCurdy breaches. More examples are provided in the semiannual Section 804 congressional report in accordance with the John Warner National Defense Authorization Act for Fiscal Year 2007.

A comprehensive analysis of the GAO report "Assessments of Selected Weapons Systems" has been initiated. Of the $295 billion of cost growth identified in the report between 2000 and 2007, $202 billion—approximately two-thirds of the $295 billion—was incurred before 2004; $93 billion was incurred from 2004 to 2007, with a pipeline of about $1.5 trillion, representing an approximate 3-percent growth per year for those 2 years utilizing year 2008 base year dollars. We are still analyzing that 3 percent. We do not consider it to be a crisis, but need to better understand the uncontrollable elements of rising medical costs, rising material costs—i.e., specialty metals—rising fuel costs, and requirements changes.

Another perspective is the definition of the baseline of the GAO report of $295 billion cost growth. Between 2000 and 2006, we added 48 programs and removed 30 major defense acquisition programs. That mix change represents a content-to-content difference and is not fully understood and is still being analyzed. For example, the quantity of ships, aircraft, vehicles all changed during the GAO report time frame. The DDG 51 ship baseline went from 23 to 62 ships. The JSF quantities were cut by 409 aircraft, reduced the total quantity to 680. The future combat systems increased their quantities for brigade combat teams. The Virginia class submarine shifted from a two-per-year procurement to a one-per-year procurement at two naval shipyards and experienced increased shipyard labor and material costs.

Our review of the GAO data reflects the changes, some but not all, as characterized here for these four programs contributed $147 billion, 50 percent of the $295 billion. The GAO data in this regard continues to be reviewed with the GAO to better understand the root causes of the cost growth and where to focus attention and take action.

Our perspectives of the five conclusions from the GAO report have been summarized in our written testimony. We continue to work with the GAO to better understand their data, methodologies, and conclusions associated with the assessments of selected weapons systems.

In summary, measurable progress for acquisition excellence has been accomplished on a broad front of initiatives. We have traction. We will continue to improve. Much work remains to be done. A plan for that work has been established. It goes beyond this Administration.

Chairman Carper, Senator Coburn, and distinguished members of the Subcommittee, thank you for the support of our troops. I will be pleased to address any questions you may have.

Senator CARPER. Thanks, Dr. Finley. Let me just lead it off. And thanks very much for your testimony.

The Department's weapons system acquisition process has, I think, been on the GAO's high-risk list—I want to say about 18 years, since 1990. And since that time, the Department has made what GAO has called "well-conceived changes to its acquisition policies." But as we have seen from the graphs up here earlier, the outcomes still are not improving, or at least not the way we would like for them to.

In your own view, why are the acquisition programs immune to the kind of improvement that we both seek? And what are the factors that make them so susceptible to cost growth, to delivery delays, and to poor performance?

Mr. FINLEY. Well, I think there is a lot of agreement between the GAO and DOD on some of the issues that are driving these, as you summarized on the chart. Technology maturity has been a definite problem, and——

Senator CARPER. Talk about that a little bit, if you would.

Mr. FINLEY. OK. The technology maturity is now defined to be a Level 6 before we go forward with an ACAT I major defense acquisition program. At a Milestone B decision, you are to have demonstrated a Level 6 of technology maturity. Some programs in previous decisions have not achieved a Level 6 and yet have gone forward with a Milestone B decision.

Senator CARPER. Who allows that to happen? And whose job is it to ensure that it does not happen?

Mr. FINLEY. Well, I think it is a collective responsibility. OSD—in my case, I am OSD in A&T. We are to provide the oversight to make sure that does not happen; or if it does, we need some assurances as to how these technology maturity issues would be mitigated in a timeline that would not be detrimental to the critical path of the program.

Senator CARPER. So you have, on the one hand, your program managers for a particular weapons system pushing hard to try to get something done, built, through the pipeline. And at the other—it is almost like having your car, you have an accelerator and you have a brake.

Mr. FINLEY. Right.

Senator CARPER. And you have to be able to use both of them. Somebody has got to be pushing on the brake.

Mr. FINLEY. I think many programs that were coming forward were of a PowerPoint design, paper design, and trusting without verification was being done.

Senator CARPER. Without prototypes. Is that correct?

Mr. FINLEY. Without prototypes. The initiatives of Mr. Young to enforce competitive prototyping not only helps provide us a cost re-

alism base, but also it promotes competition early on in the timeline.

Part of our objectives are to cut our timelines by 50 percent. Right now we are taking upwards of 10 years plus to field weapons systems. We believe we can cut that timeline in half.

Senator CARPER. Any idea why DOD stopped this process of prototyping?

Mr. FINLEY. I do not have an insight on that. I think part of the dilemma that DOD experienced as well as industry was we lost systems engineering capability on both sides of the equation. And we have been working very actively to bring system engineering back into the fold as a key decisionmaker at the table.

Senator CARPER. A concern that I have, it sounds like the Department of Defense and you and John Young and Gordon England are trying to get us back in terms of acquisition on these weapons systems, back using common sense, using better business judgment. And I have this concern we are going to have a change in administration in about 3 or 4 months, and I do not know if you want to sign on for another tour or you want to go spend time with your grandchildren or other things. But if we do have a new team that comes in, my concern is that some of the reasonable changes, solid changes that are being adopted may not stick. And, Dr. Coburn, I think part of our challenge is if we stick around here for a while longer—I think we have a couple more years left on our no-cut contracts. But I think part of our job is to make sure that the reforms that they have begun, some of the smart practices they are going back to, that the next Administration adheres to those as well and builds on them. And I know GAO is going to be here to help us to ensure that happens.

Mr. FINLEY. I feel very good—excuse me, if I may, I personally feel very good about where we are at. When I came into office, I had a very long timeline to get confirmed even though I had numbers of years of experience and had all the security credentials. But, nonetheless, once I got confirmed, when I came in I had six direct reports, and four of my six direct reports were not here. And people advised me, "You are in deep trouble." I told people, "I am in great shape." Because what we did was we recruited people to fill those positions that had three ingredients and three criteria that we established: One, we wanted industry experience; two, we wanted them to have military experience, preferably with MDAP programs, and the scar tissue to prove it; and, three, we wanted them to have the passion to serve their country.

I am very pleased to inform the Subcommittee that we have filled these positions, and we have had these people in these positions now for some years. So they are career SESs at the senior level, and this we are talking about now is within OSD. And as we build our rapport within OSD and AT&L, going outside the AT&L organization into the Comptroller organization, the P&E organization, the Joint Staff organization, and now getting into the component organizations, we start to build traction and respect, and we have to work this as a team very collaboratively. It is a contact sport.

But these are expert people. They know the business, and we are now also bringing together, pushing this down into the organiza-

tion to empower people to make decisions. So I believe, if I were to leave today, I personally believe the organization of Acquisition and Technology is in very strong shape and would support Mr. Young and has supported Mr. Young, as well as Mr. Krieg before Mr. Young, in an excellent fashion. I believe we are on the right path. I think there is at least one other additional element on the areas of factors that are giving us cost growth, and that is funding stability. And funding stability—when I came to be confirmed by the U.S. Senate, certainly technology maturity and requirements creep were right there on the radar screen, and we are in complete agreement on those issues, and I believe today we have those issues corralled. And I believe we have them shackled, and I believe we have ways as a matter of discipline to hold people's feet to the fire to make the hard decisions and say no if they are not ready.

But beyond that, funding stability became a very visible issue, and if I looked at PB08 and the 90-some programs that are MDAP category, all but one of those programs had funding changed from the PB09 submission. Of the Nunn-McCurdys that were done in 2007 and submitted as part of the PB08, if you will, five of those six Nunn-McCurdys had just been certified by the AT&L; all had their funding changed as part of the President's budget approval.

So we have got to get a handle on funding stability as part of this equation to get better acquisition excellence, or we will be struggling with it—and it is not just the Congress, sir. Our own OSD Comptroller will play with funding. Our planners and programmers will play with funding to pay unexpected bills. We simply have to get into a better process working together to get more stability in the funding program.

Senator CARPER. We saw that on the C–5 modernization and working with John Young. If we ended up ramping up production of the C–5Ms, we would go from one to three to five, seven, nine—somewhere up around nine is the sweet spot in terms of aircraft to retrofit every year. But then if we drop back down to three or two and back up to seven, the inefficiencies are there, unfortunately, and the costs are just driven up very high. That is, I guess, part of our challenge, and as we are not appropriators——

Senator COBURN. We just need to become appropriators, too.

Senator CARPER. Dr. Coburn says we need to become the appropriators, too. Actually, I was thinking about that today.

Let me turn it over to Dr. Coburn. I have some more questions, and maybe we will have a second round here in a minute.

Senator COBURN. Dr. Finley, it is your contention that you have the systems in place that, without you and the two or three people below you, this program change, this culture change that has been instituted in the last 31 months will continue? That is your contention?

Mr. FINLEY. It is a start, yes. But we did not start 31 months——

Senator COBURN. That is a different answer than what I—will it continue?

Mr. FINLEY. Yes, I believe it will. But we did not start 31 months ago. What we did was we built, I believe, on a lot of good work that was done back in the QDR time frame, certainly before I arrived, and there were a lot of good ideas, and there were a lot of good

initiatives going on before I arrived. We simply picked up a lot of those good ideas, and we joined each other at the hip, and we started moving them together, forward.

We will continue to have good ideas, I believe. We will continue to become more innovative in our approach to business, things like the Configuration Steering Board, which is now going to become law. We certainly appreciate Congress' acting on that, and John Young, Mr. Young, brought that forward, in particular to help stabilize some of the funding requirement changes as well as some of the stability changes for the programs.

So we should never stop looking for new ideas to cut the cost and reduce the schedule and find smarter ways to do business.

Senator COBURN. Let me just query you for a minute because I am not educated in a lot of these areas and do not have the practical experience or the knowledge. Explain to me why when we contract for a new weapons system that we do not place more of the risk on the contractor.

Mr. FINLEY. Well, I think——

Senator COBURN. I mean, if you are contractor, it is a slam-dunk. You are going to make money. Now, I do not know any other business in this country that has a slam-dunk no matter what they do or what the performance is, they are going to make money. So what I do not understand is why we have not transferred some of the risks for new technology based on the guaranteed reward that is going to be there to these individual contractors. Can you teach me or educate me so I can have a better understanding of that?

Mr. FINLEY. Certainly. Prior to the environment that we are in today with cost-plus contracting, we were in fixed-price contracting, and the pendulum was, let's say, way over here on the left. And as companies were eating the risk and swallowing the cost, that pendulum started to swing over to the far right to cost-plus award fee and cost-plus incentive fee kinds of contracts.

We have changed the award fee criteria so it is not a slam-dunk, and we have also advocated and have started to put into regulation with the 5000 change that you will now go more toward what we call fixed-price incentive contracts and push the profit that companies can make more to the right of their timelines as opposed to spread closer to the left, which is where it has traditionally been that we have discovered, and by doing that, we share that risk—industry shares more of that risk, if you will, than the government than before. And by fixed-price, it starts to definitize what has to be delivered and what the expectations, what the requirements are in terms of the deliverables.

The dynamic in contracting is changing dramatically, and that is very recent.

Senator COBURN. Are you seeing that transmitted into a decrease in underestimation of costs?

Mr. FINLEY. I would say it is premature——

Senator COBURN. A decrease in the frequency of underestimation of costs.

Mr. FINLEY. I would say it is premature. The programs where we are going to see fixed-price incentives are new starts or our program restructures out of Nunn-McCurdy breaches, if you will, because we are applying all these techniques both to programs that

are in the pipeline as well as new starts. But programs like Tanker, programs like JLTV, programs like JAGM, Joint Advanced Missile program—all these programs are carrying fixed-price incentive types of contracting vehicles with them.

Senator COBURN. Did not the—I am trying to think which iteration of the Tanker contract. The one that was recently challenged, did it not have a significant component, about 18 percent, of cost-plus contracting in it?

Mr. FINLEY. I am not familiar with all those details.

Senator COBURN. Well, I may be in error. It may have been 8 percent or 9 percent. But here is the question for you. Here you have something that the Air Force has been trying to buy for 15 years, and then we let a contract, and 8 or 10 percent of it still cost-plus. I cannot fit that with any modem of common sense that the Air Force does not know what it wants in the way of a tanker in terms of requirements. Why there would still be a component of cost-plus rather than a pure fixed-price-plus-incentive contract, I do not understand that. And so I am trying to get a hold, if we are going to have an impact to try to help you do what you need to get more defense for this country for the same amount of money, it would seem to me we have to figure those kind of—we have to answer those questions.

Mr. FINLEY. I agree.

Senator COBURN. OK. Thank you. I will withhold any additional questions. Thank you, Mr. Chairman.

Senator CARPER. Dr. Finley, when you reported aboard to your present position, were confirmed and moved into your job, how long had that post been vacant? Any idea?

Mr. FINLEY. I think it was 3½ years.

Senator CARPER. That is part of the problem. Why was it vacant for so long?

Mr. FINLEY. I am not familiar with all the details, but I believe there was some gridlock for the appointees in Acquisition due to the Druyun situation with the Air Force, which had a number of people in the Pentagon, like Mr. Wynn was Acting AT&L, he could not move. As a result, the AT&L back-ups for him could not come in. And then that waterfall just went downhill, and the pipeline just got backed up.

Senator CARPER. I see. So your position that you filled a couple of years ago, 31 months ago, that position was vacant for about 3 years. When you got onboard, confirmed, and moved into your post, out of your six direct reports, four positions were vacant?

Mr. FINLEY. Yes, sir.

Senator CARPER. That helps explain some of this, doesn't it?

Senator COBURN. Yes. That would be our fault.

Mr. FINLEY. You did have acting SESs in those positions, but they were acting, and they were excellent people. But I could have certainly promoted those to be permanent, acting directors, if you will. I elected to take the road less traveled perhaps, and I wanted an experienced senior military, senior industry experience that could really build this team for the long run. And we have excellent people up and down and throughout the organization.

Senator CARPER. And your six direct reports, those are folks that stay, even if you decide to go off——

Mr. FINLEY. I have two politicals that report to me: One is in industrial policy and the other one is in small business programs. Both of those organizations report to me. They will be exiting on or about January 20, as far as I know. And we have great backups for them as well.

Senator CARPER. Well, obviously, the next Administration and the next Congress needs to do a better job of addressing this.

Mr. FINLEY. It is a big issue, sir. It is something I believe Secretary Gates is addressing way up front, much earlier, I am told, than previous Administrations, even the current Administration. And we are very proactive, and very open and transparent about what we believe ought to be addressed. And we are building our cases for the people that come in and relieve us, if you will.

Senator CARPER. In the Navy, we used to have turnover. We would be overseas for 6 months, home for 8 months, overseas for 6 months, and home for 8 months. And whenever we would go overseas, the squadron that we were leaving would have a turnover document that they would turn over to us and basically explain what their jobs were and to help us come up to speed.

I presume you have a similar kind of turnover, but if it had been 3 years since your predecessor left, it is pretty hard to have much of a constructive turnover.

Mr. FINLEY. Well, we have accomplished a lot. I believe we are back at full stride. I believe that there is a transition team that has been stood up in the Pentagon, for Secretary Gates, and it is in full swing.

Senator CARPER. I think one of the things we will get into with our next panel is the number of acquisition personnel that we actually have, whether the slots are filled or not, but the number that we have and whether or not we give them enough clouts, four-star generals, or three stars or two stars, do we have people for whom there is a good pipeline to grow to have a career? And do we give them enough oomph to do their jobs? Any thoughts on that? I think others will discuss that.

Mr. FINLEY. Yes, the acquisition workforce is very high on my radar screen as well. The legislation last year, initiative 852, did authorize but not appropriate, but we are taking it as if it were appropriated, and we have agreement with the OSD Comptroller and the principals of DOD and how we are going to do this. But it essentially is about $1.3 billion over the FDIP to reinvigorate the acquisition workforce. That is about 12, 13 different functions that are called acquisition.

Now, one of the holes that has come up, as you look at the personnel situation, and as you have addressed, very eloquently, both you, Mr. Chairman, and Senator Coburn, is requirements. And what do the requirements people get in acquisition? So we have also set up training modules and training capabilities and requirements. I think by law by September 30, the requirements people must have certifications to these acquisition levels of capability, or they will not be allowed to provide requirements for the programs of record, if you will, that they are making.

So we are also very encouraged by this. This has been a major collaboration between the military and the civilian workforce at the Joint Staff level and all the services as well as OSD, and the P&R

people of OSD as well. So we see very positive traction. Here, again, this is something that I do not think will be solved overnight, but the acquisition workforce, as people would normally think about the acquisition workforce, has been relatively flat for the past several years, but the workload on this workforce has doubled or tripled.

Senator CARPER. OK. Now, I am going to follow this up by just sharing with you a quote, I think it is a direct quote from GAO in the report that they presented to us. But it goes something like this: "The unrealistic cost estimates for major weapons systems are developed in an environment where DOD commits to more programs than available resources can support, which promotes unhealthy competition among programs for funding. This competition creates strong incentives for program officials to establish requirements that make their particular weapons system stand out from others, with less consideration given to the resources that will be needed to develop them."

Now, you have already answered this in part. I want to ask you just to reiterate it and then add anything that you want. But that is a pretty serious problem, I think you will agree. Share with us again what are we doing in the Department of Defense, in the Office of the Secretary of Defense, in your shop, what are we doing to address this serious problem with DOD's acquisition culture? You have addressed it some. Restate some of what you have done if you want.

Mr. FINLEY. Well, I think cost realism is a real issue. I do not think there has been enough competition. I do not think competition has caused people to buy in. I think it is more perhaps, if I have it right, if I was correct with Senator Coburn, you may bid unrealistically to get the program of record approved and through the decision gates to move forward. As we sometimes say, once you have the coffee cups, the mugs, and the T-shirt, you are good to go. In 2½ or 3 years, it may be predictable that you will have a Nunn-McCurdy.

So the effort is to start with—the initiative of 852 is to start building more of our core competencies that we have lost in DOD over the years of attrition and restructuring and outsourcing to bring these core competencies that include price estimating and cost estimating back into the mainstream of OSD for oversight, but also to the services so that they have these inherent capabilities.

Senator COBURN. Just a little rebuttal. When you had those core capabilities, you had the same kind of cost overruns. So how does that answer the question?

Mr. FINLEY. Well, it is a start. Coming from industry and the years of fixed-price, more fixed-price development if you will, than cost-plus, the leadership I was groomed under and the management training I received was to perform. And if we had problems, we came and we worked them, and we went eyeball to eyeball, to resolve those differences quickly and not let them drag out.

Again, there is no silver bullet, but getting the functions back in the right place is part of getting the right people in the right place.

I think the aspects of empowering the workforce, recognizing the workforce, fundamentally comes down to a lot of discipline issues

and leadership issues. And we have got to get that back to where it was, with accountability.

So, again, there is no one piece that is going to do this all by itself. It will take time to get back to where we were, and I am not sure if where we were was acceptable to you, Dr. Coburn. But I would say from my experience of where we were in industry, in excellence and performance, the channels I came up through, is where I am trying to help steer this for the future.

Senator COBURN. Yes, and I am not meaning to demand that. I am just looking back at history of what we have seen from the 1930s, the 1940s, the 1970s, when we had these varying levels of competency and staffing and everything else.

Mr. FINLEY. Yes, sir.

Senator COBURN. This is the same problem. When we had cost-plus, fixed-price, we had the same problem. To me it goes back to the two major problems: One is requirement creep, which somebody has to get a hold of so that if you are going to have a requirement creep, it does not happen until you do the first MOD; and the second is underestimation of costs when you begin it so you can get a program started. And the transparency in that aspect of it, with a penalty—and, really, the Pentagon is complicit in this because they want the program, so they have an incentive to have it come in under cost knowing that it is unrealistic. And so what happens, the American taxpayer gets a program that is supposed to cost this, and we all know it is never going to come close to costing that, and that is just the way we do business.

We have to break that cycle because, quite frankly, in the years to come the Defense Department spending as a percentage of the total budget is going to be less. Our interest costs are going to be 27 percent this year. Now, think about that. And in 10 years, they are going to be 40 percent. Some of it is going to come out of the Pentagon.

So we need to be about making sure—and I applaud your service and your leadership. My hope is—and I think, Senator Carper, I can speak for both of us—that the leadership that you have put in will be followed by similar leadership that will continue to penetrate accountability, responsibility, integrity, and performance. And that is my worry. And we did not even talk—I have got several other questions which I will submit for the record, but, of the people who are the worst in terms of purchasing IT, it is the Pentagon. This Subcommittee has followed all IT problems throughout. GAO has been helping us with it. But, by far—and you have the worst IT in the country, and the rest of the country is way ahead of you on IT. And yet the cost overruns, the programs that are in trouble in IT, it is the same problem.

So our hope is and our appreciation is—we know people are trying, are working. There has got to be something we have not got, and I think the two things are underestimation in the original and requirement creep. And unless we do something to change those things, we are going to keep getting the same results.

Mr. FINLEY. Another major shift in response to those two areas, one of the observations we made when we came onboard was so much was being done with these programs—and these programs are obviously much bigger and much more complicated, to a large

extent, than we have had in the history of the DOD. But the acquisition strategies in these procurements were what we would characterize as "big bang." You would have expectations on requirements that were unachievable, to a large extent. But trust me, no problem, we will get there.

What we have done is we have gone—again, what we have done before—this is nothing new to this—is go back to a more incremental strategy that you develop a little, you test a lot, and you deliver a capability to the field. And you increment this with a strategy that provides the warfighter something they can use in the security of the country, and at the same time we do not—we can then estimate costs more realistically, and we have a better handle on our requirements.

In parallel with that, in our S&T world, we can be incubating newer technologies and newer activities as on ramps to come into these programs when and if ready. But they will be done in an incremental block fashion.

Now, there are several programs of record—F–18, F–16—that have practiced this in spades since their inception, and they do get very favorable write-ups. Of all the programs written up in the most recent GAO report, 10 of the programs, in fact, did return money. All these ACAT I programs, MDAPs did not overrun.

Senator COBURN. And what were those, again, tell me? Just give me some examples.

Mr. FINLEY. The Growler program, F–18G, did underrun its budget—on schedule, below budget, meeting performance.

Senator COBURN. What else?

Mr. FINLEY. I will take it for the record. I have it somewhere in my notes here.

Senator COBURN. That is OK. I would love to see that.

Because our tendency, when we are doing Federal financial management oversight, our tendency is to always look at the negative. It is great to hear about the positive and to figure out what happened there and why and how do we duplicate it. So I would very much appreciate it.

I am going to offer the rest of my questions for the record so we can move on.

Senator CARPER. One last quick question if I could, Dr. Finley, before you leave us. The hearing that John Young came before at Armed Services and testified in early June, I think Chairman Levin asked him for the Department's position on a proposal by Senator Levin, a proposal to create an independent office that would review cost estimates on all major defense acquisition programs and would develop its own independent cost estimates. And at the time, back in early June at the hearing, Mr. Young said that the Department, your Department, did not have a position on this proposal. And I am just asking, do you all have a position now?

Mr. FINLEY. I think there is a DOD position on this. I do not have it in front of me.

Senator CARPER. Would you submit that for the record for us, please?

Mr. FINLEY. Certainly. I would be happy to.

Senator CARPER. OK. Well, I think we will excuse you at this point in time. Thank you very much for joining us.

Mr. FINLEY. Thank you so much.

Senator CARPER. And thank you for your stewardship. Thanks for putting together a good team around you. And if on January 20th, you decide to head out into the sunset, we wish you fair winds and following sea, as we say in the Navy.

Mr. FINLEY. Thank you. We appreciate your service as well, Senator Coburn as well. We appreciate your support to our troops. This is an ongoing efforts. Everybody is committed. In my opinion, it does come down to leadership. We need strong leadership, and you need checks and balances, and you need informed oversight to kick those cans in the right place. I think we are making progress.

Senator CARPER. OK. I hope you are right. I think you are right. Thank you so much.

Mr. FINLEY. Thank you.

Senator CARPER. Welcome, panelists. I am going to take just a moment and provide a brief introduction for each of you, if I could.

Mike Sullivan served as Governor of Wyoming when I was first elected Governor of Delaware. You looked different then. You have a lot more hair now. Actually, Mike Sullivan was a Governor of Wyoming, but it was another Mike Sullivan. And I am sure there are a bunch of you out there. This Mike Sullivan serves as Director of Acquisition and Sourcing Management at the Government Accountability Office where he has worked for 23 years. Most recently, he directed GAO's Annual Assessment of Major Weapons Systems Programs, which is the subject of our hearing today, and we are grateful to you for being here.

Steve Schooner is an associate professor of law and co-director of the Government Procurement Law Program at The George Washington University. Before joining the law school faculty in 1998, Professor Schooner was the Associate Administrator for Procurement Law and Legislation at the Office of Federal Procurement Policy in the Office of Management and Budget and served for—how many years in the military? Twenty good years?

Mr. SCHOONER. Twenty good years.

Senator CARPER. Twenty good years in our armed forces. Thank you for that service.

And Clark Murdock—this is the second hearing we have had literally in a week where one of our witnesses' names was Murdock. The other fellow, we had to call him "Dr. Murdock." He is the fellow who is the head of the census.

Clark Murdock is the Senior Adviser to the International Security Program at the Center for Strategic and International Studies, specializing in strategic planning, defense policy, and national security affairs. He currently directs the four-phase study on the Defense Department's reform "Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era." Mr. Murdock has served in many roles in the defense world, including as a Senior Policy Adviser to House Armed Services Committee Chairman Les Aspin, with whom I was privileged to serve. This Clark Murdock looks familiar to me. I know that our paths have crossed before, and I very much enjoyed serving with Les Aspin. We thank you for joining us today and for your willingness to testify.

Gentlemen, I have been asked by my staff to remind you that we would ask you to try to keep pretty close to 5 minutes. I am not one who will gavel you down at 5 minutes, but try your best to keep close to 5 minutes, and then we will get into some questions. Thank you.

Mr. Sullivan, why don't you lead us off?

TESTIMONY OF MICHAEL J. SULLIVAN,[1] DIRECTOR, ACQUISITION AND SOURCING MANAGEMENT, U.S. GOVERNMENT ACCOUNTABILITY OFFICE

Mr. SULLIVAN. Thank you, Chairman Carper. I am pleased to be here to discuss the Department of Defense's management of its major weapon system acquisitions. My statement today will focus on current acquisition program outcomes, the reasons for them, and potential solutions, some of which the Department is now trying to implement, as you heard from Dr. Finley earlier.

With regard to outcomes, the Department is not receiving expected returns on its investment. As the table to my far left indicates, which mirrors some of the——

The most important number on that table is the $295 billion, probably.[2]

Senator CARPER. All right.

Mr. SULLIVAN. Since we began our annual assessments in 2000, which is one of the columns on that table, the number of major acquisition programs has grown by 20, from the 75 to the 95. Total investment by the Department in those programs has doubled to $1.6 trillion. Development cost overruns have increased from 27 percent in 2000 to 40 percent in the programs in the 2007 portfolio. And delays in deliveries have increased from 16 months to 21 months. All told, this represents the total cost growth that you allude to on your pie chart up there of close to $300 billion and results in degraded buying power for not only just the Department but, as you point out, for the Nation as a whole.

There are systemic problems that contribute mightily toward these poor outcomes, and we break them into strategic and programmatic. At the strategic level, there simply are too many programs chasing available dollars in the Department's acquisition budget. As the other graphic up here to my left indicates—and I think this gets at some of the questions that Dr. Finley was fielding—the Department's organizations and processes that identify needs—in other words, candidates to become programs—funding, and the acquiring of the weapons systems, which together these three processes and their leaders more or less make up the Department's overall acquisition team, are fragmented and broken. Leadership at these levels is not necessarily answerable to each other, and, therefore, there is little accountability for the poor outcomes.

The requirements process, which is led by the Vice Chief of Staff, tends to be stovepiped. Each of the services may offer different new acquisition programs, sometimes to fill the same capability gap, creating an overwhelming number of candidate programs that must promise very high, sometimes unachievable performance, with very

[1] The prepared statement of Mr. Sullivan appears in the Appendix on page 47.
[2] The chart referred to appears in the Appendix on page 53.

low, often unachievable cost estimates in order to fit into the Department's budget. The funding process, led by the Comptroller, accepts these overly optimistic cost estimates as inputs, which is not a sound basis for allocating resources and ensuring program stability.

Finally, the acquisition process, led by the Under Secretary for Acquisitions, initiates these programs, signs cost-reimbursable contracts with sole sources, and begins expensive product development with little or no evidence that technologies, designs, or manufacturing capabilities will be able to build the weapons system in question.

At the program level, the programs begin with an unmanageable business case, cost, and schedule estimates heavy on optimistic assumptions, light on data. As a result, true costs and schedules are usually not known for years on these programs until assumptions give way to empirical evidence and significant sums of money have been consumed.

To be sure, problems resulting from a poor business case at the outset will quickly cascade into design changes, manufacturing inefficiencies, quality problems, and delayed deliveries. Solutions are available, and we have made recommendations. A well-balanced, well-prioritized mix of candidate acquisition programs would alleviate the pressure each program now faces in winning the competition for funding in the Department. This means the Department must become more unified. Each of the three organizations that we have on our chart are critical to acquisitions and must integrate and must make early hard decisions together concerning needed capabilities and limited resources. That is something that does not exist today. There is an awful lot of segmentation between these three critical organizations.

If the Department's leadership can get priorities right, limit the number of programs to start, and establish sound business cases which are executable, program managers that are responsible for those programs will be empowered to control program execution and then can be held accountable for their outcomes.

The Department understands all this, and Dr. Finley talked to some of that today. It has many initiatives underway now, which I would be happy to go into in the Q&A. Some of them are in response to our recommendations, and some are in response to passed legislation that has been designed to address these problems. However, we have seen initiatives like this before that go back almost all the way to Dr. Coburn's example of General Washington needing the ships. The most recent Packard Commission in the 1980s is probably a good basis where a lot of this stuff has been said before, the answers are out there, but they just for some reason have not ever been implemented properly.

Too often in the Department, well-meaning policy just does not translate into practice. Cultural barriers, the transitory nature of the positions at the top, and the stovepiped nature of acquisitions make culture change and improvement very difficult. Therefore, we will maintain a healthy skepticism until we see some results from these initiatives.

In conclusion, Mr. Chairman, let me say that significant and lasting change in this acquisition process and in the requirements

process and in the funding process can only take place with improved cooperation across the Department and the military services, continuing support and advocacy from a unified departmental leadership, and perhaps most importantly, sustained oversight from this Subcommittee and others in the Congress.

I look forward to your questions on these and other ways to solve some of these problems.

Senator CARPER. Mr. Sullivan, thank you very much. Thanks for your good work and for being with us today.

Next we will hear from Steve Schooner. Mr. Schooner? Is it Dr. Schooner? It is, isn't it?

Mr. SCHOONER. Steve Schooner is fine, but professor is OK, not doctor.

Senator CARPER. Professor Schooner, take it away.

TESTIMONY OF STEVEN L. SCHOONER,[1] CO-DIRECTOR, GOVERNMENT PROCUREMENT LAW PROGRAM, THE GEORGE WASHINGTON UNIVERSITY

Mr. SCHOONER. Chairman Carper and Ranking Member Coburn, I appreciate the opportunity to discuss these issues with you today, and I will try to briefly offer some explanations in context and recommend that DOD could achieve better results by more aggressively employing incentives than disincentives and making a significant investment in the acquisition workforce, all of which you have apparently already heard at this point.

Major systems are, by definition, challenging, complicated, and inherently risky. We have fundamental pathologies, we have absence of market forces on the buyer, an unwieldy appropriations cycle, a diffusion of responsibility, and all of this makes accountability maddeningly difficult. And that is why it is, frankly, overly optimistic to expect any institution to consistently and quickly advance the state of the art and employ significant untested technological applications while still meeting firm budgets and schedules. None of that means that we are not going to get superb weapons systems and we do not get value for money. And I do not mean diminish the importance of costs or schedule, but it is important to keep in mind that costs and schedule are not the only metrics.

The relationships that we have seen discussed today typically proceed on the unstated assumption, by both parties, that the problems will be worked out during contractual performance. The parties do not resolve the "unknown unknowns." They do not aggressively reduce programmatic risk. The government simply chooses a course of action, it selects a partner, and the parties know they will out the problems later. Contractors sign these contracts because they know that the likelihood of catastrophic failure is particularly low for large-scale and important programs.

But just because DOD either will not or cannot pay for the necessary research and development needed for the systems to mature does not mean that the contractors have any meaningful choice other than to propose immature technologies and commit to long-term delivery schedules, knowing that the government's needs are rapidly evolving. The contractors enter these programs willing to

[1] The prepared statement of Mr. Schooner appears in the Appendix on page 64.

invest and lose money on their bid and proposal costs, in their research and development, and typically in initial production—all hoping someday they are going to recoup that investment during full-scale production or, increasingly, foreign military sales.

But because the government also lacks the patience to mandate demonstration and validation, we rarely see functional prototypes, and we almost never see competitive prototypes anymore. We would need a dramatic cultural change to generate the necessary funds and patience to complete R&D before production.

Now, granted, the alternatives to tolerating overrun are limited and unattractive. You can stop the contracts and squander the investment made. The government can accept substandard products, or the contractors can suffer devastating losses. But none of that will work. The only way we are going to get better cost control and schedule discipline is to slow down the process, break the programs down into clearly defined stages, and then impose discipline ensuring that nothing goes forward until technological and design issues have been resolved.

I just briefly wanted to go back to a point that Dr. Coburn made. The underestimation that you describe is caused in large part by government policies and practices, and to place all of the cost risk on contractors for that is simply not feasible in the current environment. Some of the most spectacular acquisition debacles we have ever seen in history were fixed-price research and development contracts.

So when we go forward, I think what we have to look at is meaningful incentives and disincentives, not just disincentives but meaningful ones.

Just last week, Minneapolis unveiled the new bridge replacing the I–35 bridge that collapsed just last year. That contract successfully employed meaningful incentives, a $200,000-a-day bonus. By bringing that contract in on time, the contractor made nearly a $20 million special profit for that.

On a larger scale, DOE employed extremely lucrative incentives for the clean-up out at the Rocky Flats Environmental Site in Colorado. There, a project that many people thought simply could not be done was done for half a billion dollars under budget. Now, granted, this made a lot of contractors very wealthy, but you have a very satisfied government customer.

But in the modern era, even with the revisions to DOD's profit policies with the weighted guidelines approach, we still have the problem that many government officials believe that artificially suppressing contractor profits is a public good. And as long as we live in a world where profit is evil, market-based incentives and disincentives will not be the primary way to ensure that the government gets value for money.

The human capital crisis is something that we could discuss at length. I am mindful of my time, but let me just mention three things. We have a legitimate crisis in terms of the acquisition workforce; we do not have enough quality program managers, and we are particularly short in terms of systems integration staff, and the new Defense Science Board study is very good in that regard.

I just want to close with two brief anecdotes, and I will try to do it quickly.

First, if we look at the Future Combat System, which is actually in GAO's report, this originally proceeded under the OTA, or "other transactions authority," and, frankly, there is nothing less transparent or less appropriately managed that we have in our arsenal. I am glad to see that this program came out of the OTA program, but I encourage Congress to limit OTA authority to the maximum extent possible.

But I would like to close with an anecdote talking about the Air Force and the tanker program. The Air Force has been saying for years that its aging in-flight refueling capacity was one of its highest priorities. We had an original lease deal that was ill-conceived, non-competitive, and it was ultimately derailed. We followed that up with a competition that failed. And, recently, Defense Secretary Gates conceded that DOD can no longer complete a competition that would be viewed as fair and objective in this highly charged environment.

Looking back, what this saga created was: It cost private industry and private shareholders staggering sums of money in proposal costs and legal fees; it generated the dramatic and destabilizing procurement scandal; it exposed relentless protectionist pressures that hamper the procurement system; it diluted public confidence in the procurement system; and at the end, it achieved nothing in terms of meeting the warfighters' needs for restoring the Air Force's in-flight refueling capacity.

So, in closing, let's not forget that the ultimate goal of major system acquisition is providing the end user with the tools necessary to perform the individual's or the organization's role in furthering the agency's congressionally mandated mission. Obviously, lots of room for improvement remains.

That concludes my statement, and I look forward to answering any of your questions.

Senator CARPER. Professor Schooner, thank you.

Dr. Coburn said, "I have got to go. I have just been paged." He is heading over to the floor, but he expressed his thanks to the panel.

Mr. Murdock, you are recognized. Please proceed. Thanks for joining us.

TESTIMONY OF CLARK A. MURDOCK, PH.D.,[1] SENIOR ADVISER, INTERNATIONAL SECURITY PROGRAM, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES

Mr. MURDOCK. Thank you. I am pleased to be here, sir, and I commend the Subcommittee and commend GAO for its long record of substantial analysis of this problem. I will just say a few words in summary. I have a statement that I have submitted.

The defense acquisition system is incredibly complex, process centric and risk averse. As the Defense Science Board (DSB) concluded when it looked into the Darleen Druyun scandal, it is so complex that her mastery of the system gave her the ability to abuse it and give her a position of invulnerability.

The system is characterized, as we have been discussing throughout, by a loss of competency, a lack of accountability. I think that

[1] The prepared statement of Mr. Murdock appears in the Appendix on page 79.

was really demonstrated when the previous witness, Dr. Finley, when you asked him why was it that systems were passing Milestone B authority when they did not have the mandated Level 6 technological maturity, you asked him who is responsible for that, and he said, "Well, it is a collective responsibility." Committees are not responsible. Individuals are responsible. Program managers are responsible. That is one of the reasons why I think we have to change the system instead of continuing to talk about the system.

There is a lack of transparency, and we have all talked about the dysfunctional incentives system that causes everyone—we say it is overpromise, we say it is underestimate, we say it is structural optimism in the system. Really what it is is everybody lies. The incentive structure is that strong. You want to get a program started? You say what you have to say to get it. You want to get a program through Milestone B? You say what you have to say to get it through Milestone B. You want to get a requirement validated? You say what you have to say to get it validated by the Joint Requirements Oversight Council (JROC). Systems do not fail, yet they continually underperform.

My package depends upon a couple of large precursor statements, one of which is addressable, one of which is not.

The first is, I think, the military services get out of the requirements generation business. Only the combatant commanders have operational requirements. They are the warfighters. They are the only ones with the requirements. The services provide capabilities to meet the combatant commanders' needs. We need processes—and there has been progress in that direction, but it is incomplete—processes that increase and enhance the authority and the influence of the combatant commanders over the definition of requirements. We have made a number of proposals on that. It is something we can examine in questions.

The second one is an issue that has been referred to a number: Budget discipline, too many programs chasing too few dollars. Secretary Young earlier this year urged in an early 2008 memo that programs should be properly priced and that he was ready for the resulting budget increases to squeeze programs out so that we would have a fully funded acquisition program budget left. Well, good luck with that. We say these things all the time. We do not do them. There is nothing harder in Washington to kill than a bad weapons program, as we all know.

What is the goal here? I think it is a very straightforward one. As I indicated, it is an acquisition system characterized by accountability and realism, and by that we mean the accountability of institutions, decisionmakers, and program managers based on realism in cost, schedule, and performance goals, based on realistic assessments of technological maturity. And I think the way you get there is through much greater transparency to both the Office of the Secretary of Sefense (OSD) and to the Congress on how acquisition programs are managed.

We suggest briefly four things: Restore the service chief's authority and responsibility for the management and execution of acquisition programs. We have had civilians in AT&L and service secretariats managing these systems for the last 20 years. Look at the track record. GAO has documented it. They cannot do it, and uni-

formed bodies tend to be much better on accountability than those in civilian suits. There is a crisis in the C–17 scandal. Two general officers and one civilian were involved in it. Two general officers lost their jobs. The civilian was Darleen Druyun. She went to NASA for an extended stay.

The second thing, we need to establish four-start systems commands back in each of the services to build a cadre of acquisition generals that you need.

We also need an acquisition process that has shorter, more frequent programs phases that are aligned with the tours of the program managers, and the program managers held accountable for the performance during that phase of the acquisition program, not one big one like Acquisition B, many smaller ones.

And, finally, we need to establish independent assessment offices in both OSD and the military services that provide independent estimates, not just of costs, as Senator Levin suggested, but also of performance and also of technological maturity that would be available to those who have oversight. And then we need a Nunn-McCurdy on steroids that really punishes programs that fail.

Thank you, sir.

Senator CARPER. I know both Sam Nunn and Dave McCurdy, the idea of them being on steroids, I am trying to sit here and think what that would look like. But I think I understand what you are saying.

All right. I think I am going to start off by asking Mr. Sullivan and Professor Schooner just to respond to some of what Clark Murdock has said here in his testimony.

Mr. SULLIVAN. Yes, I think one of the points that Mr. Murdock talked about I think I would agree with is that as you start to maybe try to take apart some of the basic problems with organizations and accountability in this, writ large, the acquisition process, which takes up those three—requirements and budgeting and acquisition processes as a whole—and, in fact, Mr. Murdock has done a lot of work in this. There is a Defense Science Board study that backs up a lot of what he says, that the services should stick to acquisitions. The services should get out of the requirements business. The COCOMs should have a lot more to say about requirements. They are fighting the wars, they are matrixed, they are joint. They are not as stovepiped. They can have representatives that bring prioritized needs forward. The funding process then should—the idea of an independent office I think is a good idea. It should be studied. It should be done properly. But right now cost estimates that come with the requirements that come forward with candidate programs are unreal. I mean, they basically have no founding in reality most of the time, and the reason for that is because the acquisition community and the S&T community, quite frankly, do not have a good handle on the technologies that they are asking for to get the capabilities that they want. They do not have a lot of the design experience that they need on these. These are revolutionary needs that they bring forward, things like the F–22 fighter.

So these programs begin with an initial business case that I do not think anybody in the business inside the Pentagon even takes seriously. You have to wait 4 or 5 years, usually, and a lot of

money spent and sunk into a program before you start getting to the reality of things. We are looking at a program right now, the Joint Strike Fighter, that is about midway through development, and real costs are beginning to come out on that.

So I think that is one thing. The services should stick to proposing solutions. The Under Secretary for AT&L should make the decision. The Comptroller should accept better cost estimates based on knowledge. And the COCOMs, who have real skin in the game in terms of what they need to fight, should be more involved with the requirements.

Senator CARPER. Professor Schooner.

Mr. SCHOONER. Both Mr. Murdock and GAO have focused on the issue of accountability, and I think this is a great opportunity just to look at one slice of the acquisition workforce crisis. In major programs, leadership is tremendously important, and there are a lot of people who believe that you need a visionary or one particularly dynamic individual, and that is critical to the success of any major program.

But what private industry does is completely different than the approach the government takes. First of all, they use very significant monetary incentives, and they also provide key personnel with stability. Among the uniformed ranks and among a lot of senior government people, stability is anathema. Frequent rotation and diversity of assignments are necessary for promotion.

Dr. Finley concedes that program managers on average are in their position for slightly less than 2 years, and that is an improvement. That is simply not going to get the job done, and we are nowhere close to really making significant progress on that.

Senator CARPER. Mr. Murdock, one of the things that Professor Schooner talked about was trying to introduce incentives, financial incentives, whether you are building a bridge in Minnesota or whether you are trying to clean up Rocky Flats in Colorado, to offer incentives for contractors. And I think back, I mentioned this to Professor Schooner in a conversation earlier this week that we had. When I was Governor of Delaware, we basically closed I–95 between the Pennsylvania line and Wilmington, Delaware. Initially we did it to the southbound lanes, just closed them, did not move them over to the northbound lanes, but we just closed them, and provided incentives for the contractor to get the lanes "rubble-ized" and rebuilt and repaved, and offered incentives for doing that. Then we did the same thing for the northbound lanes. And it worked. It was ahead of schedule. We were very pleased with the outcome, provided the incentive payments as well.

But it works in highways. It works on I–95 in northern Delaware. It works on bridges in Minnesota. It apparently works out in Colorado at Rocky Flats. Is this idea a good one? Would it work and is it applicable to these major weapons systems?

Mr. MURDOCK. There are aspects of it that I think would work, but I think there are many concepts that come out of the private sector that depend upon a healthy infrastructure to operate. I will give several examples—a few examples.

In the private sector, people say best value, and they mean it; that people will pay for high-end performance if it is genuine high-end performance. The government is a very dumb customer. It has

a very weak acquisition force. They say best value. They do not. They mean cheapest. And so you always have a mismatch right there at the very beginning where a contractor does not know what kind of incentives to respond to.

My feeling is that I very much believe in making individuals accountable for different phases of the acquisition process. That program managers stay there for only 2 years is shocking. What you do is have shorter acquisition phases, you overlap the tours of program managers with those phases, and you make their PARs, their performance reviews, dependent upon what they inherited at the beginning of the phase and what they performed at the end of it. The incentives that they will have and the disincentives they will have, if you poorly perform, you are not going to get promoted. If you poorly perform, you are not going to go up the chain.

So my belief is that you have to start with the individuals, and I believe there should be educational awards, there should be perhaps cash bonuses for good performance during that time the way we do with SES'ers. But I would do it at the individual level first before you start talking the large kind of incentives.

In the private sector, there are two things that can change the performance of a company on a dime: One, performance metrics that are quantifiable and that you can measure; and two, performance-based compensation. Those two things are extremely hard in the government.

And so my feeling is that, yes, you can use incentives, but I would start on a smaller scale before going to a larger scale.

Senator CARPER. Mr. Sullivan.

Mr. SULLIVAN. Yes, I think my perspective on that is we have had a good discussion here about the development contracts that contractors get into and the risk that is assigned to those development contracts and the length of time they take. And if you look at a traditional, a current, typical DOD big acquisition—I will use the F–22; you could use anything else—you are looking at a program that begins with a cost estimate that is not grounded in any really firm data. You are looking at usually a 15-year development program, and you are looking at having a program manager who is going to be there maybe 2 or 3 years to start it.

So, we have done an awful lot of work in the commercial world to go out and find best practices for how to develop products. We have tried to find some very complex products, low-volume products that would match up with DOD, things like satellites, and oncology systems, medical devices. And what we found consistently is that in those best practices, the things that they have to have before they would start a program similar to what they do in the Department of Defense is they would limit it in terms of schedule. So they immediately would say we are going to build something, we are going to try to hit the market with cutting-edge technology, but we are going to limit ourselves to 3 to 5 years to do that. We are going to have the same person responsible for that program from the outset to the end. And if we have to call a contractor in to do this, we are going to do the proper systems engineering and the requirements analysis that is required to understand exactly what kind of technologies and technical problems and design issues and manufacturing issues we are going to have, and we are going to have

that in the first business case that we have; and then we are going to baseline that cost and schedule.

So they are limiting time frames, they are understanding their cost estimates before they begin the program, and they limit the technologies to what is available to them at the time. So requirement, in essence. Again, we are back to these three arrows. So the requirements are limited, and they have evolutionary product development.

Now, the way that they—usually, these companies will have a revolution within 20 years, which is the same amount of time it took the F–22 to be the revolutionary fighter over the F–15 and F–16. In fact, if you go back to the F–15 and F–16 acquisitions and look at how they did it, they were kind of incremental in the way they did that. They had block upgrades to those aircraft. Those aircraft are still pretty good today. They hold their own up in the air today. And they were done pretty good on cost and schedule, too.

The idea of this, the companies that we looked at that were really pushing technologies and trying to get to market as quickly as possible, they took on a lot of risk in that product development. Basically a fixed-price environment for them because they were going to invest a certain amount of money and they were going to have to recoup all that money. The Department can do the same thing, and the defense industry should be able to do the same thing. What they need to do is they need to get requirements under control, do them in quick spurts, and continue to upgrade their products, and they can move to more fixed-price kind of development contracts.

I think Professor Schooner said that we have tried that, we have been there, we have done that, and it did not work. But we mandated development contracts in the 1980s without any of this, and requirements were just the same. So there was nothing else really done at that time to try to make that fixed-price environment work.

Those are the kinds of things that we learned, and what we brought to this study that we did here is keep requirements simple, keep your S&T base vibrant, let them take the risks there, but keep product development pretty much fixed-price and fixed-schedule and deliver to the warfighter quickly, no bells and whistles, except the 80-percent solution.

Senator CARPER. OK. Thank you.

Let me just ask Professor Schooner and Mr. Murdock, anything in GAO's report that you especially agreed with or maybe disagreed with that you would like to just underline?

Mr. SCHOONER. Well, let me just underline two things because I think they emphasized both of them. I think they did, in fact, emphasize the acquisition workforce, which is tremendously important. And we can sit there and kick that dead horse as long as we want. But it is going to be a generation for us to undo what we have done. I think that Dr. Finley undersold the amount of damage that was done. Congress started taking apart the DOD workforce in the late 1980s, and we took an entire half-generation of cuts, and then we have been flat during this decade. And procurement spending has gone from the low $200 billion to over $435 billion in this decade alone, and we do not have the workforce to do it. And even worse, the workforce we have were not hired to do the

work we need them to do today. So this is a legitimate crisis, and I think that is really important.

I think that overall the report is really good. The one thing that I do take issue with is I think in the end, in an abundance of kindness, GAO suggested there were reasons for optimism, and I think they were being a little bit kind in that regard.

Mr. SULLIVAN. Well, if I could address that this goes back to how I opened with, we have been here before. And I would agree with that. But I would say that the Under Secretary of Defense for Acquisitions now, Mr. Young, and Mr. Finley as his Deputy, they have—in fact, we have looked at policy revisions they have made to their acquisition policies, and we have looked at all these policy memos that Mr. Young has issued over the past year. And they are really right on what we think would be best practices. But I agree with Professor Schooner. As I said, we have been here before.

The problem is sustained leadership, and I think you talked about that earlier. How do you keep someone in place who has the leadership capability and the ideas? I mean, how do you sustain that leadership? How do you hold accountability when you have got three processes and three process owners that can say no to each other? These are the critical things that have to be solved: Who is in charge? Who is going to be held accountable? And how do you sustain that, given the appointment process that we have? That is a real problem.

Mr. SCHOONER. But I think you heard from all of us, I think GAO is absolutely right, that if you wait until you have mature technology, then you have a fair chance of controlling costs and schedule. Without mature technology, it is a pipe dream.

Mr. SULLIVAN. If you have technologies that are mature enough to meet the requirements, you are way ahead of the game. I would agree with that.

Mr. MURDOCK. And I believe that the way you get there is through transparency and accountability. The transparency is why I think it is so important to have an independent assessment office that gives people assessments of cost, of performance, and technological maturity, and a schedule that OSD has, that Congress has, that empower a program manager, because he or she has them and they cannot be changed through requirements creep, they should not be changed through program instability, funding instability and so on. And I think you have to have transparency to do that because there is a lack of transparency right now.

I will give one vivid example. If there was ever a source selection that the Air Force had to get right, it is the KC–135 replacement. Given its baggage, had to get it right. And yet I am told that when the Air Force outbriefed Boeing on why it did not win the competition, in that briefing the sections were left blank on the front of the cover: Who is the source selection authority, what was the composition of the group of people who advised the source selection authority, and who was the composition of the special overarching board, somewhat like the Configuration Steering Boards that Secretary Young has called for, who composed those. Before the protest was upheld, Secretary Young was quoted as saying, "Well, we created this board, and Sue Payton, the Assistant Secretary, said it was

very useful and very helpful." Total fiasco. The decision of the GAO was a slam-dunk, the procedural infractions were so great.

Now, accountability, the standards of accountability have been established by Secretary Gates with the Chief of Staff of the Air Force and the Secretary of the Air Force on the nuclear mission, or with the person who headed up Walter Reed and the persons in the Army who were not moving fast enough. The whole Air Force acquisition unit had failed, but it was a broader DOD failure because there was some kind of overarching committee with it as well, and satisfaction being expressed by the Under Secretary, the defense acquisition executive for the process.

These are—not these individuals, because these individuals are relatively new. Some of them had to wait 3½ years before they could get into their job, whether it has been these individuals that have been running the process since Goldwater-Nichols and implemented the Packard Commission results. We need a different process, and we need a different structure to do it.

Senator CARPER. A friend of mine who began and has run a great nonprofit nationally in this country likes to say—and his program is designed to help young people to improve their lot in life and improve their futures. He likes to say, "Programs do not change people. People change people." And a good program puts a person who needs change in their life with somebody who can help them change.

I do not want to do a play on words here, but when it comes to programs and cost overruns, rather than saying that programs do not change people, we need people who can change programs. We really need people who can oversee these programs. And the idea that Dr. Finley's position was vacant for 3 years, the idea that he walked into his job and four out of his six direct reports were not around, and he had to go out and hire them—hopefully—he says he thinks he got good people and they will be around for a while. But that is just—talking about a system that is broken or at least a situation that was broken.

I went back in my head trying to think through 2 years ago, did we have a majority Democrat Congress in place at the time who was denying the Administration their appointments? And, actually, 2 years ago we did not. It was a Republican majority in the Senate and a Republican Administration. So I am not sure that would have played a role.

I look and I think about all the different positions within the Executive Branch for which we require Presidential appointment and Senate confirmation. And I am wondering if—we talked about requirement creep in programs. I wonder if we have some kind of creep in terms of Senate confirmation for some of these positions. We really need it for all of them.

Let me just ask you to think about that last point. Have we run amok? I remember when I was Governor of Delaware, I was nominated to be on the Amtrak Board of Directors. I loathed the process. I had been a naval flight officer for 23 years, a Congressman and State Treasure and Governor. I was nominated to serve on the Amtrak Board, and the disclosure process I had to go through was maybe not outrageous, but it was just so time-consuming and labo-

rious. Finally, I got confirmed, served for 4 years, enjoyed my service. But, boy, there was a lot to put up with to get confirmed.

Do you think we require too many Presidential appointments to be confirmed by the Senate? Is this an issue that is part of the problem?

Mr. SCHOONER. I believe Mr. Murdock's testimony specifically cites to the Defense Science Board study that was done after the Druyun debacle, and I actually served on that group when we did it. And one of the things that was discussed in there at great length—and there is even a terrific chart in there that shows the level and the extent of the vacancies at the highest level of the Defense Department—and it is complicated for a number of reasons. I think the one thing we have to think about is there are a lot of reasons why these jobs are simply not attractive to the kind of people you need to do the jobs.

The Under Secretary position is one where we are specifically looking for someone with significant business experience. The pay stinks. Nobody ever brings them down here to talk about all the good news that they have achieved. They are inheriting problems. They have got staggering budget problems. They have a grossly inadequate workforce. And they are given impossible tasks. The jobs are not attractive. It is tough to find the right people to do it, and the incentive structure is totally broken.

Senator CARPER. But other than that? Does anybody else want to comment on this? [Laughter.]

Mr. SULLIVAN. That is a very interesting question. I think it is a huge problem. I do not have any particular specific answers to that. I know that GAO is very much involved this year, more than ever before, in the transition process. I know the Congress has reached out with GAO to try to help—we are looking a lot harder at issues, some of the issues that we are talking about here today, to bring people up to speed quicker and maybe grease the skids a little bit more for these appointments. But to me it is one of the key problems. I do not know how you—if it is politically possible to take away these appointments or, to have some politically appointed or part of the bureaucracy or how you would do it. But it would certainly help if there were a CEO-type mentality in the Under Secretary of Defense for AT&L who had the time—as we said before, there is a transitory nature. People can wait John Young out, quite frankly. But he has got good ideas. He has got the will to fix these things. And if he were there for a while and he was able to sustain that and push that down through the culture—it has got to be a culture change, and that takes years.

So how do you do that with political appointments? That is the question of the day, I think.

Mr. MURDOCK. I do not think there is any question; there are too many political appointees.

Senator CARPER. Did you say there is no question but there are too many?

Mr. MURDOCK. There are too many political appointees. And it is not just confirmable appointees. It is political appointees that go deep down into the bureaucracy. You are taking the entire leadership essentially from the Deputy Assistant Secretary on up and switching them out every 2 years. Only there are lots of staggered

empty spots in that, so that you will have a place that is empty, filled by an Acting for 10, 11 months; somebody comes in for 2 years, gone; another gap.

The vetting process that we go through now for somebody to take a confirmable position is onerous. And it is actually, for somebody who is a successful career person, humiliating in terms of the kinds of questions they are being asked. And it is also very limiting in terms of what happens when you come out the other end. You take somebody like myself, I am at the end of my career. I do not have a future. Maybe I will take that kind of a job. But you know something? I am too old to go through that. So I am not going to do that. I do not want to go back into the government now, in part because of the process that is involved with it.

So you do what you can from the outside during that time, and you enjoy being a grandfather, and you make your balances.

Senator CARPER. As we come to a close here, I again want to thank each of you for your participation and your preparation and the input you have provided for us. Each of you have already spoken to this question I am about to ask, at least indirectly, but in terms of what—setting aside the Executive Branch and things that they need to do better or differently—and we have talked about that a good deal—talk about the Legislative Branch. And we have talked about it to some extent in confirming people whose names are submitted to us.

I remember when I was a governor, I served with Tommy Thompson, Governor Christie Whitman from New Jersey; Mike Leavitt, Utah; Tom Ridge, Pennsylvania—a lot of governors in this Administration ended up—former governors ended up being cabinet secretaries, and what I would say to each of them, when you nominate good people to be your key direct reports, and you are having trouble getting them confirmed, let me know and I will do what I can from the inside to try to move those names. And most of them took me up on it, and there is just—it is easy for names to get just hung up for reasons large and small. Sometimes you have somebody in the Legislative Branch who is interested in getting a person in a whole different part of the government confirmed or nominated by the President, and they will hold up confirmations completely over here in order to get somebody nominated over here that they are interested in. So it is not a good situation.

But advice for us in the Congress? One of the other pieces of advice I think I heard here today was in terms of providing an appropriate level of funding for weapons systems over multiple-year periods of time so that we do not have this going on all the time and it is difficult to come up with any kind of efficiencies. But that is the kind of thing I am interested in for us. What advice do you have for just——

Mr. SULLIVAN. If I could start with the funding levels—really I would take issue a little bit with what we heard from Dr. Finley. The trend has been upward. We are probably in the highest spending trend for development and procurement, the acquisition budget itself, since the late 1980s. So the money is there. I think the legislature has funded the Department fully. And I do not think—the funding instability that the doctor talked about, I know that I would get a lot of debate on this and probably a lot of argument.

But I think that most of that is done by the Department itself, I think, because they come in with such shoddy cost estimates for programs, and they begin things on such risky levels that the funding instability builds in the program, about midway through you start figuring out what you really have there.

I think that the legislature, that Congress' biggest role is oversight, obviously, and when we do reports like this, this $300 billion—which, by the way, is really $300 billion. I know that Dr. Finley said that if you look at the last 5 years it is 3-percent growth per program. Well, if you have 3-percent growth on a program that takes 15 years, you have 45-percent growth on the program. These are really real dollars.

So, we have been through some potential answers for this. I think we have raised some issues concerning how do you run the shop over there, how do you get accountability out of these three processes. I think the Congress has to continue oversight over that, quite frankly, maybe ask for information more often than when we come up and have to show the $300 billion cost growth. That is a real portfolio. That is 95 programs that exist today, and it is $300 billion. And that is an eye-opening pie chart that you have over there. So, to me, it is oversight.

Mr. MURDOCK. I would like to respond second on this one. Actually, I take the province of having worked on the Hill myself for 5 years but on the authorizing side. And when I worked for the House Armed Services Committee, Les Aspin was the Chairman of the House Armed Services Committee, and Sam Nunn was the Chairman of the Senate Armed Services Committee, and authorizers ruled. That is not the case anymore. Appropriators rule today. And that does create a very difficult problem in terms of actually killing programs. Appropriators do not do policy oversight. The Congress does not do things like Goldwater-Nichols. And then when they do do something like enact all of the reform recommendations out of the 9/11 Commission, they reform everything but Congress during that time.

So, for me, as a former Congressman who works—I mean a former staffer who works for a former staffer, John Hamre, somebody said Admiral Pollack said—and I am sure he was quoting somebody—"A problem that doesn't have a solution isn't a problem. It is a fact." And that is why very few people talk to you about congressional reform because it seems like such an intractable process.

One of the recommendations, for example, of the 9/11 Commission, reduce the number of oversight committees. They point it was reduced from—what?—66 to 65. This does not help. So there are a number of things that Congress could do to strengthen its ability to do oversight, and I believe close congressional involvement via the transparency of a process that could be produced through an independent cost and performance and technology assessment office would give authorizers who cared the tools to bring more transparency and responsibility to the Department of Defense because the Department has clearly demonstrated it cannot do it itself. Many of the wounds are self-inflicted. But I believe a more effective congressional role is essential to solving that problem.

Senator CARPER. Professor Schooner, the last word.

Mr. SCHOONER. Three things, quickly.

Workforce, workforce, workforce. We need some really creative solutions, and they are going to have to be outside of the civil service system because it is not going to get done.

Second, overall the profit policy and weighted guidelines system that DOD has to work with is fundamentally broken, and we need meaningful incentives and disincentives to do any of the things that we are talking about.

But we also need, third, real discipline on behalf of the government. If you want the government to break things into small pieces and lock down their technology before they go forward, then you are going to have to actually do something. And maybe what you say is, "I will give you program stability, but the price of that is I am going to hold you to your actual promises." And the one thing that Congress should never forget is the power of anecdote. And when it is all said and done, all you have to do is stop a couple of major programs, and you will get some people's attention.

Senator CARPER. All right. Well, gentlemen, before you close your books and walk away, let me again say thank you. I am glad that Dr. Coburn and I were here to participate in this hearing. I am glad our staffs are here. I know we have folks in the audience and people who may be watching on television. But this has been, I think—I turned to our staff, and I said to Wendy Anderson and Harlan Geer, this is such an important issue. The dollars are so substantial. And at a time when our Federal budget deficit issue even before this President's $700 billion, if you will, bailout to address our financial problems, even before that our deficit was running between $400 and $500 billion this year. Our national debt in this 8-year period of time will have doubled from about $5.5 trillion to about $11 trillion. And we have got to find a way, all kinds of ways to begin turning that back.

You have helped provide us with some very good ideas, and I am encouraged, knowing about Dr. Coburn's tenacity, knowing a little bit about my own, that we might just take this ball and run with it.

I want to close by saying the hearing record will be open for 2 weeks for the submission of some additional questions and statements, and I would just ask, if you do get those questions, that you try to respond promptly to them for the record.

Again, we thank you very much, and with that, this hearing is adjourned.

[Whereupon, at 4:22 p.m., the Subcommittee was adjourned.]

APPENDIX

TESTIMONY OF

JAMES I. FINLEY

DEPUTY UNDER SECRETARY OF DEFENSE

(ACQUISITION AND TECHNOLOGY)

Chairman Carper, Senator Coburn, and distinguished members of the committee, thank you for the opportunity to appear before you today to discuss the Department's policies and practices in the acquisition of major weapons systems. I will also discuss the GAO report entitled "Defense Acquisitions, Assessments of Selected Weapon Programs." I am fully committed to Acquisition Excellence and the restoration of the confidence in our leadership for our acquisition system. The history of acquisition reform for the Department of Defense (DoD) covers over 60 years. The most recent two decades of reform and transformation are often times referred back to the Packard Commission in 1986. The Goldwater-Nichols Act of 1986, the Acquisition Streamline Act of 1994, the Clinger-Cohen Act of 1996 and Intelligence Reform and Terrorism Prevention Act of 2004 all addressed improvements for our Acquisition System. The most recent studies of the Defense Acquisition Performance Assessment (DAPA), Center for Strategic and International Studies (CSIS) and Defense Science Board (DSB) served to assist my preparation for confirmation by the Senate in February 2006.

My perspectives, coming from industry with over 30 years of experience in Aerospace and Defense, have been shaped utilizing that experience along with the acquisition reform and transformation initiatives, especially the most recent studies. At the time of my confirmation hearing, the consensus seemed to be that the DoD acquisition process (DoDI 5000.2) was broken. As a back drop to my confirmation, my position had not been filled for some time and there were several vacancies in my direct reports. That too was considered, by many, as broken. We quickly moved to recruit and fill the vacancies with civilians with significant military and industry experience that had a passion to serve our Country. We eliminated a layer of management to tighten communications. We aligned the organization for accountability and improved efficiency of our workforce within AT&L, OSD, the Joint Staff and the Components.

After my first 90 days in office where I listened, discussed and reflected on the leadership perspectives of Industry, Congress and DoD military and civilian personnel, my opinion was that the acquisition process was NOT broken. We needed to add discipline into the process and ensure that "the basic blocking and tackling" in executing the acquisition process was being done correctly. We also needed to properly scale and tailor processes where and when needed, to implement changes that streamlined

and simplified processes, to reduce our cycle times, to increase our competition and to broaden our communications – up, down, across and within Congress, Industry, Academia and our Coalition Partners and especially within our DoD. We developed a three year plan, established our vision and strategy, and implemented goals and initiatives with a sense of urgency. Today, we are thirty-one months into implementing that plan.

TRENDS

We utilized the 2006 Quadrennial Defense Review as a strategic framework to enable aggressive initiatives in support of the most recent studies – DAPA, CSIS and DSB. Those reports represent collectively, fifty –five unique recommendations for acquisition reform. Of those fifty-five recommendations, fifty have been implemented fully or partially. Our trends and strategic direction are aligned with Mr. Young's vision and strategic thrust areas:

- to define effective and affordable tools for the Joint Warfighter,
- to responsibly spend every single tax dollar,
- to take care of our people, and
- to address the DoD transformation priorities with a sense of urgency.

We are striving for acquisition excellence with a broad set of objectives by using short and long term initiatives. These objectives include balancing the trade space, getting programs started right, improving process efficiency, and providing program stability.

- Balancing the Trade Space

  Examples of initiatives that enable decision making to balance the trade space focus on affordability and schedule. The Concept Decision was a key QDR initiative that we successfully piloted utilizing four, diverse programs ranging from traditional platforms, to information management programs, to special programs, to systems-of-systems programs. These programs each represented unique challenges to attempt to shorten cycle time, to make earlier investment decisions, to make strategic choices with debate and differences vetted between the Component, Joint and OSD organizations. We have emphasized the utilization of incremental vs. "big bang" acquisition strategies. Tradeoff decisions were bounded with the convergence of affordability, technical performance and time-certainty.

  As a result of the Concept Decision Initiative, we established a new formal decision point in the acquisition process entitled the Material Development Decision [MDD]. The MDD will be the

formal entry point into the acquisition process and will be mandatory for all acquisition programs. At the MDD we will carefully review the capability gap and prepare to conduct a formal and rigorous analysis of the materiel options available. As a result, we believe our programs will be better conceived because we will have considered our overarching approach to satisfying the capability need, the key technical issues, and the associated cost, schedule, and executability implications before starting technology development. These actions are an important part of our effort to ensure that we start programs right.

- Starting Programs Right

Examples of initiatives that enable starting programs right focus on improved, up front planning and awareness of risk. Increased focus on Milestone A and the Utilization of Competitive Prototyping.

The Joint Light Tactical Vehicle (JLTV) Program and Broad Area Maritime Surveillance (BAMS) Program are examples of increased focus on Milestone A and utilizing prototyping in preparation for Milestone B decision making. Prototyping provides insight for performance, cost, producibility, integration and testing. Design reviews, drawing releases, bills of material, assembly

documentation and basis for cost and schedule estimates, from components to systems are enabled utilizing early and competitive prototyping.

- Continuously Improve Process Efficiency

Examples of initiatives that continuously improve process efficiency are focused on tailored, agile, open and transparent communications with checks and balances. Lean Six Sigma, Restructured Executive Reviews, implementation of Configuration Steering Boards, integrating Development Test (DT) and Operational Test (OT), System Assurance, Risk Management and Utilization of Common Data have been implemented. These initiatives are applied to all MDAPs.

Executive Reviews were reengineered to reduce the support documentation by half, to focus on decision making and to standardize and simplify Red, Yellow, Green indicators for cost, schedule and performance. Leading metrics were established and closure plans were required with 30/60/90 day horizons for known problems. The standard Systems Engineering likelihood versus consequences methodology was implemented to address risks and associated mitigation plans. Continuous improvement has been

utilized to incorporate quad charts for tracking Key Performance Parameters (KPP's), Cost Drivers, Technology Maturity Status and Acquisition Program Baseline performance for cost and schedule. A Triage has also been conducted on all ACAT-1 Programs in the portfolio to identify troubled programs.

- Enable Program Stability

  Examples of initiatives that enable program stability are the Configuration Steering Board, Program Management Tenure and Utilization of Capital Funding Accounts. Technology Readiness Level (TRL), Manufacturing Readiness Level (MRL), Funding Stability, Earned Value Management Systems with Trip Wires, Earlier Integrated Baseline Reviews are initiatives that we are implementing. Trip Wires have been added as an additional metric for Earned Value Management Systems (EVMS).

  The EVMS Trip Wires have provided excellent insight for trends and projections of planning execution in a variety of cost, schedule, and performance criteria on a monthly basis utilizing EVMS as a management tool for decision making.

INCENTIVES

Incentives are very important for consideration when establishing the acquisition strategy for programs. The program manager, systems engineer and contract manager work as a team to understand the challenges, opportunities and risk in a program. Risk management has become an increasingly important factor for managing large, complex programs.

Contracting terms and conditions for large programs have shifted over the past couple decades due to increased technical complexity and associated cost and schedule impacts. Accordingly, DoD has shifted from firm fixed price environments to the fixed price incentive and cost plus award/incentive fee structures to motivate and encourage industry performance.

Every weapon system is planned to meet cost, schedule and performance requirements. Providing incentives to industry should motivate and encourage achievement of those requirements. Our objective is to utilize objective criteria, whenever possible, to measure contract performance where incentive structures are utilized.

CHALLENGES

One of the challenges facing our Department of Defense is the career planning for our acquisition workforce. As Mr. John Young stated at the 2007 USD (AT&L) Development Award Presentation, "The AT&L team

must continue the legacy we have inherited – a legacy of providing unmatched weapons technology that has assured the security and freedom of our Nation." With a workforce of over 128,000 members, comprised of military and civilian personnel from across all of the DoD Services and Agencies, we are serving to sustain our world-class mission for the defense of our national security on a global scale. We are actively working to assure our workforce continues to meet that mission.

GAO REPORT 08-467SP

ASSESSMENTS OF SELECTED WEAPON SYSTEMS

The GAO's report was issued several months ago. I would like to highlight some concerns we have with it. We are developing questions to better understand the relevance, usefulness and credibility of many of the methodologies and conclusions presented in the report.

For example, our initial perspectives of five conclusions provided in the GAO Summary page are summarized as follows:

- The opening statement, "Of the 72 programs, none proceeded through System Development meeting best practices....".

  That statement is not understood. The utilization of best practices and Lean Six Sigma are embraced and practiced throughout the Department of Defense and in particular the

Acquisition Community for continuous process improvement. Improvements are well documented and demonstrated on such programs such as the F/A 18 engine overhaul and repair at NAS Lemoore, CA that substantially reduced overhaul and repair time.

- The statement, "The absence of wide-spread adoption of knowledge-based acquisition [GAO] processes ... major contributor...lack of maturity."

  That statement is not understood. DoD knowledge based decision making may not utilize the GAO process; however, the acquisition system (DoD 5000.2) utilizes extensive sources of knowledge and expertise to make decisions with a variety of methodologies.

- The statement, "63% of the programs had changed requirements once system development began..."

  That statistic may be true but the conclusion reflects a naivety about derived requirements, management of necessary change tradeoffs for cost, schedule and performance during system development.

- The statement, "Average tenure to date of program managers has been less than half of that called for by DoD policy."

  The comparison may be true; however, the data is based on benchmarks over five years old and may only be a "snap shot" of time. For example, if the program manager comes in for a two year assignment and that data was taken at month three, then the tenure may only reflect three months versus twenty four months planned. Program manager tenure agreements have been established with all the Services, have been a fundamental change in our Acquisition Excellence initiatives for tenure agreements with four year goals and correlated to major milestones. The actual average tenure of program managers today, across all Services is 23.8 months with an expected tenure of 42 months, average.

- The statement, "...roughly half the programs that provided GAO data experienced more than a 25 percent increase in the expected lines of software code since starting their respective system development programs."

  The statistic may be true. However, the benchmarks date back five years. There is also a lack of insight as to the cause of code

change, for example poor estimating or legitimate requirement changes. The demand for software is growing exponentially with ever increasing complexity. Software Engineering has been elevated to the Senior Executive Service level. Software training is being added as a core competency in Acquisition Workforce and industry/government relationships have been established with senior executive participation for software continuous improvement. Our data reflects the cost per line of code has dropped as productivity has increased over past decade. We do not have a sense of comfort, in that regard, and continue to increase the technical rigor and management focus of software and its role our weapon systems.

We look forward to our continuing work with the GAO to better understand their data, methodologies and conclusions.

SUMMARY

In summary, measurable progress for acquisition excellence has been accomplished. Much work remains to be done. A plan for that work has been established.

Chairman Carper, Senator Coburn, and distinguished members of the committee, I am pleased to address any questions that you may have for me. Thank you.

United States Government Accountability Office

GAO

Testimony
Before the Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security, Committee on Homeland Security and Governmental Affairs, U.S. Senate

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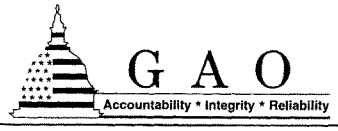
DEFENSE ACQUISITIONS

Fundamental Changes Are Needed to Improve Weapon Program Outcomes

Statement of Michael J. Sullivan, Director
Acquisition and Sourcing Management



GAO-08-1159T

GAO
Accountability · Integrity · Reliability
Highlights

Highlights of GAO-08-1159T, a testimony before the Subcommittee on Federal Financial Management, Government Information, Federal Services, and International Security, Committee on Homeland Security and Governmental Affairs, U.S. Senate

Why GAO Did This Study

Since 1990, GAO has designated the Department of Defense's (DOD) management of major weapon system acquisitions a high risk area. DOD has taken some action to improve acquisition outcomes, but its weapon programs continue to take longer, cost more, and deliver fewer capabilities than originally planned. These persistent problems—coupled with current operational demands—have impelled DOD to work outside of its traditional acquisition process to acquire equipment that meet urgent warfighter needs.

Poor outcomes in DOD's weapon system programs reverberate across the entire federal government. Over the next 5 years, DOD expects to invest more than $357 billion on the development and procurement of major defense acquisition programs. Every dollar wasted on acquiring weapon systems is less money available for other priorities.

This testimony describes DOD's current weapon system investment portfolio, the problems that contribute to cost and schedule increases, potential solutions based on past GAO recommendations, and recent legislative initiatives and DOD actions aimed at improving outcomes. It also provides some observations about what is needed for DOD to achieve lasting reform. The testimony is drawn from GAO's body of work on DOD's acquisition, requirements, and funding processes, as well as its most recent annual assessment of selected DOD weapon programs.

To view the full product, including the scope and methodology, click on GAO-08-1159T. For more information, contact Michael J. Sullivan at (202) 512-4841 or sullivanm@gao.gov.

September 25, 2008

DEFENSE ACQUISITIONS

Fundamental Changes Are Needed to Improve Weapon Program Outcomes

What GAO Found

DOD is not receiving expected returns on its large investment in weapon systems. Since fiscal year 2000, DOD significantly increased the number of major defense acquisition programs and its overall investment in them. During this same time period, the performance of the DOD portfolio has gotten worse. The total acquisition cost of DOD's 2007 portfolio of major programs under development or in production has grown by nearly $300 billion over initial estimates. Current programs are also experiencing, on average, a 21-month delay in delivering initial capabilities to the warfighter—often forcing DOD to spend additional funds on maintaining legacy systems.

Systemic problems both at the strategic and at the program level underlie cost growth and schedule delays. At the strategic level, DOD's processes for identifying warfighter needs, allocating resources, and developing and procuring weapon systems—which together define DOD's overall weapon system investment strategy—are fragmented and broken. At the program level, weapon system programs are initiated without sufficient knowledge about system requirements, technology, and design maturity. Lacking such knowledge, managers rely on assumptions that are consistently too optimistic, exposing programs to significant and unnecessary risks and ultimately cost growth and schedule delays.

Our work shows that acquisition problems will likely persist until DOD provides a better foundation for buying the right things, the right way. This involves making tough decisions as to which programs should be pursued, and more importantly, not pursued; making sure programs can be executed; locking in requirements before programs are ever started; and making it clear who is responsible for what and holding people accountable when responsibilities are not fulfilled. Recent congressionally mandated changes to the DOD acquisition system, as well as initiatives being pursued by the department, include positive steps that, if implemented properly, could provide a foundation for establishing a well balanced investment strategy, sound business cases for major weapon system acquisition programs, and a better chance to spend resources wisely.

At the same time, DOD must begin making better choices that reflect joint capability needs and match requirements with resources. DOD investment decisions cannot continue to be dictated by the military services who propose programs that overpromise capabilities and underestimate costs to capture the funding needed to start and sustain development programs. To better ensure warfighter capabilities are delivered when needed and as promised, incentives must encourage a disciplined, knowledge-based approach, and a true partnership with shared goals must be developed among the department, the military services, the Congress, and the defense industry.

Mr. Chairman and Members of the Subcommittee:

I am pleased to be here today to discuss the Department of Defense's (DOD) management of its major weapon system acquisitions—an area that has been on GAO's high risk list since 1990. Prior to and since that time, Congress and DOD have continually explored ways to improve acquisition outcomes without much to show for their efforts. DOD's major weapon system programs continue to take longer, cost more, and deliver fewer quantities and capabilities than originally planned. Current operational demands have highlighted the impact of these persistent problems as DOD has been forced to work outside of its traditional acquisition process to acquire equipment that meet warfighter needs.

Investment in weapons acquisition programs is now at its highest level in two decades. The department expects to invest more than $357 billion over the next 5 years on the development and procurement of major defense acquisition programs. Given the size of this investment, poor outcomes in DOD's weapon system programs reverberate across the entire federal government. Every dollar wasted during the development and acquisition of weapon systems is money not available for other internal and external budget priorities—such as the war on terror and mandatory payments to growing entitlement programs.

My statement today is drawn from our body of work on DOD's acquisition, requirements, and funding processes, as well as our annual assessment of selected DOD weapon programs. My statement today focuses on (1) the performance of DOD's major defense acquisition program portfolio; (2) the underlying systemic problems that contribute to poor cost and schedule outcomes; (3) potential solutions based on past GAO recommendations; and (4) recent congressional and DOD actions and the extent to which those actions can be expected to improve the future performance of DOD's major defense acquisition programs. Our work was conducted in September 2008 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Summary

Since fiscal year 2000, DOD significantly increased the number of major defense acquisition programs and its overall investment in them. During this same time period, acquisition outcomes have not improved. Based on

our analysis, total acquisition costs for the fiscal year 2007 portfolio of major defense acquisition programs increased 26 percent and development costs increased by 40 percent from first estimates—both of which are higher than the corresponding increases in DOD's fiscal year 2000 portfolio. In most cases, the programs we assessed failed to deliver capabilities when promised—often forcing warfighters to spend additional funds on maintaining legacy systems. Our analysis shows that current programs are experiencing, on average, a 21-month delay in delivering initial capabilities to the warfighter, a 5-month increase over fiscal year 2000 programs.

Several underlying systemic problems at the strategic level and at the program level continue to contribute to poor weapon system program outcomes. At the strategic level, DOD does not prioritize weapon system investments and the department's processes for matching warfighter needs with resources are fragmented and broken. At the program level, programs are started without knowing what resources will truly be needed and are managed with lower levels of product knowledge at critical junctures than expected under best practices standards. In the absence of such knowledge, managers rely heavily on assumptions about system requirements, technology, and design maturity, which are consistently too optimistic. This exposes programs to significant and unnecessary technology, design, and production risks, and ultimately damaging cost growth and schedule delays. DOD officials are rarely held accountable for these poor outcomes and the acquisition environment does not provide the appropriate incentives for contractors to stay within cost and schedule targets, making them a strong enabler of the status quo.

These problems will likely persist until DOD provides a better foundation for buying the right things, the right way and holds decision makers, program managers, and contractors accountable. Across-the-board improvements in acquisition outcomes require fundamental changes. This involves (1) maintaining the right mix of programs to invest in by making better decisions as to which programs should be pursued given existing and expected funding and, more importantly, deciding which programs should not be pursued; (2) ensuring that programs that are started can be executed by matching requirements with resources and locking in those requirements; and (3) making it clear that programs will then be executed based on knowledge and holding program managers responsible for that execution. We have made similar recommendations in past GAO reports, but DOD has disagreed with some and not fully implemented others.

There is some reason for optimism. Recent congressionally mandated changes to the DOD acquisition system, as well as initiatives being pursued by the department, could improve DOD's overall investment strategy and the soundness of the programs it allows to move forward. Congress has enacted legislation that requires DOD to certify that programs meet specific criteria at key decision points early in the acquisition process; report on its strategies for balancing the allocation of funds and other resources among major defense acquisition programs; and identify strategies for enhancing the role of program managers in carrying out acquisition programs. Based in part on GAO recommendations and congressional direction, DOD has also begun several policy initiatives including a new concept decision review initiative, acquisition approaches with shorter and more certain delivery time frames, a requirement for more prototyping early in programs, and the establishment of review boards to monitor weapon system configuration changes, which are designed to enable key department leaders to make informed decisions before a program starts and maintain discipline once it begins.

While legislation and policy revisions can help guide change, DOD must begin making better choices that reflect joint capability needs and match requirements with resources or the department will continue to experience poor acquisition outcomes. DOD and the military services cannot continue to view success through the prism of securing the funding needed to start and sustain new programs. Sound programs should be the natural outgrowth of a disciplined knowledge-based process. DOD's policy emphasizes the importance of a knowledge-based approach, but practice does not always follow policy. The transitory nature of leadership and the stovepiped process further undermines successful reform. Meaningful and lasting reform will not be achieved until the right incentives are established and accountability is bolstered at all levels of the acquisition process—both within the department and in the defense industry. Finally, unless all of the players involved with acquisitions—the Congress, DOD, and perhaps most importantly, the military services—have unified goals, outcomes are not likely to improve.

DOD's Major Acquisition Programs Continue to Experience Significant Cost Growth and Schedule Delays

DOD is not receiving expected returns on its large investment in weapon systems. The total acquisition cost of DOD's 2007 portfolio of major programs under development or in production has grown by nearly $300 billion over initial estimates. While DOD is committing substantially more investment dollars to develop and procure new weapon systems, our analysis shows that the 2007 portfolio is experiencing greater cost growth and schedule delays than the fiscal years 2000 and 2005 portfolios (see table 1).[1] Total acquisition costs for programs in DOD's fiscal year 2007 portfolio have increased 26 percent from first estimates—compared to a 6-percent increase for programs in its fiscal year 2000 portfolio. Total RDT&E costs for programs in 2007 have increased by 40 percent from first estimates, compared to 27 percent for programs in 2000. The story is no better when expressed in unit costs. Schedule delays also continue to impact programs. On average, the current portfolio of programs has experienced a 21-month delay in delivering initial operational capability to the warfighter, and 14 percent are more than 4 years late.

[1] Our analysis in this area reflects comparisons of performance for programs meeting DOD's criteria for being a major defense acquisition program in fiscal year 2007 and programs meeting the same criteria in fiscal years 2005 and 2000. The analysis does not include all the same systems in all 3 years.

Table 1: Analysis of DOD Major Defense Acquisition Program Portfolios

Fiscal year 2008 dollars			
	Fiscal year		
	2000 portfolio	2005 portfolio	2007 portfolio
Portfolio size			
Number of programs	75	91	95
Total planned commitments	$790 Billion	$1.5 Trillion	$1.6 Trillion
Commitments outstanding	$380 Billion	$887 Billion	$858 Billion
Portfolio performance			
Change to total RDT&E costs from first estimate	27 percent	33 percent	40 percent
Change in total acquisition cost from first estimate	6 percent	18 percent	26 percent
Estimated total acquisition cost growth	$42 Billion	$202 Billion	$295 Billion
Share of programs with 25 percent or more increase in program acquisition unit cost	37 percent	44 percent	44 percent
Average schedule delay in delivering initial capabilities	16 months	17 months	21 months

Source: GAO analysis of DOD data

Note: Data were obtained from DOD's Selected Acquisition Reports (dated December 1999, 2004, and 2006) or, in a few cases, data were obtained directly from program offices. Number of programs reflects the programs with Selected Acquisition Reports. In our analysis we have broken a few Selected Acquisition Report programs (such as Missile Defense Agency systems) into smaller elements or programs. Not all programs had comparative cost and schedule data, and these programs were excluded from the analysis where appropriate. Also, data do not include full costs of developing Missile Defense Agency systems

Continued cost growth results in less funding being available for other DOD priorities and programs, while continued failure to deliver weapon systems on time delays providing critical capabilities to the warfighter. Put simply, cost growth reduces DOD's buying power. As program costs increase, DOD must request more funding to cover the overruns, make trade-offs with existing programs, delay the start of new programs, or take funds from other accounts. Delays in providing capabilities to the warfighter result in the need to operate costly legacy systems longer than expected, find alternatives to fill capability gaps, or go without the capability. The warfighter's urgent need for the new weapon system is often cited when the case is first made for developing and producing the system. However, DOD has already missed fielding dates for many programs and many others are behind schedule.

Fragmented Processes, Unexecutable Business Cases, and Lack of Knowledge Underlie Poor Acquisition Outcomes

Over the past several years our work has highlighted a number of underlying systemic causes for cost growth and schedule delays both at the strategic and at the program level. At the strategic level, DOD's processes for identifying warfighter needs, allocating resources, and developing and procuring weapon systems—which together define DOD's overall weapon system investment strategy—are fragmented and broken. At the program level, the military services propose and DOD approves programs without adequate knowledge about requirements and the resources needed to successfully execute the program within cost, schedule, and performance targets.

Key Acquisition Support Processes Are Fragmented and Result in Unsound Programs

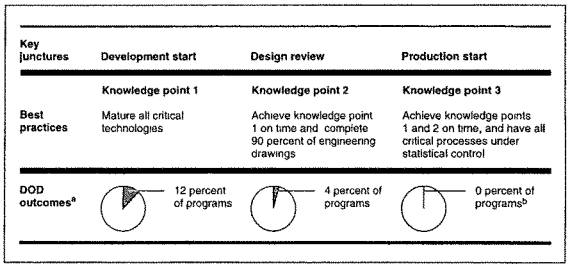
DOD largely continues to define war fighting needs and make investment decisions on a service-by-service basis, and assess these requirements and their funding implications under separate decision-making processes. While DOD's requirements process provides a framework for reviewing and validating needs, it does not adequately prioritize those needs and is not agile enough to meet changing warfighter demands. Ultimately, the process produces more demand for new programs than available resources can support. This imbalance promotes an unhealthy competition for funds that encourages programs to pursue overly ambitious capabilities, develop unrealistically low cost estimates and optimistic schedules, and to suppress bad news. Similarly, DOD's funding process does not produce an accurate picture of the department's future resource needs for individual programs—in large part because it allows programs to go forward with unreliable cost estimates and lengthy development cycles—not a sound basis for allocating resources and ensuring program stability. Invariably, DOD and the Congress end up continually shifting funds to and from programs—undermining well-performing programs to pay for poorly performing ones.

Initiating Programs with Unexecutable Business Cases Sets Them Up to Fail

At the program level, the key cause of poor outcomes is the consistent lack of disciplined analysis that would provide an understanding of what it would take to field a weapon system before system development. Our body of work in best practices has found that an executable business case is one that provides demonstrated evidence that (1) the identified needs are real and necessary and that they can best be met with the chosen concept and (2) the chosen concept can be developed and produced within existing resources—including technologies, funding, time, and management capacity. Although DOD has taken steps to revise its acquisition policies and guidance to reflect the benefits of a knowledge-based approach, we have found no evidence of widespread adoption of

such an approach in the department. Our most recent assessment of major weapon systems found that the vast majority of programs began development with unexecutable business cases, and did not attain, or plan to achieve, adequate levels of knowledge before reaching design review and production start—the two key junctures in the process following development start (see figure 2).

Figure 2: Knowledge Achievement for Weapon System Programs in 2008 Assessment at Key Junctures



Source: GAO analysis of DOD data

[a]Not all programs provided information for each knowledge point or had passed through all three key junctures.

[b]In our assessment of two programs, the Light Utility Helicopter and the Joint Cargo Aircraft, are depicted as meeting all three knowledge points when they began at production start. We excluded these two programs from our analysis because they were based on commercially available products and we did not assess their knowledge attainment with our best practices metrics.

Knowledge gaps are largely the result of a lack of disciplined systems engineering analysis prior to beginning system development. Systems engineering translates customer needs into specific product requirements for which requisite technological, software, engineering, and production capabilities can be identified through requirements analysis, design, and testing. Early systems engineering provides knowledge that enables a developer to identify and resolve gaps before product development begins. Because the government often does not perform the proper up-front analysis to determine whether its needs can be met, significant contract cost increases can occur as the scope of the requirements change or become better understood by the government and contractor. Not only does DOD not typically conduct disciplined systems engineering prior to beginning system development, it has allowed new requirements to be

added well into the acquisition cycle. The acquisition environment encourages launching ambitious product developments that embody more technical unknowns and less knowledge about the performance and production risks they entail. A new weapon system is not likely to be approved unless it promises the best capability and appears affordable within forecasted available funding levels. We have recently reported on the negative impact that poor systems engineering practices have had on several programs such as the Global Hawk Unmanned Aircraft System, F-22A, Expeditionary Fighting Vehicle, Joint Air-to-Surface Standoff Missile and others.[2]

With high levels of uncertainty about technologies, design, and requirements, program cost estimates and related funding needs are often understated, effectively setting programs up for failure. We recently compared the service and independent cost estimates for 20 major weapon system programs and found that the independent estimate was higher in nearly every case, but the difference between the estimates was typically not significant. We also found that both estimates were too low in most cases, and the knowledge needed to develop realistic cost estimates was often lacking. For example, program Cost Analysis Requirements Description documents—used to build the program cost estimate—are not typically based on demonstrated knowledge and therefore provide a shaky foundation for estimating costs. Cost estimates have proven to be off by billions of dollars in some of the programs we reviewed. For example, the initial Cost Analysis Improvement Group estimate for the Expeditionary Fighting Vehicle program was about $1.4 billion compared to a service estimate of about $1.1 billion, but development costs for the system are now expected to be close to $3.6 billion. Estimates this far off the mark do not provide the necessary foundation for sufficient funding commitments and realistic long-term planning.

When DOD consistently allows unsound, unexecutable programs to pass through the requirements, funding, and acquisition processes, accountability suffers. Program managers cannot be held accountable when the programs they are handed already have a low probability of success. In addition, they are not empowered to make go or no-go decisions, have little control over funding, cannot veto new requirements,

[2]GAO, *Best Practices: Increased Focus on Requirements and Oversight Needed to Improve DOD's Acquisition Environment and Weapon System Quality*, GAO-08-294 (Washington, D.C.: Feb. 1, 2008).

and they have little authority over staffing. At the same time, program managers frequently change during a program's development.

Limiting the length of development cycles would make it easier to more accurately estimate costs, predict the future funding needs, effectively allocate resources, and hold decision makers accountable. We have consistently emphasized the need for DOD's weapon programs to establish shorter development cycles. DOD's conventional acquisition process often requires as many as 10 or 15 years to get from program start to production. Such lengthy cycle times promote program instability—especially when considering DOD's tendency to change requirements and funding as well as leadership. Constraining cycle times to 5 or 6 years would force programs to conduct more detailed systems engineering analyses, lend itself to fully funding programs to completion, and thereby increasing the likelihood that their requirements can be met within established time frames and available resources. An assessment of DOD's acquisition system commissioned by the Deputy Secretary of Defense in 2006 similarly found that programs should be time-constrained to reduce pressure on investment accounts and increase funding stability for all programs.

The Way Forward: Potential Solutions

Our work shows that acquisition problems will likely persist until DOD provides a better foundation for buying the right things, the right way. This involves (1) maintaining the right mix of programs to invest in by making better decisions as to which programs should be pursued given existing and expected funding and, more importantly, deciding which programs should not be pursued; (2) ensuring that programs that are started can be executed by matching requirements with resources and locking in those requirements; and (3) making it clear that programs will then be executed based on knowledge and holding program managers responsible for that execution. We have made similar recommendations in past GAO reports, but DOD has disagreed with some and not fully implemented others.

These changes will not be easy to make. They will require DOD to reexamine not only its acquisition process, but its requirement setting and funding processes as well. They will also require DOD to change how it views program success, and what is necessary to achieve success. This includes changing the environment and incentives that lead DOD and the military services to overpromise on capability and underestimate costs in order to sell new programs and capture the funding needed to start and sustain them. Finally, none of this will be achieved without a true partnership among the department, the military services, the Congress,

and the defense industry. All of us must embrace the idea of change and work diligently to implement it.

Buy the Right Things: Develop and Implement an Investment Strategy

The first, and most important, step toward improving acquisition outcomes is implementing a new DOD-wide investment strategy for weapon systems. We have reported that DOD should develop an overarching strategy and decision-making processes that prioritize programs based on a balanced match between customer needs and available department resources—that is the dollars, technologies, time, and people needed to achieve these capabilities. We also recommended that capabilities not designated as a priority should be set out separately as desirable but not funded unless resources were both available and sustainable. This means that the decision makers responsible for weapon system requirements, funding, and acquisition execution must establish an investment strategy in concert.

DOD's Under Secretary of Defense for Acquisition, Technology and Logistics—DOD's corporate leader for acquisition—should develop this strategy in concert with other senior leaders, for example, combatant commanders who would provide input on user needs; DOD's comptroller and science and technology leaders, who would provide input on available resources; and acquisition executives from the military services, who could propose solutions. Finally, once priority decisions are made, Congress will need to enforce discipline through its legislative and oversight mechanisms.

Buy the Right Way: Ensure Individual Programs Can Be Executed

Once DOD has prioritized capabilities, it should work vigorously to make sure each new program can be executed before the acquisition begins. More specifically, this means assuring requirements for specific weapon systems are clearly defined and achievable given available resources and that all alternatives have been considered. System requirements should be agreed to by service acquisition executives as well as combatant commanders. Once programs begin, requirements should not change without assessing their potential disruption to the program and assuring that they can be accommodated within time and funding constraints. In addition, DOD should prove that technologies can work as intended before including them in acquisition programs. More ambitious technology development efforts should be assigned to the science and technology community until they are ready to be added to future generations of the product. DOD should also require the use of independent cost estimates as a basis for budgeting funds. Our work over the past 10 years has

consistently shown when these basic steps are taken, programs are better positioned to be executed within cost and schedule.

To keep programs executable, DOD should demand that all milestone decisions be based on quantifiable data and demonstrated knowledge. These data should cover critical program facets such as cost, schedule, technology readiness, design readiness, production readiness, and relationships with suppliers. Development should not be allowed to proceed until certain knowledge thresholds are met—for example, a high percentage of engineering drawings completed at critical design review. DOD's current policies encourage these sorts of metrics to be used as a basis for decision making, but they do not demand it. DOD should also place boundaries on the time allowed for system development.

To further ensure that programs can be executed, DOD should pursue an evolutionary path toward meeting user needs rather than attempting to satisfy all needs in a single step. This approach has been consistently used by successful commercial companies we have visited over the past decade because it provides program managers with more achievable requirements, which, in turn, facilitate shorter cycle times. With shorter cycle times, the companies we have studied have also been able to assure that program managers and senior leaders stay with programs throughout the duration of a program.

DOD has policies that encourage evolutionary development, but programs often favor pursuing more revolutionary, exotic solutions that will attract funds and support. The department and, more importantly, the military services, tend to view success as capturing the funding needed to start and sustain a development program. In order to do this, they must overpromise capability and underestimate cost. In order for DOD to move forward, this view of success must change. World-class commercial firms identify success as developing products within cost estimates and delivering them on time in order to survive in the marketplace. This forces incremental, knowledge-based product development programs that improve capability as new technologies are matured.

Hold People Accountable

To strengthen accountability, DOD must also clearly delineate responsibilities among those who have a role in deciding what to buy as well as those who have role in executing, revising, and terminating programs. Within this context, rewards and incentives must be altered so that success can be viewed as delivering needed capability at the right

price and the right time, rather than attracting and retaining support for numerous new and ongoing programs.

To enable accountability to be exercised at the program level once a program begins, DOD will need to (1) match program manager tenure with development or the delivery of a product; (2) tailor career paths and performance management systems to incentivize longer tenures; (3) strengthen training and career paths as needed to ensure program managers have the right qualifications to manage the programs they are assigned to; (4) empower 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 the start of a program; and (5) develop and provide automated tools to enhance management and oversight as well as to reduce the time required to prepare status information.

DOD also should hold contractors accountable for results. As we have recommended, this means structuring contracts so that incentives actually motivate contractors to achieve desired acquisition outcomes and withholding fees when those goals are not met.

Recent Congressional Initiatives and DOD Actions Aim to Promote a More Disciplined, Knowledge-Based Acquisition Approach

Recognizing the need for more discipline and accountability in the acquisition process, Congress recently enacted legislation that, if followed, could result in a better chance to spend resources wisely. Likewise, DOD has recently begun to develop several initiatives, based in part on congressional direction and GAO recommendations that, if implemented properly, could also provide a foundation for establishing a well balanced investment strategy and sound, knowledge-based business cases for individual acquisition programs.

Legislation Could Have a Positive Impact on Acquisition Outcomes

Congress has enacted legislation that requires DOD to take certain actions which, if followed, could instill more discipline into the front-end of the acquisition process when key knowledge is gained and ultimately improve acquisition outcomes. For example, legislation enacted in 2006 and 2008 requires decision-makers to certify that specific levels of knowledge have been demonstrated at key decision points early in the acquisition process before programs can receive milestone approval for the technology development phase or the system development phase respectively. The 2006 legislation also requires programs to track unit cost growth against

their original baseline estimates—and not only their most recent estimates—and requires an additional assessment of the program if certain cost growth thresholds are reached. Other key legislation requires DOD to report on the department's strategies for balancing the allocation of funds and other resources among major defense acquisition programs, and to identify strategies for enhancing the role of program managers in carrying out acquisition programs.

Recent DOD Actions Provide Opportunities for Improvement

DOD has also initiated actions aimed at improving investment decisions and weapon system acquisition outcomes, based in part on congressional direction and GAO recommendations. Each of the initiatives is designed to enable more informed decisions by key department leaders well ahead of a program's start, decisions that provide a closer match between each program's requirements and the department's resources. For example:

- DOD is experimenting with a new concept decision review, different acquisition approaches according to expected fielding times, and panels to review weapon system configuration changes that could adversely affect program cost and schedule.
- DOD is also testing portfolio management approaches in selected capability areas to facilitate more strategic choices about how to allocate resources across programs and also testing the use of capital budgeting as a potential means to stabilize program funding.
- In September 2007, the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics issued a policy memorandum to ensure weapons acquisition programs were able to demonstrate key knowledge elements that could inform future development and budget decisions. This policy directed pending and future programs to include acquisition strategies and funding that provide for contractors to develop technically mature prototypes prior to initiating system development, with the hope of reducing technical risk, validating designs and cost estimates, evaluating manufacturing processes, and refining requirements.
- DOD also plans to implement new practices that reflect past GAO recommendations intended to provide program managers more incentives, support, and stability. The department acknowledges that any actions taken to improve accountability must be based on a foundation whereby program managers can launch and manage programs toward greater performance, rather than focusing on maintaining support and funding for individual programs. DOD acquisition leaders have told us that any

improvements to program managers' performance hinge on the success of these departmental initiatives.

- In addition, DOD has taken actions to strengthen the link between award and incentive fees with desired program outcomes, which has the potential to increase the accountability of DOD programs for fees paid and of contractors for results achieved.

If adopted and implemented properly these actions could provide a foundation for establishing sound, knowledge-based business cases for individual acquisition programs, and the means for executing those programs within established cost, schedule, and performance goals.

Concluding Observations on Achieving Successful and Lasting Reform

DOD understands what it needs to do at the strategic and at the program level to improve acquisition outcomes. The strategic vision of the current Under Secretary of Defense for Acquisition, Technology and Logistics acknowledges the need to create a high-performing, boundary-less organization—one that seeks out new ideas and new ways of doing business and is prepared to question requirements and traditional processes. Past efforts have had similar goals, yet we continue to find all too often that DOD's investment decisions are too service- and program-centric and that the military services overpromise capabilities and underestimate costs to capture the funding needed to start and sustain development programs. This acquisition environment has been characterized in many different ways. For example, some have described it as a "conspiracy of hope," in which industry is encouraged to propose unrealistic cost estimates, optimistic performance, and understated technical risks during the proposal process and DOD is encouraged to accept these proposals as the foundation for new programs. Either way, it is clear that DOD's implied definition of success is to attract funds for new programs and to keep funds for ongoing programs, no matter what the impact. DOD and the military services cannot continue to view success through this prism.

More legislation can be enacted and policies can be written, but until DOD begins making better choices that reflect joint capability needs and matches requirements with resources, the acquisition environment will continue to produce poor outcomes. It should not be necessary to take extraordinary steps to ensure needed capabilities are delivered to the warfighter on time and within costs. Executable programs should be the natural outgrowth of a disciplined, knowledge-based process. While DOD's current policy supports a knowledge-based, evolutionary approach to

acquiring new weapons, in practice decisions made on individual programs often sacrifice knowledge and realism in favor of revolutionary solutions. Meaningful and lasting reform will not be achieved until DOD changes the acquisition environment and the incentives that drive the behavior of DOD decision-makers, the military services, program managers, and the defense industry. Finally, no real reform can be achieved without a true partnership among all these players and the Congress.

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

Contacts and Staff Acknowledgements

For further questions about this statement, please contact Michael J. Sullivan at (202) 512-4841. Individuals making key contributions to this statement include Ron Schwenn, Assistant Director; Kenneth E. Patton, and Alyssa B. Weir.

Testimony of

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Co-Director of the Government Procurement Law Program

Addressing Cost Growth of Major Department of Defense Weapons Systems

Thursday, September 25, 2008

UNITED STATES SENATE
COMMITTEE ON HOMELAND SECURITY & GOVERNMENTAL AFFAIRS,
SUBCOMMITTEE ON FEDERAL FINANCIAL MANAGEMENT, GOVERNMENT
INFORMATION, FEDERAL SERVICES, AND INTERNATIONAL SECURITY

The final component of the trusted relationship between the military services and the established defense industry concerns the reaction to program failures. Few development projects meet all of the official requirements set out in the contract. Very often, the resulting equipment turns out to be very capable anyway.... But the acquisition bureaucracy ... asks the reasonable question, "did the project fail to reach its upfront goals for bad reasons (e.g., because the contractor did not try hard enough or because the contractor over-promised ... during the competitive development phase ...), or did the project fail because of real technical constraints despite the best efforts of talented, hard-working engineers?[1]

Chairman Carper and Ranking Member Coburn, and members of the Committee, I appreciate the opportunity to discuss why cost overruns and schedule delays increasingly bedevil the Defense Department's major systems.[2] I will attempt to explain some of the reasons for this not-unexpected outcome, offer a slightly different assessment of the importance of the problem, make two recommendations, and conclude with a discussion of two specific programs. Specifically, I recommend that DOD could achieve better results by: (1) more aggressively employing incentives and disincentives and (2) making a significant investment in human capital throughout the acquisition workforce, but particularly in the government's program management and systems integration capacity.

A Sobering Preface:
Risk Reduction and "Unknown Unknowns"

Major systems acquisitions are, by their very nature, challenging, complicated, and inherently risky. Specifically, it is overly optimistic to expect any institution to consistently advance the state of the art or employ significant, untested technological applications within firm

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[1] PETER DOMBROWSKI & EUGENE GHOLZ, BUYING MILITARY TRAN$FORMATION 25-26 (2006).

[2] I commend the Government Accountability Office (GAO) for its excellent and informative work on this issue. *Defense Acquisitions: Assessments of Selected Weapon Programs*, GAO-08-467SP (March 2008).

budgets or schedules. Thus, while cost and schedule control are tremendously important, they are not the only measure of success. Indeed, the procedural steps of major systems acquisition require reliance upon budgets and schedules that, objectively, range from the notional and aspirational to the speculative. In the end, however, once deployed, a superb weapon system may provide excellent value for money for a government customer even if it was delivered late and its total cost exceeded its original contract price. This is not to diminish the importance of cost or schedule control, but this point is critical.

In acquiring major systems, fundamental pathologies – ranging from the absence of market forces on the buyer (a government customer), an unwieldy annual appropriations cycle (untethered from principles of capital budgeting), and a diffusion of responsibility (exacerbated by the interplay of political, military, civil servant, and contractor actors/agents) – conspire to make accountability maddeningly difficult to achieve.

A common theme that permeates contractual relationships involving major systems is haste in the formation of the contract, accompanied by the unstated assumption, by both parties, that problems will be worked out during contractual performance. Nowhere is this more true than where a program entails an effort to advance the state of the art or embark upon a multi-decade endeavor that will deploy an entirely new technology or product. In the rush to commence the process, both the government and the contractor frequently kick certain cans down the street. Specifically, rather than attempt to minimize the number of "unknown unknowns,"[3] or aggressively reduce performance risk, the government chooses upon a course of action, selects a partner, and works out many critical details later. A popular Pentagon adage, attributed to General George S. Patton, is that "a good plan executed violently today is better than a perfect plan tomorrow." Because this practice is both understood and widely accepted, contractors willingly sign government contracts, despite the very real risk of catastrophic failure and monumental losses (and, of course, endless litigation). Experience teaches that the likelihood of catastrophic failure is *particularly* low for large-scale and/or long-term contracts involving major systems. As a general rule, because they are important, large government contracts are performed or successfully completed, not terminated, even if they may be late or over budget. The additional cost or time rarely justifies cancellation or starting over.

Potent institutional forces drive the government and the contractor to agree to contract pricing that subsequently proves unrealistic. Because DoD either will not or cannot pay for the

[3] This phrase, commonly used in major system acquisition, reflects the reality that, as projects grow in size and complexity, the parties, at the moment of contract inception, simply do not know (yet) what they do not know. The phrase often is ridiculed, yet it represents a significant concept. See, e.g. John Tierney, *Political Points*, N.Y. TIMES, Dec. 7, 2003, at 128, "[T]he Plain English Campaign, the British group that awards the Foot in Mouth to a 'truly baffling comment' by a public figure, [selected a] statement by ... secretary [Rumsfeld] during a briefing on Iraq: 'But there are also unknown unknowns -- the ones we don't know we don't know.' Granted, it's a tongue-twister[, b]ut ... it makes perfect sense. In fact, the problem of 'unknown unknowns' has been studied by economists, who call it 'radical uncertainty' and say it prevents consumers and businesses from making purely rational decisions."

necessary R&D needed for systems to mature, contractors must over-promise in terms of price, schedule, and ability to achieve specifications. Thus, contractors submit proposals for immature technologies and commit to long-term delivery schedules fully cognizant that both technology and the government's needs (and wants) are rapidly evolving. This, in turn, leads to cost overruns and calls into question GAO's use of DoD's "expected returns" as a meaningful benchmark.[4] Thus, as noted above, DoD's "expected returns," frankly, are not truly expected.

Similarly, estimated "program costs" and lifecycle costs are, at best, hypothetical. In retrospect, few government consumers judge the success of a weapons program by comparing its total cost to its original estimate. Not only are memories short, but history is replete with examples of programs that long have exceeded even the most expansive expectations for their lifetimes. Like the aging aerial refueling fleet, discussed below, the Air Force continues to operate B-52 Bombers, none of which have been in service for fewer than 45 years, and expects to continue to do so.[5]

While cost overruns wreak havoc upon budgetary estimates and dilute public confidence in the system, under the current regime they are unavoidable and must be tolerated. Frequently, the alternatives to cost overruns are limited and unattractive. The contract could be stopped, squandering the investment made to that point. The government could accept an end product less effective than what is otherwise available. Or the contractor could suffer a potentially devastating loss. Here I caution against the instinct to suggest that contractors alone should bear the risk of loss. The nature of the contractual relationship between the government and its contractors is intended not only to make the contractor whole, but also to permit the contractor to earn a profit on its work.[6] (If the government does not believe that the profit motive will

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[4] GAO-08-467SP at 6.

[5] Although "[a] total of 744 B-52s were built, ... the last, a B-52H, [was] delivered in October 1962. Only the H model is still in the Air Force inventory[.] Updated with modern technology the B-52 ... will continue into the 21st century as an important element of our nation's defenses. Current engineering analyses show the B-52's life span to extend beyond the year 2040." Air Force Link, http://www.af.mil/factsheets/factsheet.asp?fsID=83&page=2. But see, Anthony Murch, The Next Generation Bomber: Background, Oversight Issues, and Options for Congress, at 5 (March 7, 2008) (suggesting that "the Air Force's operational assessment is that the B-52 will not be survivable under the 2015-2020 threat picture, and ... it's effectiveness and utility could be limited....").

[6] "It is in the Government's interest to offer contractors opportunities for financial rewards sufficient to stimulate efficient contract performance... Both the Government and contractors should be concerned with profit as a motivator of efficient and effective contract performance. Negotiations aimed merely at reducing prices by reducing profit, without proper recognition of the function of profit, are not in the Government's interest. [E]xtremely low profits ... do not provide proper motivation for optimum contract performance." 48 C.F.R. § 15.404-4(a)(2), (3). See also Phil W. Bolin & James S. O'Brasky, *Defense Acquisition Needs to Change Course*, PROGRAM MANAGER, Mar.-Apr. 2001, at 10, 19 (The primary motive of the defense industrial base is profit. "This is not a criticism ... but recognition of a basic fact....").

produce the best possible result, it should consider state-run enterprise. I do not advocate this approach.)

Because life is full of uncertainties, one of the defining traits of government contracts is the frequency with which they are modified or changed during contractual performance. Standard government contracts, and specifically large, complicated, long-term agreements, are defined by their ability to address anticipated and unanticipated contingencies.[7] Standardized contract clauses allocate – between the parties – the risk of frequently anticipated contingencies.[8] The hallmark of these remedy-granting clauses is their methodical endeavor to control contingencies by (1) demanding that contractors not pad their bids or offers (or, in effect, insulate themselves) when competing for government business[9] and (2) reassuring those contractors that the government will equitably adjust contracts to reimburse for unforseen contingencies.[10] In other words, *in exchange for the contractor's willingness not to inflate its initial contract price to insulate itself against certain risks (or contingencies), the Government agrees to make the contractor whole if and when such contingencies occur.*

Later, when unanticipated contingencies arise that require the contractor to incur additional costs, the contracting officer and the contractor can agree upon compensation.[11] This,

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[7] A contingency is: "a possible future event or condition arising from presently known or unknown causes, the outcome of which is indeterminable at the present time." 48 C.F.R. § 31.205-7(a).

[8] See, e.g., the Changes clause, 48 C.F.R. § 52.243-1; the Termination for Convenience clause, 48 C.F.R. § 52.249-2; the Differing Site Conditions clause, 48 C.F.R. § 52.236-2; and, *inter alia*, the Government Furnished Property clause, 48 C.F.R. § 52.245-2(a)(3), (4) (in anticipation of potentially defective, or late delivery of, government furnished property). See, also, Foster Construction C.A. v. United States, 435 F.2d 873, 887 (Ct. Cl. 1970) ("long-standing, deliberately adopted procurement policy" that bidders "need not consider how large a contingency should be added to the bid to cover the risk."); Richard J. Kendall, *Changed Conditions As Misrepresentations in Government Construction Contracts*, 35 GEO. WASH. L. REV. 978, 979-82 (1967); Joshua I. Schwartz, *Liability for Sovereign Acts: Congruence and Exceptionalism in Government Contracts Law*, 64 GEO. WASH. L. REV. 633, 695-97 (1996).

[9] Contingencies "that may arise from presently known or unknown conditions, the effect of which cannot be measured so precisely as to provide equitable results to the contractor and to the Government . . . are to be excluded from cost estimates . . . but should be disclosed separately . . . to facilitate the negotiation of appropriate contractual coverage." 48 C.F.R. § 31.205-7(c)(2).

[10] See generally, Ralph C. Nash, Jr., *Risk Allocation in Government Contracts*, 34 GEO. WASH. L. REV. 693, 698-99 (1966) ("terms and conditions . . . attempt . . . to define the remedies ... for most foreseeable contingencies that may occur. . . Little is left to the workings of the common law of contracts since these standard terms and conditions represent a relatively thorough statement of intended risk allocation.").

[11] The parties can modify the contract. 48 C.F.R. § 43.103(a). If that fails, the contractor can file a claim and ultimately sue. 48 C.F.R. §§ 33.2, 33.206, 52.233-1; 41 U.S.C. §

(continued...)

of course, tends to increase the original contract price or, in other words, result in an overrun. But, remember, the alternative was for the government to have agreed to a higher contract price at the outset.

Simple Solution, Difficult Implementation

Accordingly, if cost control and schedule discipline are important, better results can be achieved by (1) slowing down the process, (2) breaking down programs into more clearly defined stages or, in other words, distinguishing between basic research, demonstration and validation of a concept, prototyping or low rate initial production, and, only later, full-scale production; and (3) imposing discipline (or gates) ensuring that programs do not progress to subsequent stages until technological and design issues have been resolved. GAO correctly points out that: "A knowledge-based acquisition approach can lead to better outcomes." Indeed, the most important prerequisite to better cost and schedule results on major systems is mandating the existence of "mature technologies, stable design, and mature production processes" before commencing. That's true, but it's not easy.

GAO is correct to suggest that, before DOD bets the farm on a technological solution, "the technologies needed to meet essential product requirements [should] have been [proven] to work in their intended environment." But fully 88 percent of the programs studied ""fell short of achieving [this] knowledge point[.]" Further, "[k]nowing that a product's design is stable before system demonstration reduces the risk of costly design changes occurring during the manufacturing of production representative prototypes—when investments in acquisitions become more significant." Yet, in at least one out of every three major programs studied, DOD encouraged its contractors to commence the manufacturing process before design was complete. DOD "continu[es] to develop weapons system in a highly concurrent environment, which forces acquisition programs to manage technology, design, and manufacturing risks at the same time and [thus, unavoidably] can lead to waste from costly rework." To exacerbate this problem, "[r]ather than seeking to reduce risk early in programs, DOD's common practice ... has been to create aggressive risk mitigation plans in its programs after poor investment decisions have been made."[12]

Unfortunately, the government (often, appropriately) neither wants to pay for necessary research to reach that stage, nor does it enjoy the patience to mandate demonstration and validation.[13] That's why we rarely see fully functional prototypes – think "fly before your buy,"

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611.

[12] GAO-08-467SP at 15-22.

[13] GAO-08-467SP at 12, et seq. "Schedule elongation on a research and development (R&D) project that is composed almost entirely of the technology development core team is relatively inexpensive compared to holding up a large program, burdened with sizable overhead and product teams unrelated to the emerging technology." Dennis K. Van Gemert and Martin Wartenberg, *Lessons Learned in Acquisition Management*, 45 DEFENSE

(continued...)

or, even better, competitive prototypes – before major system production contracts begin. Dramatic cultural change would be required to generate the necessary funds and patience to complete research and development before production. And it may not be worth it.

The private sector model only takes us so far. Whether viewed through a business or an economics lens, the fundamental rationale for why institutions invest capital in innovation – which depends upon the profit motive – does not translate well to major defense systems.

> [B]usiness choices to invest in military innovation ... are channeled by military and political forces rather than directly responding to traditional financial calculations. ... When firms are spending the government's [R&D] money rather than their own, the profit motive does not provide the traditional incentive to innovate....
>
> [D]efense firms hesitate to spend their own money (profits) on R&D investment ... [because they] cannot hope to earn very high profits from production ... because the government buyers impose profit caps.... Even more important, the military customers' interest in controlling the characteristics of the weapons that they buy often leads them to reject systems proffered by contractors when government-determined requirements did not define the original product specifications.[14]

Here, GAO's report fails to grapple with a root cause of many of these problems. Increasingly, for a host of reasons, the government is neither patient enough to demand, nor willing to pay the appropriate costs of the research and development necessary to achieve, the kind of knowledge-based acquisition the GAO's report envisions. Accordingly, contractors must enter major systems contracts or programs willing to invest and lose money – often staggering sums of money – on bid and proposal costs, R&D, and, typically, low rate initial production – all in the hope of someday recouping their return on investment during full-scale production and, increasingly, foreign military sales. That's high stakes poker.

Meaningful Incentives and Disincentives

> *Before the ... business/acquisition model can change, the DoD and Congress must shift from a posture of "maximum risk avoidance" to an objective of "effective and efficient acquisition risk management."*[15]

(...continued)
ACQUISITION REVIEW JOURNAL 133 (September 2007).

[14] DOMBROWSKI & GHOLZ, at 20-21.

[15] Report of the Defense Science Board Task Force on Defense Industrial Structure for Transformation, *Creating an Effective National Security Industrial Base for the 21st Century: An Action Plan to Address the Coming Crisis*, at 50 (July 2008), http://www.acq.osd.mil/dsb/reports/2008-07-DIST.pdf.

Both the military and the public would be ill served if Congress paralyzed the acquisition system in the name of cost and schedule discipline. Accordingly, DOD may find that injecting meaningful incentives and disincentives into the process can help achieve better results. Two quick examples may illustrate the point.

I happened to be in Minneapolis last week, when, with much fanfare, the Minnesota Department of Transportation opened the new, high-tech, span replacing the I-35 bridge that collapsed on August 1, 2007. The Minnesota DOT awarded the contract – worth more than $230 million – with a firm deadline, but employed significant incentives and disincentives. While disincentives, in the form of liquidated damages, are quite common in the construction industry, the Minnesota DOT successfully employed incentives: specifically, a $200,000-a-day "bonus" for every day that the contractor completed the project early. By delivering a completed bridge months before the established deadline, the contractor reaped a bonus in the $20 million range.[16]

On a larger scale, the Department of Energy employed extremely lucrative incentives when faced with the cleanup of the Rocky Flats Environmental Technology Site, a project that many perceived as not only difficult, but unlikely to be accomplished at all.

> DOE and Kaiser-Hill successfully partnered in a 10-year effort to complete the largest, most complex environmental cleanup project in United States history and converted an environmental liability into a community asset, completing the project nearly fifty years and $30 billion below initial estimates. ... A key element in the successful project was a unique, incentive-driven contract between DOE and Kaiser-Hill that rewarded schedule and cost savings while maintaining outstanding safety and protection of human health and the environment.[17]

Kaiser Hill completed the $3.96 billion contract for approximately $3.44 billion, and attributes much of its success to a profit sharing regime through which it "tied individual rewards to organizational success. Over 20% ($100 million) of KH's incentive fee was used to motivate employees to work safer, faster and smarter."[18] To be clear, this approach made a number of contractors very wealthy. But it is difficult to find a more satisfied government customer.

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[16] 35W Bridge Design-build Project, http://www.dot.state.mn.us/designbuild/35wbrproject.html. As an aside, the bridge design-build contract was competed in an admirably transparent manner, employing a best value, rather than low price approach. The successful contractor proposed the highest price of the four offerors, but also received the highest technical proposal score.

[17] U.S. Department of Energy, DOE's Rocky Flats Cleanup Site Named 2006 Project of the Year By Project Management Institute (October 23, 2006) http://www.energy.gov/news/4398.htm.

[18] 2007 Nova Award Nomination, Rocky Flats Closure Project, http://www.cif.org/nom2007/nom-2007-13.pdf.

Thus, it is imperative to remember that, for many major systems, cost and schedule are not the only measures, nor are they often the most important metric. For example, incentives and disincentives may more effectively be employed for critical performance specifications. For a developmental aircraft program, depending upon its purpose, delays in schedule or increases in price may be justified to maintain or even increase performance in terms of speed, range, capacity, take-off speed, maneuverability, etc. Of course, the permutations for applying incentives and disincentives are endless.

Modern era revisions to the DOD's profit policy, expressed through its Weighted Guidelines approach, have generated greater flexibility in this regard. The DOD Federal Acquisition Regulation Supplement (DFARS) offer two somewhat recent opportunities to exploit this approach – a technology incentive and a cost efficiency factor.[19]

Unfortunately, any effort to aggressively employ profit policy is challenging in federal procurement. A host of well-intentioned participants believe they are serving the public good by artificially suppressing contractor profits or, as they see it, controlling excessive profits.[20] In the end, the weighted guidelines and the government's profit policy serve not to maximize, but to limit, the utility of profit as a motivational tool. So long as this instinct prevails in political Washington, market-based incentives and disincentives cannot serve as the primary tool for government to maximize the value it receives for the taxpayers' dollars.

Program Management and the Acquisition Workforce

GAO appropriately focuses upon the government's human capital crisis and its impact on these issues.[21] In previous testimony before this Committee, I advocated that the government acquisition or contracting workforce – understaffed, under-resourced, and under-appreciated – desperately requires a dramatic recapitalization. No investment could have a greater impact on

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[19] While the "normal value" for standard technological risk, which reflects "the technical uncertainties of performance," is in the five percent range, the technology incentive increases the "normal value" to nine percent. "For the technical factor only, contracting officers may use the technology incentive range for acquisitions that include development, production, or application of innovative new technologies." 48 C.F.R. § 215.404-71-2(c)(2). In addition, the "special [cost efficiency] factor provides an incentive for contractors to reduce costs. To the extent that the contractor can demonstrate cost reduction efforts that benefit the pending contract, the contracting officer may increase the prenegotiation profit objective by an amount not to exceed 4 percent of total objective cost ... to recognize these efforts...." 48 C.F.R. § 215.404-71-5(a). See also, See also, Alan S. Gilbreth and Sylvester Hubbard, *How to Make Incentive and Award Feeds Work*, 48 DEFENSE ACQUISITION REVIEW JOURNAL 133 (July 2008).

[20] William E. Kovacic and Steven L. Schooner, *A Modest Proposal to Enhance Civil/Military Integration: Rethinking the Renegotiation Regime as a Regulatory Mechanism To Decriminalize Cost, Pricing, and Profit Policy* (1999 Defense Systems Management College Acquisition Research Symposium, June 21-23, 1999), available at http://ssrn.com/abstract=86998.

[21] GAO-08-467SP at 29 et seq.

injecting fiscal responsibility into an annual investment exceeding $400 billion. While this topic is too broad to be addressed at length here, three points are critical: (1) at a macro level, the acquisition workforce crisis is significant and pervasive, and it will adversely impact government procurement for the foreseeable future; (2) more specifically, the government under-invests in program management expertise; and (3) the government under-invests in systems integration capacity.

The Congressionally created Acquisition Advisory Panel found that: "The federal government does not have the capacity in its current acquisition workforce necessary to meet the demands that have been placed on it."[22] The government has not sufficiently invested in its acquisition workforce since the 1980's, precipitating a crisis even before the massive post-2000 increase in federal procurement spending. GAO's report provides more evidence of the extent of the hollowing out of critical program management offices.

> DOD relies heavily on contractors to perform roles that have in the past been performed by government employees. For programs [GAO] assessed, 48 percent [or nearly half] of their staff was made up of individuals outside of the government; performing engineering, business, and supporting program management related roles. [GAO concluded that:] These data raise questions about whether DOD has the appropriate mix of staff and capabilities within its workforce to effectively manage programs.[23]

Nowhere is it more evident that DOD lacks appropriate staffing than in its increasing inadequacy of post-award contract management resources. Ultimately, a program – in operation – depends upon a series of contractual arrangements. And no matter how sound the terms of a written contract may be, the outcome depends upon how the government customer and the contractor manage their relationship and ensure that the customer receives value for money.

> Contract management is the essential post-award contracting function to ensure mission accomplishment, and it is an important control over fraud,

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[22] Acquisition Advisory Panel Final Report at 361, available at *www.acquisition.gov/comp/aap/finalaapreport.html.* Agencies have failed to perform systematic human capital planning to assess their acquisition workforce, either in the present or with an eye towards the future. Also, "[w]hile the private sector invests substantially in a corps of highly sophisticated, credentialed and trained business managers to accomplish sourcing, procurement and management of functions, the government does not make comparable investments." See, also, Steven L. Schooner & Daniel S. Greenspahn, *Too Dependent on Contractors? Minimum Standards for Responsible Governance*, 6 J. OF CONT. MGMT 9 (Summer 2008), http://ssrn.com/abstract=1263358; the Professional Services Council (PSC) and Grant Thornton's Troubling Trends survey, *Acquisition Workforce Top Concern for Federal Managers, Survey Says, www.pscouncil.org/pdfs/2006PSCProcurementPolicySurvey.pdf*; Steven L. Schooner, *Feature Comment – Empty Promise for the Acquisition Workforce*, 47 GOV'T CONTRACTOR ¶ 203 (May 4, 2005), *http://ssrn.com/abstract=719685.*

[23] GAO-08-467SP at 5-6.

> waste, and abuse.... With not enough [administrative contracting officers], [purchasing or procuring contracting officers] could do this - but they are too busy and ***therefore it is not being done***....[24]

Leadership is also tremendously important, and a popular perception is that a visionary, a single uniquely talented or particularly dynamic individual, is critical to the success of any major program. In addition, GAO is correct in suggesting that the government (military or civil service, let alone at the political level) might obtain better results by "making it clear who is responsible for what and holding people accountable when responsibilities are not fulfilled." [25] But, here, the differences between the government and private sector model are stark. Private industry not only employs significant monetary incentives, but it provides key personnel with stability. Among the uniformed ranks, stability is anathema, as frequent rotation and diversity of assignments (but almost always including command) are necessary for promotion.

In addition, despite their importance to successful major system acquisition, inadequate systems integration resources remain with DOD.

> Systems integrators analyze alternatives, make necessary tradeoffs between cost and performance, and sequence decisions so that early architectural choices do not limit the future expansion and adaptation of the system or systems.
>
> Responsibility for integration ... is not easy to find ... [within DOD].... In-house capabilities for full-scale systems-of-systems integration have been weakened by years of cutbacks and retirements. Even more disheartening, systems integration ... is poorly understood.... [F]ew program managers have the resources, technical know-how, authority, and organizational clout to ensure that sound decisions about system-design tradeoffs are made.[26]

I encourage the Committee to examine the recent Defense Science Board report on the National Security Industrial Base. One of its primary findings was that: "A weakened DoD acquisition workforce impedes the acquisition of military capability and government oversight[.]" The expert group emphasized the shortages in the essential skills of systems engineering and program management. Not surprisingly, the Report recommended that DoD

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[24] Commission on Army Acquisition and Program Management in Expeditionary Operations, "Urgent Reform Required: Army Expeditionary Contracting," October 31, 2007, available at www.army.mil/docs/Gansler_Commission_Report_Final_071031.pdf (emphasis added).

[25] GAO-08-467SP at 28. Although policy and practice envision a scenario in which the program manager is the single point of program accountability, "program managers may now have fewer resources to manage their programs as they spend much of their time and budgets managing the bureaucracy." John T. Dillard, *Toward Centralized Control of Defense Acquisition Programs*, 40 DEFENSE ACQUISITION REVIEW JOURNAL 133 (August 2005).

[26] DOMBROWSKI & GHOLZ, at 143-44.

"[m]ove aggressively to strengthen the future, high-quality, high-skill, Government Acquisition Workforce."

> The Department should also strengthen the management of programs, systems engineering, production and logistics support -- all inherently governmental mangement positions requiring high skills and experience. Industry-to-government and government-to-industry rotations should also be encouraged. Lost acquisition general officer positions should be introduced as incentives for military acquisition careers. **In this new security environment, the acquisition management challenges are far greater and the government must have the top people, with the necessary training and authority, to achieve success.**[27]

Two Anecdotes

Despite the bad news presented, GAO attempts to suggest that there is reason for optimism.[28] If your interest in major systems is how they perform in terms of cost and schedule discipline, I do not share that optimism. Let me conclude with two anecdotes (or harbingers); one addressed by the report, and one of which is related to, but technically outside the scope of the report.

Future Combat System

The Future Combat System (FCS), discussed in GAO's report,[29] merits attention because it previously proceeded pursuant to the artfully-named "other transactions authority."

> The FCS program is managed by a lead systems integrator group.... *Although widely criticized, the Army adopted this program management approach largely because it did not have enough acquisition, scientific, and engineering staff to manage a program of this complexity and scope.* ... [U]se of an Other Transaction Authority (OTA) agreement in lieu of a more structured Federal Acquisition Regulation (FAR) contract raised a number of concerns regarding program oversight and protecting the taxpayer's interests. Partly due to Congressional pressure, the Army recently decided to change from an OTA to a more traditional contract, although specific details at this point are few.[30]

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[27] Defense Science Board at 10, 42-44.

[28] GAO-08-467SP at 6.

[29] GAO-08-467SP at 89-90.

[30] Andrew Feickert, *The Army's Future Combat System (FCS): Background and Issues for Congress*, Congressional Research Service (April 28, 2005) (emphasis added), http://www.ndu.edu/library/docs/crs/crs_rl32888_28apr05.pdf ("FCS entered the [System Development and Demonstration] SDD phase in May 2003 despite GAO warnings ... [of] 'more

(continued...)

The "other" in OTA meant that – although the transaction was an acquisition (in that the government planned to acquire goods and services in exchange for billions of appropriated funds) and the vehicle for doing so was a contract (a bargain in which the government exchanges money for value) – the agency could do so outside of the Congressionally-mandated acquisition regime and, more specifically, the Federal Acquisition Regulation (FAR). Thus, OTAs, as a general rule, are neither transparent nor well regulated, nor are they designed with an eye towards damage control if things go awry. Accordingly, I commend those that caused the FCS to transition from an OTA to a legitimate vehicle, and I encourage the Congress to aggressively limit OTA authority in the future.

But the FCS is also an important anecdote because it demonstrates the limits on the primary programmatic metrics at issue today: cost and schedule. FCS is an ambitious, far-reaching program that:

> consists of an integrated family of advanced, networked combat and sustainment systems; unmanned ground and air vehicles; and unattended sensors and munitions intended to equip the Army's new transformational modular combat brigades. Within a system-of-systems architecture, FCS features 14 major systems and other enabling systems along with an overarching network for information superiority and survivability.

The Army, which touts FCS as the "cornerstone of Army Modernization" explains that:

> FCS is not just a technology development program - it is the development of new Brigade Combat Teams - these new brigades, with more infantry, better equipment, unmatched situational awareness and communications allowing complete domination in asymmetric ground warfare while allowing the Army to build a force that can sustain itself in remote areas.[31]

At some point, we must concede that, particularly for evolutionary technologies, cost and schedule estimates spanning more than five, and as many as a dozen years, are more likely to experience change than remain static or true to expectation. For example, GAO notes that:

(...continued)
risk than recommended by best practices or DOD guidance.'"). See also, generally, 10 U.S.C. § 2371, 10 U.S.C. § 845, and 42 U.S.C. § 7256; GAO-05-442T, *Future Combat Systems Challenges and Prospects for Success* (March 2005), at 10. See also, Renae Merle, *McCain, Auditors Question Army Modernization Effort.*, WASH. POST, May 17, 2005, at E2; Renae Merle, *Hearings Focus on $100 Billion Army Plan*, WASH. POST, May 15, 2005, at E10.; Renae Merle, *McCain, Army Will Restructure Modernization Contract*, WASH. POST, April 6, 2005, at E2; Tom Bowman, *Army to Restructure $20.9 Billion Contract for Future Combat System*, BALTIMORE SUN, April 6, 2005, 5A.

[31] See, e.g., https://www.fcs.army.mil/.

"Only 2 of the program's 44 technologies are fully mature and 30 are nearing full maturity. ... All critical technologies may not be fully mature until the Army's production decision in February 2013...." But – and this is a breath of fresh air – all parties involved concede the ultimate end product will not fulfill all of the Army's aspirations. GAO explains that:

> The Army's FCS development cost estimate depends on a number of assumptions. *Historically, programs using such assumptions tend to underestimate costs.* Program officials stated they will not spend more in development than the current value of the FCS development contract. Any projected cost overruns would be eliminated by deleting requirements, forcing the user to forego certain capabilities.

Thus, FCS is a rare example where DOD concedes that it is a work in progress. Within the monetary constraints imposed, the Army will prioritize which projects to continue pursuing, and which to jettison. In other words, the FCS could be described as the Army's funding vehicle for a broad range of pursuits of technological advances that the Army hopes to integrate into its fighting brigades. Rather than treat these individual pursuits – most of which lack the technological maturity to produce accurate cost and schedule projections – as unique programs, the Army has concatenated the initiatives into a massive enterprise.

> CBO reports that "the costs from 2006 through 2020 to develop and purchase the first increment, which would equip 15 — or about one-third — of the active Army's combat brigades, could approach $90 billion." This... would make FCS the largest and most expensive program in Army history. Others suggest that FCS research and development and procurement costs through 2022 could run as high as $157 billion.... [32]

All of which returns to the difficult question of how Congress can provide sufficient funds to modernize the Army so that it enjoys battlefield superiority and ensure that the funds are spent efficiently.

Aerial Refueling

I offer this final anecdote to return the focus to the ultimate goal of major systems acquisition: providing the end user with the essential tools necessary to perform that individual's or organization's role in furtherance of the agency's Congressionally-mandated mission. In that context, Congress should, first and foremost, judge the military agencies on their ability to work with finite budgets, prioritize amongst competing demands, and effectively field appropriate weapons (and support) systems.

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[32] Feickert, *Future Combat System (FCS), supra*, nothing that: "Program delays could further add to total program costs, with GAO suggesting that a one year delay late in the FCS development cycle could cost over $3 billion."

The Air Force, dating at least back to 2001, articulated that the monumental task of replacing its aging in-flight refueling capacity[33] was one of its highest priorities. Yet, as of today, no progress has been made towards doing so. Rather, the program has provided a relentless cascade of bad news and embarrassment. The initial lease deal was ill-conceived, intentionally eschewed the benefits of market competition, and, ultimately, was derailed,[34] limping along until, with the prior presidential election looming, it was put to rest.[35] The tanker-lease deal's primary by-product was the scandal that rocked the defense acquisition community.[36]

The subsequent competition suggested an inability to manage a high-profile, high-stakes procurement consistent with procurement laws, regulations, and norms. The Air Force issued a Request for Proposals ("RFP") on January 30, 2007, then awarded a contract to Northrop Grumman on February 29, 2008. Boeing promptly protested the award, and, for a host of reasons, on June 18, 2008, the Government Accountability Office ("GAO") sustained Boeing's protest.[37] The Defense Department intervened in an attempt to accelerate a re-competition, but this, too, resulted in cancellation earlier this month. Defense Secretary Robert

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[33] The fleet of 480+ tankers ranges in age from 43 to more than 50 years of service. "The KC-135 Stratotanker provides the [Air Force's] core aerial refueling capability. ... The first aircraft flew in August 1956 and the initial production Stratotanker was delivered ... in June 1957. The last KC-135 was delivered to the Air Force in 1965." Air Force Link, http://www.af.mil/factsheets/factsheet.asp?fsID=110.

[34] In December 2001, "Congress approve[d] a defense bill allowing the Air Force to spend $20 billion . . . to lease 100 modified 767 Boeing jetliners as refueling tankers." Andy Pasztor, Jonathan Karp & J. Lynn Lunsford, *Rumsfeld Stalls Air-Tanker Deal With Boeing as Criticism Builds*, WALL ST. J., May 26, 2004 , at A3. The tanker fleet was meant to replace "a tanker fleet that dates from the Vietnam War." Douglas Jehl, *Air Force Pursued Boeing Deal Despite Concerns of Rumsfeld*, N.Y. TIMES, Dec. 6, 2003, at A1.

[35] Leslie Wayne, *Documents Show Extent of Lobbying by Boeing*, N.Y. TIMES, Sept. 3, 2003, at C1; Douglas Jehl, *Air Force Pursued Boeing Deal Despite Concerns of Rumsfeld*, N.Y. TIMES, Dec. 6, 2003, at A1; Leslie Wayne, *Boeing Must Compete for Tanker Contract*, N.Y. TIMES, Sept. 3, 2003, at C2; Andy Pasztor, Jonathan Karp & J. Lynn Lunsford, *Rumsfeld Stalls Air-Tanker Deal With Boeing as Criticism Builds*, WALL ST. J., May 26, 2004 , at A3.

[36] The former principal deputy assistant Air Force secretary, Darlene Druyan, went to prison after admitting to engaging in the improper conduct that led to the contract being originally awarded to Boeing. Andy Pasztor & Jonathan Karp, *Career Crash: How an Air Force Official's Help for a Daughter Led to Disgrace*, WALL ST. J., Dec. 9, 2004, at A1. See also Defense Science Board, *Management Oversight in Acquisition Organizations* (March 2005), *available at* http://www.acq.osd.mil/dsb/reports/2005-03-MOAO_Report_Final.pdf.

[37] The Boeing Company, B-311344, June 18, 2008 (Comp. Gen.); Press Release, Office of Comp.Gen. of the U.S., GAO Sustains Boeing Bid Protest (June 18, 2008), available at http://www.gao.gov/press/press-boeing2008jun18_3.pdf; Dana Hedgpeth & Robert O'Harrow Jr., *Air Force Faulted Over Handling of Tanker Deal*, WASH. POST, June 19, 2008, A1.

Gates bemoaned that: "we can no longer complete a competition that would be viewed as fair and objective in this highly charged environment[.]"[38]

Looking back over nearly seven years, the tanker lease/procurement saga has:

- cost private industry (and, ultimately, private shareholders) staggering sums in proposal preparation costs, plus legal, lobbying, and public relations fees;
- generated one of the most dramatic procurement scandals of the modern era;
- brought into question the fundamental competence of what, until recently, was perceived as one of the government's leading procurement agencies;
- exposed the relentless protectionist pressures that hamper the procurement system;[39]
- diluted public confidence in the procurement system;
- proven extremely lucrative for the private bar, lobbying firms, and public relations and advertising firms; and
- achieved nothing in terms of meeting the warfighters' needs for restoring the Air Force's in-flight refueling capacity.

Obviously, room for improvement remains.

Conclusion

That concludes my statement. Thank you for the opportunity to share these thoughts with you. I would be pleased to answer any questions.

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[38] August Cole & J. Lynn Lunsford, *Boeing Considers Bailing out of Tanker Bid*, WALL ST. J., Aug. 22, 2008, at B1; August Cole & J. Lynn Lunsford, *Boeing Gets Reprieve in Fuel-Tanker Contest*, WALL ST. J., Sept. 11, 2008, at B1.

[39] Defense Science Board Task Force on Defense Industrial Structure for Transformation, at 17. The Report notes existing isolationist and protectionist constraints: "Despite globalization, U.S. policy continues to not allow the nation to gain the security and economic benefits that could be realized; instead focusing on 'Buy American;' the Berry Amendment, obsolete International Traffic in Arms Regulations (ITAR) and export controls; and restrictions on foreign scholars, students and [science and technology] workers; all of which limit flexibility in acquisition options and cost savings."

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Statement on Addressing DoD's Systemic Acquisition Failures

Senate Committee on Homeland Security and Governmental Affairs
Subcommittee on Federal Financial Management, Government Information, Federal Services and International Security

September 25, 2008

Mr. Chairman, I commend the Subcommittee for addressing the systemic crisis in how the Department of Defense acquires major weapons systems. I also commend the GAO for its substantial and superb analysis of this vexing problem over the past decade, because it has been instrumental in documenting that the persistent and growing failures in defense acquisition have reached crisis proportions. Adding to the urgency is the prospect of an era of flat, if not declining, defense budgets which ensures that the true cost of a poorly performing acquisition system will be military capabilities that the nation needs but DoD can not afford. I thank the Subcommittee for the opportunity to express my views on why so many DoD weapons programs experience cost overruns, schedule delays and, in some cases, performance shortfalls and to suggest some potential legislative solutions.

Nature of the Problem (briefly stated)

Defense Department acquisition processes cannot be examined in isolation from the "front-end" capability requirements determination process that addresses the issue of what to acquire, and the "back-end" resource allocation process that provides funding for acquisition programs. Instability in how requirements are defined, often referred to as "requirements creep," and in how programs are funded undeniably make it difficult, and sometimes impossible, for acquisition program managers to make trade-offs among performance, cost and schedule.

That having been said, the defense acquisition system is incredibly complex, process-centric and risk-averse. The Defense Science Board Task Board charged with assessing the implications of the illegal actions of the former Air Force Principal Deputy Assistant Secretary Darleen Druyun concluded that today's acquisition process was "an extremely complex system requiring many inputs from many organizations with many people who can say 'no" but few who can say 'yes.'" In fact, the "diffusion of authority" was so great that it "enables those who master the system to gain power" and to abuse it, despite the "excessive amount of resources...devoted to thwarting or uncovering relatively rare cases of fraud and abuse."[1] Ironically, the very complexity of the process enabled the very thing it was intended to prevent: the abuse of power by a corrupt official.

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[1] *Report of the Defense Science Board Task Force on Management Oversight in Acquisition Organizations* (March 2005), Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, p. 3.

Exacerbating the effects of too much bureaucracy is the widespread loss of competency in DoD's acquisition workforce, which has been reflected in an increased dependency on contractors for staffing (e.g., contractors comprise about two thirds of OSD-AT&L's 1,500 personnel) and acquisition program management (see the rise and, hopefully, the fall of the Lead Systems Integrator). As the number of major defense acquisition programs has declined in the post-Cold War era, an increased rate of protests by losers in the competition is to be expected since the stakes for each competition are higher. However, the higher rate of successful protests suggests the DoD is the "gang that couldn't shoot straight" with the most vivid example being Boeing's successful protest of the Air Force's decision on the replacement to the KC-135 tanker. If there was ever a source selection process that DoD had to get right, it was this one. Nevertheless, GAO's upholding of the decision was a "slam dunk."

The underlying incentive structure for defense acquisition is profoundly dysfunctional. "Structural optimism" is the euphemism given to a system that causes all the actors to "lie" by over-promising (with respect to performance and technological maturity) and under-estimating (with respect to cost and schedule) in order to get their program's "nose into the tent." The lack of realism – "faster, better, cheaper" is an unachievable oxymoron in defense acquisition – and the lack of accountability is pervasive. The repeated failure of previous reforms efforts underscores the enduring strength of this dysfunctional incentive structure. An experienced participant-observer once stated in Pogo-like fashion: "We have the acquisition system we want and we deserve."

The Goal (briefly stated)

- A defense acquisition process characterized by accountability and realism:
  - Accountability of institutions, decision makers and program managers
  - Realism in cost, schedule and performance goals
    - Based on realistic assessments of technological maturity
    - Enables competent and informed management of risk
  - Proposed initiatives to be implemented via both DoD directives and legislative action
    - Greater transparency to Congressional oversight needed to promote accountability in DoD

Predicated on the Following Assumptions about "Big A" Processes

In a previous report on defense reform, I stated plainly: "*only the Combatant Commanders have operational requirements; joint capability requirements, both near- and far-term, must drive DoD resource allocation and acquisition policies and decisions.*"[2] Although the U.S. military fights as a joint team, the Military Services still have great influence over the decisions over what to buy for that joint team, in part because of their Title 10 "force provider" responsibilities to "organize, train and equip"

[2] Clark A. Murdock and Michele A. Flournoy (July 2005), *Beyond Goldwater-Nichols: U.S. Government and Defense Reform for a New Strategic Era Phase 2 Report*, Washington, DC (CSIS), p. 78.

forces and in part because of the centrality of their role in DoD resource allocation process (the DoD budget is comprised of program submissions from the force providers). While it is true that the Office of the Secretary of Defense (OSD) provides front-end guidance to Program Objective Memorandums (POMs) submitted by the Military Services, defense agencies and Special Operations Command (SOCOM), it is usually provided too late in the process and is cost-unconstrained.[3] Nevertheless, significant progress has been made during the Bush Administration in strengthening the joint perspective in defining military requirements. While the Joint Staff-installed (in 2003) Joint Capabilities Integration and Development System (JCIDS) is very labor-intensive and needs to be streamlined, the role of the Combatant Commands (COCOMs) has been enhanced in a process that "validates" only joint (and no longer Service) capability needs statements which is required for any major acquisition program. My "Back-to-the-Future" recommendation that responsibility for managing and executing be returned to the Service Chiefs assumes that the recent trend towards greater jointness in defining capability requirements continues. This will reduce the risk of a return to the pre-Goldwater-Nichols, pre-Packard Commission days when the Military Services acquired capabilities that met their own parochial visions for how they want to operate, rather than meet the joint capability requirements of the COCOMs. However, it is my judgment that the need to fix defense acquisition is so urgent that it cannot wait until jointness dominates the requirements generation process to same degree it does in the operational realm.

DoD's appetite for acquisition programs has always exceeded its budget – a former senior-level official in the comptroller's office once told me that "his job was to cram as much program as possible into the budget" – because the Pentagon's strategy for getting more dollars from Congress was not served by killing inadequately-funded program (another dysfunctional incentive). The lack of discipline in DoD resource allocation appears to be growing, in part because DoD has been using wartime supplementals to fund acquisition programs that would normally be part of the baseline budget (e.g., over 40% of the Army's peacetime budget is now funded through supplementals). Defense budget expert Steve Koziak from the Center for Strategic and Budgetary Assessments recently stated that it would take $30 billion more per year (assuming costs goals are met) over the next the five years (bringing the base budget to $560 billion per year in 2009 dollars) and then sustained at that level to 2025 to fully fund the current defense plan.[4] Under Secretary for Defense (AT&L) stated last August he wanted to "properly price programs" (since underfunded programs are "walking wounded and waiting to be cost-growth problems and failures") and was encouraging program managers to submit fully funded budget requests since he was prepared for a FY2010 POM process that would "create budget pressures to squeeze programs out of the budget."[5] While I applaud (and endorse) Secretary Young's call for a fully-funded DoD acquisition program, the defense budget crisis facing the next Secretary of Defense is so great and the tendency of the

[3] The Aldridge task force, which Secretary Donald H. Rumsfeld commissioned to examine how DoD develops, resources and provides joint capabilities, estimated that fully funding recent Defense Planning Guidances would have required between 1.3 and 1.8 times the funds available.
[4] *Inside the Pentagon* (September 11, 2008), p. 25.
[5] *Ibid* (April 24, 2008), pgs. 5-6.

Pentagon to kill no program before it absolutely has to is so pervasive that inadequately-funded acquisition programs will continue to negate the effects of defense acquisition reform, including the implementation of those offered here.

A Proposed Package of Interrelated Reforms

The intent of the first two initiatives is to simplify and clarify responsibility and accountability for acquisition management and to rebuild acquisition competence in the Military Services. The third proposal aims to both empower Program Managers and to hold them accountable. The fourth initiative seeks greater realism in cost, technological and performance estimates by increasing transparency and providing for tougher Congressional oversight.

1. Restore the Service Chief's authority and responsibility for the management and execution of acquisition programs.
    - Supported by both the 2005 DSB Transformation Study and DAPA
    - By re-establishing the Systems Command (see #2) in the Army, Navy and Air Force with the Systems Command 4-star report to the Service Chief and Department Secretary, who will serve as the Department's Service Acquisition Executive (SAE)
        - Service Secretary cannot delegate SAE function to the Secretary's Assistant Secretary for Acquisition, who would serve only as an adviser to the Department Secretary
        - In this model, the Service Chief (who reports to the Department Secretary) would have responsibility for (and be held accountable for) balancing and integrating resource allocation and acquisition.
            - Recognizes growing reality of Service work-arounds (via dual-hatting and the reporting chain for fitness reports) that undermine the authority of the civilian Assistant Secretaries
            - Responsibility for determining requirements, however, continues to migrate to COCOM-centric joint requirements process
        - Chain of Command:
            - PM/PEO -> System Command 4-star -> Service Chief -> Service Secretary (SAE) -> Under Secretary for AT&L (the Defense Acquisition Executive or DAE)
        - Would limit OSD (AT&L)'s role to acquisition policy formulation, oversight and milestone decisions for key (as determined by the Secretary of Defense) major programs
            - This "Back to the Future" proposal makes the uniformed military (that is, the System Command) responsible for acquisition, not the civilian ASD
                - Recognizes reality that the uniformed military is much better (although hardly perfect) on accountability issues than political appointees and civilian deputies

- Uniform PMs, PEOs and System Command would have career civilian deputies to provide expertise and continuity

2. Establish in each Military Service an acquisition career track headed by a 4-star (a 3-star in the case of the Marines) with sufficient officer billets to ensure a sufficient cadre of "Acquisition General Officers) to man that Service's share of joint acquisition billets and provide 1-star and 2-star PMs for major acquisition billets in the 4-star Systems Command (see #1)
    - Strengthen service program management expertise by mandatory experience and educational requirements tied to promotion
        - In order to be a "smart customer," Military Services need professional Acquisition Officers (albeit with operational experience) at PM, PEO and 4-star levels, not operators with little or no acquisition experience
    - Separate career tracks for Military Services and joint acquisition (SOCOM, Defense Agencies, TBD), but with lots of commonality and jointness in PME and leadership development programs
    - Recognizes reality that DoD cannot afford a large uniformed acquisition workforce
        - Acquisition-support FFRDCs such as Mitre provide useful support but do not supplant the need for smart, experienced Acquisition flag officers
        - To reduce the need for LSIs and to manage an acquisition work force heavily reliant on civilian professionals and contractors, each Military Service needs a smaller, thoroughly professional acquisition force, with a broad enough base of experience (including sufficient 0-6 and 0-6 billets) to support the cadre of Acquisition GOs.

3. Establish an acquisition process that has shorter, more frequent program phases and align (and make mandatory) the PM's 3-to-5 year duty tours with those phases
    - PMs would participate in formulating the objectives for each program phase and then held accountable for the achievement of those objectives
    - An illustrative 7-milestone option:[6]
        - Milestone 0 – Develop/approve mission need statement
        - Milestone 1 – Develop/approve capability need statement
        - Milestone 2 – Develop/assess Technology (including maturity)
        - Milestone 3 – Systems Definition & Preliminary Design
            - Point at which requirements definition ends and acquisition ends

[6] In the illustrative example, a PM's tour could be for Milestone 0-1, 2-4 or 3-5. As called for by FY08 Defense Authorization Act, GAO is already assessing the utility of this proposal.

- "Spiral" or "evolutionary" development between Milestone B and Milestone C of leads to "requirements creep" based upon immature technologies
    - Milestone 4 – Final Design, Production Prototyping & Testing
    - Milestone 5 – Start Limited Production and Field Testing
    - Milestone 6 – Start Full Rate Production
        - It's block production (the F-16 model), not spiral development
- At the outset of each phase, the Service Systems Command (under the supervision of the Service Chief and Secretary) must certify (after auditing progress) program status to the Under Secretary (AT&L) **and** to Congress and set the standards (including cost, schedule and technical performance) that an incoming PM "accepts" as the performance metrics for which he/she will be held accountable
    - Linking PM tenure, Milestone decisions and Department Certification (see #4) should empower PMs and hold them accountable for managing acquisition programs through one or two Milestone decisions

4. Establish independent assessment offices in OSD and the Military Services that report both to DoD and the Congress and toughen enforcement through tough, no-waiver mechanisms ("Nunn-McCurdy on steroids")[7]
    - Ensure transparency and accountability in acquisition management by mandating that the Systems Command must certify to OSD and the Congress after each Milestone Decision (as opposed to current certification requirements for Milestone B) the status of the program at the current Milestone and the standards (to include cost, schedule, technological maturity and performance) needed to pass the next Milestone
    - Establish (and resource adequately) an Office of Independent Assessments (OIA) in OSD and each of the Military Departments to provide DoD and the Congress with independent assessments of cost, technological maturity and performance
        - Replaces OSD-PA&E's Cost Analysis Improvement Group (CAIG), which has performed well but it is under-resourced, and Office of Testing & Evaluation (OT&E), which operates erratically and is routinely ignored
        - Will enable PMs to make cost-schedule-performance trade-offs on the basis of "good numbers" that are transparent to all
            - Protects PM against "requirements creep" via changing weapon systems performance standards
        - Creating independent assessments offices who "work" for both OSD and Congress may seem draconian, but the "structural

[7] Comparable organizations need to be created for the defense agencies and commands (such as SOCOM) that have budgetary and acquisition authority and responsibility.

optimism" of the current incentive structure is so ingrained that strong structural mechanisms are needed

- Reinforce the independent assessment process by strengthening Congressional oversight of the SecDef waiver authority and the mandatory penalties
    - Cost growth penalized through mandated re-statement of performance metrics, reduced buy, significant financial penalties on companies, and, if large enough, program cancellation
    - Linking OIA process with SecDef exercise of his waiver authority (for programs in breach of Nunn-McCurdy or assessed to have immature technology) will bring greater transparency and accountability to SecDef use of this authority and will raise the political costs of routinely exercising it

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CHARRTS No.: SG-11-001
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #1

Question. Last year's National Defense Authorization Act (Section 852) authorized the transfer of $300 million to the Department of Defense Acquisition Workforce Development Fund. Has that transfer occurred for this year and how will those funds enable the reduction of cost overruns of major defense acquisition programs? The Defense Department suffered cost overruns when it's acquisition workforce was fully staffed during the Cold War era, how much will this help?

Answer. The transfer for NDAA Section 852 FY08 Plan has occurred. Increased hiring made possible by this funding is underway. The Fund is being used to increase hiring of interns, journeymen and highly qualified experts.

Also, initiatives are in place for increasing training capacity and meeting priority training needs. Funding is also targeted for retention and recognition, important elements of strengthening the workforce. This funding is allowing us to close certification gaps that currently exist in the workforce.

The NDAA Section 852 provides a jump start to grow the acquisition workforce. That jump start coupled with other Acquisition excellence initiatives and Congressional support to dramatically curb cost overruns.

CHARRTS No.: SG-11-002
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #2

Question: In general are the DoD program managers well matched up against their private sector counterparts in terms of skills and experience?

Answer: In general, DoD program managers have the requisite skills and experience to fulfill their mission, at a level commensurate with that of their industry counterparts. The Department is conducting a skills inventory assessment of all the Program Managers in DoD. This assessment will be used to further identify gaps and needs for improvement. Those improvements are integrated with the Defense Acquisition University education and training programs, providing continuous improvement initiatives for our program managers.

CHARRTS No.: SG-11-003
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #3

Question: What incentives do DoD program managers have to stay with the government?

Answer: The Department has both civilian and military program managers (PMs). For both groups, our PMs are motivated to stay in procurement for the satisfaction of successfully delivering critical capabilities to our warfighters.

For military members, the primary incentive to stay in military service beyond their PM assignment is the potential for advancement, whether via promotion or to positions of increased responsibility.

In addition to the potential for advancement, civilians compete for performance bonuses within the National Security Personnel System. Because PM positions are the toughest jobs in the acquisition community, we would expect successful civilian PMs to compete favorably for bonuses. Civilians would also be incentivized to stay in government service through their continued participation in their retirement plan (i.e., additional years of service).

Retaining and increasing the pool of qualified candidates to take on program management responsibilities is an acquisition workforce priority. The Department does not today have a specific incentive program designed to keep and attract highly qualified PMs in government service. We are currently studying the need for incentives and possible incentive methodologies that could be employed in the Department to both civilian and military candidates. Because this touches on sensitive compensation issues, we are working with stakeholders in the Military Departments and OUSD(Personnel & Readiness) to define whether such a program would be viable and how to best implement it.

CHARRTS No.: SG-11-004
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #4

Question: What can be done beyond measures to "hold program managers accountable" to provide meaningful incentives to attract and keep skilled program managers in the DoD?

Answer: Retention of skilled program managers is more of an issue than recruiting. DoD program managers are selected from very experienced civilians and military members who view program manager positions as extremely desirable.

In terms of retention, we are investigating three approaches to help keep our program managers in the DoD. We intend to review the overall compensation strategy as a potential means to retain program managers. We are examining financial incentives to keep program managers in their positions (and also make these demanding positions even more desirable). We are also looking at post-program management assignments that are sufficiently challenging and rewarding so as to make continued DoD service competitive with moving to industry. We hope to have the initial package of financial incentives implemented at the start of fiscal year 2010.

CHARRTS No.: SG-11-005
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #5

Question. Under the current personnel system's limited compensation rates do you see any way we can support these programs without substantial contractor assistance? Does NSPS help at all here?

Answer. Yes, NSPS does help. There are many very valid reasons to have contractor support for acquisition programs. DoD policy is to manage from a Total Force perspective. The Total Force includes active and reserve military members, civilian employees, and support contractors. When used appropriately, we believe we achieve the best outcomes under a Total Force approach. The issue is not seen solely in terms of eliminating contractor support but rather in terms of ensuring work that should be performed by military personnel or DoD civilian employees is in fact done by them; for example, work that is inherently governmental, personal services by its nature, or for which a business case supports using DoD personnel. The Department is proactively conducting human capital planning and initiatives to address the organic capability of the acquisition workforce.

CHARRTS No.: SG-11-006
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #6

Question: Does the Congressional budgeting process have a negative impact on the major weapons systems programs? If so, how significant is it? What is the effect of unpredictable funding and acquisition funding through supplementals on acquisition programs? Please provide examples.

Answer: Successful program execution is totally dependent on a stable and adequately funded budget. The many layers of review inherent in the Congressional Budgeting process accompanied with myriad unexpected decrements and increments to programs contribute to program instability and ultimately cost and schedule growth.

There are two issues with unpredictable supplemental funding: timing and source of funds. Supplemental funds are typically not received in a timely manner which causes the department to "borrow" from acquisition programs until the supplemental funds are received. This requires two sets of reprogramming actions, and significantly impacts the Department's limited General Transfer Authority (GTA). Secondly, some supplemental funding has been financed directly with funding that has been diverted from acquisition programs requested in the budget, which can impact the cost and schedule of a program.

CHARRTS No.: SG-11-007
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #7

Question: If we assume that cost overruns in weapons systems are unavoidable due to the uncharted nature of developing and in many cases inventing new weapons and technology, how do you explain the massive cost overruns in information technology and command and control systems such as the Joint Tactical Radio System (JTRS) Warfighter Information Network - Tactical (WIN-T)? These systems provide capability that is commercially available and the military is not breaking new ground. Please address communications systems in general, as well as those two programs specifically.

Answer: The assumption that cost overruns are unavoidable due to the uncharted development (and associated cases of invention) needs to be proven wrong. Commercially available command, control, computer and communication systems neither match nor meet the military requirements. Requirements stability, technology maturity and cost realism are part of the acquisition excellence initiatives to improve performance with acquisition strategies that deliver on-time with incremental capability on budget.

The Warfighter Information Network - Tactical (WIN-T) and Joint Tactical Radio System (JTRS) programs provide capabilities to operate in a military-unique environment. Whereas commercial wireless networking systems rely on fixed infrastructure and limited mobility of users, WIN-T and JTRS are required to support highly mobile warfighters operating in areas with no fixed infrastructure. Each node on the WIN-T or JTRS network is required to perform functions accomplished by cell towers and network operations centers in the commercial world in addition to providing a secure user interface that operates reliably in harsh environments (i.e., heat, sand, shock, vibration, etc.) and hostile territory. WIN-T and JTRS will be breaking new ground by providing dynamic networking on-the-move to support the modularity (networks rapidly and automatically breaking apart, recognizing their neighbors, and reforming at will), scalability (supporting rapidly and continually changing numbers of participants) and interoperability to ensure reliable transmission of voice, video and data products required by maneuver, fires and aviation forces countering a constantly shifting enemy. In addition, these future systems will embody a level of information assurance approved by the National Security Agency and not available commercially, that provides protected networking on-the-move capability against jamming, detection, and intercept, while using military-grade encryption to prevent compromise of data to an adversary.

Many of the technologies used to achieve these capabilities did not exist prior to the DoD developing them. WIN-T and JTRS were initiated with immature technologies, and the research and development to achieve the requirements was conducted in the context of these acquisition programs, rather than under a science and technology effort. The Information Assurance criteria

also evolved as the threat to the new technologies became better understood. For example, primary drivers of JTRS cost growth have root causes in post-Critical Design Review discovery of design issues and the unanticipated complexity of defining and implementing the Information Assurance criteria associated with the new technologies. The JTRS program technologies are now mature, the Department has stopped initiating new programs with immature technologies, and has begun insisting that research and development on immature technologies be completed before program initiation on all future programs. In addition, the Department used technology maturity standards to restructure the WIN-T program last year, to address both changing requirements to meet stringent Future Combat Systems interface requirements, as well as field critically needed and available on-the-move communications capability to the warfighters.

Communication programs are subject to the same cost estimation issues that all other DoD programs experience. Mainly, cost estimations are parametric and generally have wide variability around a point estimate. Depending on the program's maturity and where it is in the acquisition framework, such point estimates do not imply accuracy. Assumptions about labor rates, productivity and materials costs are some factors that can significantly affect an estimate. We try to base our estimates on the best available data at the time, but usually cost estimates are developed many years before a system is actually produced. Additionally, to gain a level of confidence prior to a DoD program initiation, both a program office estimate and an independent cost estimate are completed. In the case of WIN-T and JTRS, preliminary cost estimates were based on assumptions about how these new technologies would mature and then be designed. Without the requisite underlying research, the Department underestimated the work required to invent the new technologies which ultimately led to cost overruns. As WIN-T and JTRS programs mature through design and development, a better understanding of the technology and security challenges is resulting in improved cost estimating.

Some cost and schedule growth should be avoidable with good management and oversight, and it is those issues that the Department attempts to address with the policies that it has put forth and that leadership is enforcing.

CHARRTS No.: SG-11-009
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #9

Question: What incentive is there for a contractor to submit realistic cost and technical proposals for a new weapons system? Is there any financial downside for the contractor for later cost increases?

Answer: The nature of cost estimating is that it is both an art and a science. The reality is that cost estimators are basing their figures on estimates of systems requirements, physical characteristics, and economic assumptions many years before a system is actually produced. Furthermore, estimators are using actual historical data from weapon systems to forecast the future weapon systems. Although, this is the best and "current" data available at the time, it is almost always wrong—even when experts are weighing in. The systems of the future, like most of the assumptions about the future, are always different than the systems and realities of the past. Therefore, it is in a contractor's best interest to submit realistic cost and technical proposals and to document their assumptions and calculations so that when requirements change, there is a basis for contractors to update their estimate and to potentially receive additional funding.

In addition, the Department is fully committed to ensuring that the independent cost estimates are fully considered during any MDAP's milestone review and that realistic cost estimates and schedule projections are adopted. It is important that programs consider cutting content prior to realizing cost or schedule growth and impacting other acquisition programs.

CHARRTS No.: SG-11-010
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #10

Question. Requirements will always evolve; especially when the eventual end user is engaged in active combat. Holding requirements static from the date of contract award would mean the systems would no longer be cutting edge when fielded. Changing requirements will almost always increase total cost, but that is the trade off for making sure equipment is cutting edge on delivery, not just at the time of the initial design phase. How can we best balance these competing realities?

Answer. Requirements evolution is considered a natural phenomenon for combat and peacetime. Our acquisition excellence initiatives are proactive on requirements evolution and provide balance for competing realities.

For example, acquisition strategies have been shifted from the big bang capabilities to an incremental capabilities approach. Incremental acquisition strategy serves to field systems faster, has cutting edge technology incubating in parallel, and integrates new requirements on the basis of readiness, funding and need.

This strategy, along with a myriad of additional acquisition initiatives, help to balance the trade space of cost, schedule and performance, start programs right with risk management and systems engineering, work process efficiencies that are tailored, agile and transparent, and establish portfolio and program stability with requirements, maturity, funding and planning stability with checks and balances for governance and oversight purposes. Competitive prototyping, Joint Analysis Teams, Defense Support Teams and Configuration Steering Boards provide additional improvements to increase competition, reduce our cycle times, and broaden our communications.

CHARRTS No.: SG-11-011
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #11

Question. GAO questions whether DoD program offices have the appropriate mix of staff and capabilities within their workforce to effectively manage their mission. Has DoD done any studies on the appropriate mix of contractor-to-government personnel?

Answer. Ensuring the appropriate mix of staff and capabilities is very important.

The DoD Instruction 5000.2 requires program managers to prepare an acquisition strategy to include program office staffing. The strategy includes a workload assessment identifying the manpower and functional competency requirements, staffing plans and the roles of government and non-government personnel.

The Services are conducting an analysis of program office composition to facilitate planning improvements. For example, the Navy has deployed a staffing model which is used as a framework for assessing their program office size and mix. Another model is being used by the Air Force and Army for size assessments. These studies and assessments will be utilized to better determine and inform best practices for the acquisition workforce initiatives.

GAO Report GAO-08-467 SP has cited concerns with the percent of program, office staff outside the government. These concerns are recognized and are being addressed as part of our overall Acquisition Excellence initiatives.

CHARRTS No.: SG-11-012
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #12

Question: GAO states that a contributing factor here is that program managers frequently change during the program's development, despite DoD policy requirements to the contrary. Why does DoD have such high turnover on these programs?

Answer: We disagree with the GAO's data in regard to program manager turnover. Data we collected in the Spring of 2008 showed that our current program managers had been in their positions on average two years, consistent with their likely departures at the four year point. This is in line with Department policy for program manager tenure for our Major Defense Acquisition Programs.

CHARRTS No.: SG-11-013
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #13

Question: Why do you believe that the new tenure agreements will slow the turnover rate for program managers?

Answer: We disagree with the GAO's data in regard to program manager turnover. Data we collected in the Spring of 2008 showed that our current program managers had been in their positions on average two years, consistent with their likely departures at the four year point. This is in line with Department policy for program manager tenure for our Major Defense Acquisition Programs.

The Under Secretary of Defense for Acquisition, Technology, and Logistics' policy memorandum of May 25, 2007 served to re-emphasize and amplify existing policy regarding written program manager tenure agreements.

CHARRTS No.: SG-11-014
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #14

Question. The GAO report cites a lack of implementation of systems engineering discipline in programs as a source of the problems in outcomes. What kind of systems engineering expertise does DoD have in house?

Answer. In the section entitled "DoD Practices Continue to Contribute to Program Risk and Instability," the referenced GAO report states: "The absence of a knowledge-based acquisition process steeped in disciplined systems engineering practices contributes greatly to DoD's poor acquisition outcomes." Through independent reviews of these observations, we have identified that although we have well-trained and experienced systems engineers in-house, the real issue is that we need more systems engineers and in the right places within DoD programs.

Systems Engineering expertise within the DoD civilian and military workforce resides in all Services (Army, Navy, Air Force, and Marine Corps) and Components (including Defense Contract Management Agency, National Security Agency, National Reconnaissance Office, among others). The existing systems engineering workforce has varying degrees of expertise in risk management, software engineering, test and evaluation, design, requirements management, logistics and sustainment, earned value management, manufacturing, technical planning, system assurance, configuration management, technical assessment, etc., in addition to basic systems engineering expertise. The OSD directorate of Systems and Software Engineering (SSE), which is responsible for policy, guidance, education, training, and outreach, has a statutory oversight role to conduct technical reviews and report on Major Defense Acquisition Programs (MDAPs) in order to properly inform senior decision makers. This is accomplished through reviews of major programs' Systems Engineering Plans and in-field Program Support Reviews. Recent DoDI 5000.02 policy updates will significantly contribute to program success by mandating additional systems engineering reviews at key points in program acquisition life cycles.

We are also working to increase Systems Engineering expertise through a key initiative in our Human Capital Strategic Plan. We began a top-to-bottom competency assessment plan for our systems engineering workforce early in 2008. We plan to assess 100% of this workforce to identify the number of high-performing, program-level systems engineers we have, the number we need, and the specific skills and expertise they require. We will obtain and analyze several demographics to better understand job locations, duties and responsibilities, and expertise of these program-level systems engineers. We then plan to move these high-performers into the recently-created Program Systems Engineer career field, where we can better manage them, analyze and address shortfalls, enhance their expertise, adjust hiring and retention efforts as needed, and properly assign them to critical leadership positions in acquisition programs.

CHARRTS No.: SG-11-015
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #15

Question. How can we in Congress help change the environment that leads DoD to over-promise capabilities and underestimate cost to sell programs?

Answer. The Department is not overpromising capabilities and underestimating costs in order to sell or advance programs. To the contrary the environment with Congress has improved to recognize the many Acquisition Excellence initiatives for starting programs right, making decisions that balance the trade space, establishing process deficiencies, and stabilizing portfolios and programs. The environment can continue to be improved with Congressional support, for example for funding stability and multi-year procurements. Congress has also helped to jump start growth in the acquisition workforce which help enable an improved environment for program excellence.

CHARRTS No.: SG-11-016
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #16

Question. What is your view of the impact of diminished industrial base competition on this process? Would a more competitive defense industrial base mitigate some of these issues?

Answer. Our acquisition excellence initiatives have been effective to mobilize our industrial base and increase competition across the landscape from research and development to production. A more competitive industrial base will help mitigate program cost, schedule and performance issues.

For example, Cooperative Research and Development Agreements (CRADAs) with Industry have been initiated, competitive prototyping has been institutionalized to help get programs started right, and multiple production contracts have been awarded to industry for programs like MRAP. Our acquisition strategies have also been honed to shift from a cost-plus to fixed price incentive to better balance the incentives in the environment of increased industry participation.

CHARRTS No.: SG-11-017
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #17

Question. What can be done by Congress to improve the situation we are faced with in the acquisition of weapons systems, short of adding yet another layer of burdensome regulation and bureaucracy? Is the establishment of an Director of Independent Cost Assessment, who may not report to the Secretary of Defense, a step in the right direction?

Answer. The situation for the acquisition of weapon systems has been dramatically improved, and with Congressional support the momentum will continue. Those improvements have been demonstrated utilizing existing independent cost assessment organizations. By DoD Directive, the CAIG already appropriately serves as the principal advisor to the appropriate Milestone Decision Authority (MDA) for acquisition program cost. Establishing another Director of Independent Cost Assessment would be considered duplicative, wasteful of taxpayer dollars, and not a step in the right direction.

CHARRTS No.: SG-11-018
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #18

Question: Do you think DoD would be better served by awarding fixed-price contracts for such requirements and placing more of the risk on the contractor?

Answer: The Department is moving toward more fixed price incentive type contracts and away from cost plus award fee contracts. Whether a program should have a fixed price type of contract or cost reimbursement type of contract depends on each program's requirement, its complexity, technical maturity, schedule, risk management assessment and other factors outlined in Federal Acquisition Regulation (FAR) Part 16. There does need to be more balance between the fixed price and cost reimbursement types of contracts.

CHARRTS No.: SG-11-019
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Coburn
Question: #19

Question. You stated that DoD was actually under budget with the F/A-18E/F - HORNET Naval Strike Fighter. What other MDAP programs are under budget? What characterized these programs and how did they differ from programs suffering from massive cost overruns?

Answer. There were ten MDAP programs whose costs have decreased as assessed by GAO in their last report on Weapons Systems Programs. They were: CVN 21; Excalibur; JTRS GMR; Patriot/MEADS; P-8A MMA; EFSS; EA/18G; MUOS; MP-RTIP; B2-RMP.

Typical common characteristics of programs that avoid massive cost overruns are an incremental acquisition strategy, a coherent concept of operations and a systems engineering driven risk management plan. For example, from the above list:

- The EA/18G program is a derivative of the F/A 18 E/F program which was a derivative of the F18 C/D program. Those three increments of capability evolved from a fighter, to an attack/fighter, to an electronic warfare aircraft platform with dramatically different roles and missions that met competing realities. Excellent systems engineering, risk management and associated concept of operations.

- The P-8 MMA program is a replacement for the P-3C Orion submarine hunter aircraft. The roles and missions of the P-8 MMA provide the P-3C Orion capability as well as an incremental approach for maritime and littoral intelligence, surveillance and reconnaissance capabilities.

CHARRTS No.: SG-11-020
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Pryor
Question: #20

Question. The Government Accountability Office (GAO) has found that at the program level, weapons systems programs are initiated without sufficient knowledge about systems requirements, technology and design maturity, and that lacking such knowledge, managers rely on assumptions that are consistently too optimistic - causing cost growth and schedule delays. Section 801 of the FY06 National Defense Authorization Act (NDAA) addresses this issue by requiring acquisition decision makers to certify that programs meet specific criteria at key decision points early in the acquisition process to ensure better discipline and accountability.Do you believe this legislation is making a positive impact in the acquisition environment?Do you believe there needs to be any further policy initiatives?

Answer. This legislation is codifying into law changes that are being promulgated within the DoD Acquisition System utilizing the DoD Instruction 5000.02. In that respect, the legislation has a positive impact yet is duplicative and can be counter productive if unintended consequences result from well intended law. The results of DoDI 5000.02 and the legislation like the NDAA 2006 Section 801 will take time and a variety of program starts to get a measure of overall effectiveness. To date, the results are positive.

These legislative changes and DoDI changes are targeting acquisition excellence and require the basic blocking and tackling discipline and accountability with balanced governance and oversight to be effective for program execution.

DoD continues to provide numerous initiatives for policy change, for example MS C certifications and Program Manager tenure and accountability, as part of overall acquisition excellence initiatives outlined in the AT&L Source Document.

CHARRTS No.: SG-11-021
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Pryor
Question: #21

Question: The GAO has highlighted that current acquisition programs are experiencing, on average, a 21-month delay in delivering initial capabilities to the warfighter - often forcing warfighters to spend additional funds on maintaining legacy systems. What incentives does DoD offer for contractors to stay within cost and schedule targets? The GAO has stated that DoD officials are rarely held accountable for poor decisions or poor program outcomes. What happens if contractors don't meet specific criteria at key decision points?

Answer: With regard to incentives, the Department is moving away from award fee and toward incentive fee structured contracts that pay fee based on measured outcomes in the areas of cost, schedule and performance. Under an incentive fee contract, the contractor will maximize its fee when it delivers a product that demonstrates the required capability, on-time and within cost. Fee will be reduced when they do not. Additionally, contractors that have validated poor performance will have that adverse information captured in the past performance database and will negatively impact opportunities to be successful in future competitions.

Accountability for the outcomes of our programs is an area of emphasis for the Department. For program managers (PMs) there is a renewed emphasis on accountability and tenure agreements so that they will remain with the programs longer. Program Management Agreements establish a "contract" among PMs, acquisition, and requirements/resource officials setting expectations for cost, schedule and performance. In addition, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) writes periodic notes to a broad acquisition audience to convey lessons learned and highlight the acquisition community's responsibility for improving the success of these major programs.

CHARRTS No.: SG-11-022
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Pryor
Question: #22

Question: DoD's conventional acquisition process often requires as many as 10 or 15 years to get from program start to production. The GAO has suggested that constraining cycle times to 5 or 6 years would force programs to conduct more detailed systems engineering analysis, lend itself to fully funding programs to completion, and thereby increase the likelihood that their requirements can be met within established time frames and available resources. Do you believe a constrained cycle time is possible? What needs to happen for this to be achieved?

Answer: The GAO suggestion for constrained cycle times is consistent with DoD acquisition strategies and initiatives for fielding incremental system capabilities to reduce cycle times. To enable these strategies and initiatives, we have four objectives:

1) Balance the trade space for affordable, time-defined, and technology-ready programs

2) Start programs right with up-front planning, risk management, and systems engineering utilizing competitive prototypes and competition

3) Utilize process efficiency for tailored, agile, and transparent programs with Lean Six Sigma and standardized leading metrics

4) Stabilize program performance with Program Manager accountability and empowerment; checks and balances; and funding, requirements, and planning stability

We believe constrained cycles are possible and the first steps to make that achievable include an acquisition strategy that reflects the above four objectives.

CHARRTS No.: SG-11-023
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Pryor
Question: #23

Question: How often do weapons system acquisition programs consider impacts on the domestic industrial base during source selection?

Answer: Generally, source selections are not conducted with industrial base considerations as part of the evaluation factors. The primary focus of the source selection process is to select the best acquisition option, evaluated on the basis of warfighting capability, cost and schedule. However, the Department also has in place the industrial policies and structured procedures necessary to identify, evaluate, and preserve when necessary, essential industrial and technological capabilities that might otherwise be lost. Federal Acquisition Regulation (FAR) Part 34 and Department of Defense Instruction (DoDI) 5000.2 require development of a program acquisition strategy and the Defense Acquisition Guidebook (Chapter 2.3. Systems Acquisition: Acquisition Strategy) describes best practices. The Industrial Capability section of the Guidebook states that "development of the acquisition strategy should include an analysis of the industrial base capability to design, develop, produce, support, and, if appropriate, restart an acquisition program." The Guidebook further states that the industrial capability analysis (as summarized in the Acquisition Strategy) should consider DoD investments needed to create or enhance certain industrial capabilities; and also consider the risk of industry being unable to provide program design or manufacturing capabilities at planned cost and schedule. Within these policies and procedures, the Department has the ability to establish and has established, administratively imposed (via DoD policy, not statute) restrictions within the Defense Federal Acquisition Regulations (DFARS) precluding the use of foreign products for specific defense applications when necessary to maintain an industrial base capability ensuring military readiness.

CHARRTS No.: SG-11-024
Senate Committee on Governmental Affairs
Hearing Date: September 25, 2008
Subject: Addressing Cost Growth of Major DOD Weapons Systems
Witness: Dr. Finley
Senator: Senator Pryor
Question: #24

Question: The VH-71 program is developing a replacement for the current fleet of VH-3D and VH-60N helicopters for Presidential transport. The budget request includes $1.05 billion for VH-71 development, $225 million more than planned for FY09 last year. This Committee has found that the Increment Two phase of this program is beyond the reach of the cost, technical, and schedule baseline established for the program, with a cost overrun of at least 70 percent ($4 Billion over budget). What was the fundamental policy breakdown in this situation? How can a situation like this be prevented in the future? What drove this cost overrun?

Answer:

What was the fundamental policy breakdown in this situation?

The post-9/11 security environment drove an urgent need to replace legacy VH-3D and VH-60N aircraft with a safer, more reliable and more survivable helicopter with improved communications capability. To help meet the high risk schedule, the Department purposely accepted more cost and schedule risk than is normal for the VH-71 program. The program executed a short risk reduction period with potential vendors (vice entering a Technology Development (TD) phase) and, in January 2005, a contract was competitively awarded to Lockheed Martin Systems Integration-Owego (LMSI-O) for two capability increments. Slow progress in requirements and technical definition of the performance contract, design completion, and lack of coordination of the proposed design between the prime and subcontractors adversely affected an already high-risk schedule. Solid systems engineering processes were not adhered to in this program as it made compromises in order to keep schedule, which compounded the problem. Initially, Increment 1 and Increment 2 development efforts ran concurrently, and a larger amount of Increment 2 redesign than was originally planned, caused further delays and cost increases. (Increment 2 has since been put on hold.)

How can a situation like this be prevented in the future?

A full understanding between the contractor and government is needed prior to contract award. A more thorough TD phase prior to entering the Systems Development and Demonstration phase would have helped ensure complete flow-down of the government's performance-base specification into the contractor's proposed configuration. It would have allowed the government to fully define the technical scope of this highly concurrent, two-increment program and to develop more accurate cost and schedule estimates. Since it has been put on hold, the technical baseline for Increment 2 can and should be fully defined prior to its being reinitiated (although the urgency was of a sufficient concern that a programmatic decision was made to proceed with

Increment 1). Lastly, the "derived requirements" that must be met to obtain the Technical Authority's approval to fly the aircraft must be clearly understood at the outset.

What drove this cost overrun?

The scope of development required was underestimated and projected schedule allowances were insufficient at the outset. Those estimates resulted in errors in planning and pricing. Examples of incorrect estimates include the amount of engineering effort required to modify a derivative design of a commercial helicopter to meet the performance and safety requirements for the Presidential helicopter, defining the technical baseline for Increment 2 after contract award, and concurrent design and development of Increment 1 and Increment 2 that resulted in unplanned rework.

Post-Hearing Questions for the Record
Submitted to Mr. Michael J. Sullivan
From Senator Tom Coburn

"Addressing Cost Growth of Major DOD Weapons Systems"
September 25, 2008

1. In general, are DOD program managers well matched up against their private sector counterparts in terms of skills and experience?

   In term of skills and experience, DOD requires its program managers to meet certain qualifications; however, we have not evaluated how these compare to the private sector. The Defense Acquisition Workforce Improvement Act enacted in 1990 created a formal acquisition corps and defined educational, experience, and tenure criteria needed for key positions, including program managers. Under DOD guidance, program managers are required to meet experience and training requirements and execute written tenure agreements. The main difference between DOD program managers and their private sector counterparts are the programs they are handed to execute and the control they exercise over those programs and resources. 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.

   In our 2005 survey of DOD program managers, respondents generally believed they had the right mix of experience and training to do their jobs well. Ninety-four percent 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. About 76 percent believed they had enough leadership training, and about 92 percent said that they believed that their service consistently assigned people with the skills and experience to be effective program managers.

2. What incentives do DOD program managers have to stay with the government?

   DOD program managers have cited a lack of financial incentives, retention initiatives, and career opportunities as issues of concern for them. In our 2005 report on DOD program managers, 13 percent of program managers surveyed cited a 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. Specifically, civilian program managers were responsible for finding their next job after their tenure ended, while their military counterparts were assigned their subsequent positions.

3. What can be done beyond measures to "hold program managers accountable" to provide meaningful incentives to attract and keep skilled program managers in the DOD?

   Ensuring that program managers are given a program that has a high probability of success and the authority and means to execute it would be powerful incentives. DOD needs to develop a realistic investment strategy that assures the right programs are being pursued. The program should have an executable business case, with adequate knowledge about technology, time, and cost. Once the program begins, program managers need to be empowered to execute the program, such as with the authority to veto new requirements, control funding, and control staff. In fact, during our 2005 review of DOD program managers, we found that program managers personally consider requirements and funding instability to be their biggest obstacles to success. We also found that program managers believe they are not sufficiently supported once programs begin and must continually advocate for their programs in order to sustain support. In addition, DOD should also pursue an evolutionary path toward meeting user needs rather than attempting to satisfy all needs in a single step. This approach will provide program managers with more achievable requirements, which, in turn, facilitate shorter cycle times. It will also facilitate matching a program manager's tenure with development or the delivery of a product and tailor career paths and performance management systems to incentivize longer tenures. Finally, DOD must continue to work to address program managers' concerns about the lack of financial incentives, retention initiatives, and career opportunities.

4. GAO states that DOD adds risk to programs by relying on contractors for support of the management and oversight of these projects. Is this not just another manifestation of the government-wide shortage of skilled acquisition professionals?

   Yes. The government faces serious acquisition workforce challenges (e.g., size, skills and knowledge, and succession planning). One way agencies have dealt with this situation is to rely more heavily on contractor support. DOD has given contractors increased program management responsibilities to help develop requirements, design products, and support the selection of major system and subsystem contractors. In part, DOD's increased reliance on contractors has occurred because the department is experiencing a critical shortage of certain acquisition professionals with technical skills related to systems engineering, program management, and cost estimation.

5. Under the current personnel system's limited compensation rates do you see any way we can support these programs without substantial contractor assistance?

   At a time when weapon acquisitions are becoming more complex and larger in size, DOD is relying more on contractors and other non-government personnel to help manage and oversee weapon system programs and their contractors. In a 2008 survey of 52 DOD program offices, we found that about 48 percent of the program office staff was composed of individuals outside of the government, including 52 percent of staff in engineering and technical functions. While we have not specifically reviewed the role that compensation plays in the government's ability to attract and retain individuals in acquisition and technical fields, our 2008 report on Army contract specialists highlighted this issue. Specifically, officials from the Army's Contracting Center of Excellence (CCE) informed us that the agency has had trouble recruiting and retaining government contract specialists. According to a CCE official, from August 2006 through August 2007, 24 contract specialists—more than one-quarter of its government contracting workforce during the period—left the agency. Agency officials stated that some of these personnel retired, but many had gone to work for private contractors that support the federal government. CCE officials said that they cannot compete with the private sector when it comes to offering some employment incentives. CACI employees who were supporting CCE as contract specialists said the company offered better benefits than the federal government, including higher salaries, fewer responsibilities, and shorter work weeks (because of contract restrictions on extended hours). Senior managers from The Ravens Group told us that their firm recruits contract specialists who have worked for and been trained by the government and hires them at a higher rate of pay. The government ends up paying for these higher salaries in the form of contract costs. We found that CCE is paying up to almost 27 percent more for its contractor-provided contract specialists than for similarly graded government employees. This comparison took into account government salary, benefits, and overhead and the loaded hourly labor rates paid to contractors.

6. If we assume that cost overruns in weapons systems are unavoidable due to the uncharted nature of developing and in many cases inventing new weapons and technology, how do you explain the massive cost overruns in information technology and command and control systems such as the Joint Tactical Radio System (JTRS) and Warfighter Information Network-Tactical (WIN-T)? These systems provide capability that is commercially available and the military is not breaking new ground. Please address communications systems in general, as well as those two programs specifically.

   In general, the military services attempt to leverage commercially available technology for command, control, and communications systems. However, the JTRS and WIN-T programs are attempting to provide unprecedented networking capability with critical technologies that were not commercially available when these programs began. The JTRS program began development in 2002. At that time, a networking capability using software defined radio technology, which is critical to the program, was not commercially available or technologically mature; DOD and the military services largely underestimated the technical complexity of developing software defined radios for use in a secure networked environment. Only now are prototypes and engineering development models of the JTRS radio starting to become available for testing. The WIN-T program relies on mobile ad hoc networking technology, which was not commercially available or technologically mature when it began development in 2004. With the onset of military operations in Iraq, the Army developed an interim, commercially-available capability called the Joint Network Node-Network to meet the demands of current operations. Full-rate production of WIN-T with mobile ad hoc networking technology is still at least two years away.

7. What is the proper distribution of financial risk between the contractor and the government in major defense acquisition programs? Are contractors assuming any risk at this time?

   The distribution of financial risk between the contractor and the government should be directly related to the amount of risk and uncertainty in a program. As a result, DOD can reduce its financial risk by reducing the risk in its programs before it commits to large scale investments. The principal means that agencies have for allocating cost risk between the government and the contractor is the choice of contract type. According to the Federal Acquisition Regulation, cost reimbursement contracts—which place more of the risk for cost increases on the government—are suitable for use only when uncertainties involved in contract performance do not permit costs to be estimated with sufficient accuracy to use any type of fixed-price contract. This is typically the case for weapon system development because DOD often sets optimistic requirements for weapon programs that require new and unproven technologies. Unfortunately, when early analysis is not performed to ensure that specific DOD needs can be met and that requirements are firmly established and understood prior to starting system development, additional cost risk

to the government can occur. In certain cases, the government may decide that the immediacy of a need warrants taking on extra risk. For instance, in the case of the Mine Resistant Ambush Protected Vehicle, DOD's concurrent approach to producing, testing, and fielding the vehicles provided an urgently needed operational capability; however, it has also increased performance, sustainability, and cost risks. Absent such urgency, the government should take a more measured, less risky evolutionary, knowledge-based approach for developing and delivering warfighter capabilities.

A cost reimbursable contract may contribute to an acquisition environment that is not conducive to incentivizing contractors to utilize the best systems engineering, manufacturing, and supplier quality practices needed to ensure manageable requirements, stable designs, and controlled manufacturing processes to hold costs down. Under these contracts, the government reimburses the contractor for its allowable incurred costs. To be allowable the cost must be reasonable and allocable to the contract. Once it is determined the incurred costs are allowable, the contractor is reimbursed those costs to the extent provided by the contract, in exchange for the contractor's best efforts in completing the contract requirements. The contractor's allowable costs often include addressing quality problems. These problems can cost DOD millions of dollars to fix. For example, DOD signed a cost reimbursement contract to develop the Expeditionary Fighting Vehicle. Prior to the production decision, the contractor was only able to demonstrate 7.7 hours between mission failures, well short of the 17 hours it needed to demonstrate. Company officials stated that design and systems engineering problems contributed to the poor reliability. Nevertheless, DOD is paying an additional $750 million to General Dynamics to fix the reliability problems and has extended the systems development and demonstration phase 4 years.

In contrast, a firm-fixed price contract provides for a fixed price, and places more risk and responsibility for contract costs on the contractor, providing more incentive for efficient and economical contract performance. For example, on the Wideband Global SATCOM program, awarded as a firm-fixed price contract, the prime contractor discovered that certain fasteners were installed incorrectly. As a result, 1,500 fasteners on each of the first three satellites had to be inspected or tested and 148 fasteners on the first satellite had to be reworked. The contractor estimated the impact to the program was at least $10 million, which was borne by the company.

8. What incentive is there for a contractor to submit realistic cost and technical proposals for a new weapon system? Is there any financial downside for the contractor for later cost increases?

   In DOD's current acquisition environment, there is little incentive for contractors to submit realistic assessments of cost, schedule, and technical performance in their proposals for weapon system development contracts. The focus of both the service

sponsors in the department and industry is on capturing and maintaining program funding. The military services overpromise capabilities and underestimate costs to capture the funding needed to start and sustain development programs and this encourages the industry to propose unrealistic cost estimates, optimistic performance, and understated technical risks during the proposal process.

The financial downside for the contractor is limited. For systems development, DOD typically uses cost-reimbursement contracts, in which DOD generally pays the allowable costs incurred for the contractor's best efforts, to the extent provided by the contract. These development contracts are often awarded without the government performing the needed upfront analysis to fully understand whether its requirements can be met and significant contract cost increases can occur as the scope of the requirements become better understood. With either a cost reimbursement or a firm-fixed price contract, if the government changes the requirements after contract performance begins, which in turn causes a price or cost increase for the contractor, the government must pay for these changes.

9. Requirements will always evolve; especially when the eventual end-user is engaged in active combat. Holding requirements static from the date of contract award would mean the systems would no longer be cutting edge when fielded. Changing requirements will almost always increase total cost, but that is the trade-off for making sure equipment is cutting edge on delivery, not just at the time of the initial design phase. How can we best balance these competing realities?

   Historically, DOD's approach has been to develop new weapon systems that often attempt to satisfy the full capability in a single step, regardless of the design challenge or the maturity of the technologies. Under this approach, a warfighter can wait 15 years to receive any improved capability. We found leading commercial companies use an evolutionary or incremental approach to reduce development risks while delivering products to their customer quicker. Commercial companies have implemented the evolutionary approach by establishing time-phased plans to develop a new product in increments (5 years or less) based on technologies and resources achievable now and later. This approach reduces the amount of risk in the development of each increment, facilitating greater success in meeting cost, schedule, and performance requirements. Requirements that cannot be met within the specific timeframe are deferred to the next increment. In effect, these companies evolve a product, continuously improving its performance as new technologies and methods allow them. These evolutionary improvements to products eventually result in the full desired capability, but in multiple steps, delivering a series of enhanced interim capabilities to the customer. Because the product is developed and delivered in 5 years or less, new or needed capabilities can be quickly incorporated into the next increment allowing a quicker development and delivery to the customer. This approach also allows for regular technology updates to a product, which keeps it on the cutting-edge.

This evolutionary approach is not new to the DOD. The Air Force successfully bought more than 2,200 F-16s using an evolutionary approach. By using an evolutionary approach to develop the aircraft, the program was able to quickly deliver new and improved capabilities to the warfighter and increase the aircraft's capability as new technologies matured. The first increment, developed during the 1970s, provided a "day fighter" aircraft with basic air-to-air and air-to-ground capabilities. This allowed the contractor to deliver new and useful military capability to the warfighter in less than 4 years. With each subsequent increment, new technology was used to improve the engine, radar, structure, avionics, and other systems that allow the aircraft today to perform close air support, ground attack, air defense, and suppression of enemy defense missions.

10. How can we in Congress help change the environment that leads DOD to over-promise capability and underestimate cost to sell programs?

Congress has already taken some positive steps in this regard. Recent congressionally-mandated changes to the DOD acquisition system, as well as initiatives being pursued by the department, include elements that could improve DOD's overall investment strategy and the soundness of the programs it allows to move forward. Specifically, Congress enacted legislation that requires decision-makers to certify that programs meet specific criteria at key decision points early in the acquisition process. In addition, the legislation required that programs be measured against their original baseline estimates for the purpose of assessing and reporting unit cost growth. Congress also enacted legislation that requires DOD to report on its strategies for balancing the allocation of funds and other resources among major defense acquisition programs, identify strategies for enhancing the role of program managers in carrying out acquisition programs, and establish review boards to monitor configuration changes. Ultimately though, in fulfilling their own oversight role the members of Congress have their own ideas about whether to authorize and appropriate funds for individual weapons programs. It is the decisions Congress makes on those individual programs that will influence whether the acquisition environment will change or not.

11. You state that instead of seeking to reduce risk early in programs, DOD tends to create "aggressive risk mitigation plans in its programs after poor investment decisions have been made". Do you have any insights as to why DOD seems to do this over and over?

In DOD's acquisition environment, there are few rewards for reducing risks early in the DOD development process. In fact, the DOD requirements, funding, and acquisition processes often encourage programs and their service sponsors to take on additional risk—in the form of ambitious technical requirements and tight cost and

schedule estimates—in order to sell a program and secure funding. Program managers and contractors develop aggressive mitigation plans to address the fallout of the risks that program managers must accept at program start.

12. What is your view of the impact diminished industrial base competition has on this process? Would a more competitive defense industrial base mitigate some of these issues?

DOD's ability to maximize competition to reduce costs and encourage innovation has been limited by changes that have occurred in the defense industrial base. However, in September 2007, the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics took a positive step towards fostering competition and lowering program risk when it directed programs to fund two or more competing teams producing prototypes through the start of development. By producing technically mature prototypes of key systems prior to initiating system development, DOD hopes it can reduce technical risk, validate designs and cost estimates, evaluate manufacturing processes, refine requirements, and ultimately field systems earlier.

13. What can be done by Congress to improve the situation we are faced with in the acquisition of weapons systems, short of adding another layer of burdensome regulation and bureaucracy? Is the establishment of a Director of Independent Cost Assessment, who may not report to the Secretary of Defense, a step in the right direction?

While legislation can help guide change, DOD must ultimately begin making better choices that reflect joint capability needs and match requirements with resources or the department will continue to experience poor acquisition outcomes. Just as importantly, members of Congress can have an impact through the choices they make about whether to authorize and appropriate funds for individual weapons programs. These decisions, as much as legislation, will determine whether or not the acquisition environment will change.

The establishment of a Director of Independent Cost Assessment could result in better cost estimates and more well-developed business cases under the right circumstances. In our July 2008 report on DOD funding practices for weapon programs, we found that development costs for major acquisition programs are often underestimated at program initiation—30 to 40 percent in some cases—in large part because the estimates are based on limited knowledge and optimistic assumptions about system requirements and critical technologies. Even the independent estimates from DOD's Cost Analysis Improvement Group were in some cases understated by billions of dollars. If the Director of Independent Cost Assessment

had the ability to set and enforce policies that say programs need to have realistic cost estimates that are actually informed by knowledge, then programs would have a better foundation from the start and would be put in a better position to succeed.

14. Do you think DOD would be better served by awarding fixed-price contracts for programs and placing more of the risk on the contractor?

Contract type should reflect the risk and uncertainty associated with a program. In order to make greater use of fixed-price contracts, DOD would need to follow a more disciplined approach to weapon systems development than is currently being followed. We have found that leading commercial firms develop new products following a knowledge-based approach, where high levels of knowledge are demonstrated at critical points in development. Programs take steps to gather knowledge that demonstrates that their technologies are mature, their designs are stable, and their production processes are in control. This knowledge helps programs identify risks early and address them before they become problems. As stated earlier, Congress has enacted legislation which requires DOD to address some of these problems. The John Warner National Defense Authorization Act for Fiscal Year 2007 called for the Secretary of Defense to modify Department regulations to require the Milestone Decision Authority for a major defense acquisition program to document the basis for the contract-type selected at Milestone B approval that is consistent with the level of program risk. Before approving the use of a cost type contract for development, the Milestone Decision Authority must execute a written determination that (1) the program is so complex and technically challenging that it would not be practicable to reduce program risk to a level that would permit the use of a fixed-price type contract; and (2) the complexity and technical challenge of the program is not the result of a failure to meet the Milestone B certification requirements established in title 10. One such requirement is that the technology in the program be demonstrated in a relevant environment—a best practice. Further, the conference report accompanying the Act stated that DOD should reduce program risk to the point that the use of a fixed-price contract for major weapon system development may be appropriate.

15. You stated that DOD was actually under budget with the F/A-18 E/F – Hornet Naval Strike Fighter. What other MDAP programs are under budget? What characterized these programs and how did they differ from programs suffering from massive cost overruns?

We have found few major defense acquisition programs that have delivered capabilities to the warfighter and spent less in development than planned. In addition to the F/A-18 E/F, both the Small Diameter Bomb (Increment 1) and the Minuteman III Propulsion Replacement Program fall into this category. The success of these

programs can be characterized by the establishment of a sound business case from the outset including a greater use of an evolutionary, knowledge-based acquisition process than most DOD programs. A business case in its simplest form is demonstrated evidence that (1) the warfighter's needs are valid and that they can best be met with the chosen concept, and (2) the chosen concept can be developed and produced within existing resources—that is, proven technologies, design knowledge, adequate funding, and adequate time to deliver the product when it is needed. At the heart of a sound business case is an evolutionary, knowledge-based development approach that is both a best practice among leading commercial firms and the approach preferred by DOD in its acquisition regulations. Such an evolutionary, knowledge-based process enables decision makers to be reasonably certain about critical facets of the product under development at key points in time. As we reported in March 2008, we continue to find that a prime contributor to DOD's poor program outcomes is the lack of a widespread adoption of this knowledge-based acquisition process within DOD, despite polices that support such a process.

Post-Hearing Questions for the Record
Submitted to Mr. Michael J. Sullivan
From Senator Mark Pryor

"Addressing Cost Growth of Major DOD Weapons Systems"
September 25, 2008

1. What is your opinion of sole source and cost-plus contracts? How do these acquisition processes compare in regard to best practices standards?

   Competition is a fundamental principle underlying the federal acquisition process. Combined with well-defined requirements, competitive awards can reduce prices and help the buyer obtain innovative, high-quality goods and services. DOD's experience with the F-16 fighter engine in the 1980s, has shown competitive pressures can generate financial benefits of up to 20 percent over the life cycle of an engine program and/or improved quality and other benefits. Although maintaining two contractors through production drives up the development costs for a program, in the long run, it can reduce costs and bring other benefits, such as better system performance and reliability, improved industrial base stability, and more responsive contractors. In September 2007, the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics took a positive step towards fostering competition and lowering program risk when it directed programs to fund two or more competing teams producing prototypes through the start of development.

   Cost-reimbursement and fixed-price contracts can both be appropriate for use on weapon system programs, depending on the risk and uncertainty involved. Because DOD often enters into weapon system development contracts with significant unknowns about requirements and the resources needed to meet them, it often uses cost-reimbursement contracts. DOD relies on these contracts because it does not have sufficient information to use a fixed-price contract. However, DOD could reduce the likelihood of cost increases on its cost reimbursement contracts and make greater use of fixed-price contracts if it had clearly defined requirements and appropriate knowledge at critical junctures of its programs. Congress has enacted legislation which requires DOD to address some of these problems. The John Warner National Defense Authorization Act for Fiscal Year 2007 called for the Secretary of Defense to modify Department regulations to require the Milestone Decision Authority for a major defense acquisition program to document the basis for the contract type selected at Milestone B approval that is consistent with the level of program risk. Before approving the use of a cost-type contract for development, the Milestone Decision Authority must execute a written determination that (1) the program is so complex and technically challenging that it would not be practicable to reduce program risk to a level that would permit the use of a fixed-price type contract; and (2) the complexity and technical challenge of the program is not the result of a failure to meet the Milestone B certification requirements established in title 10. One such requirement is that the technology in the program be

demonstrated in a relevant environment—a best practice. Further, the conference report accompanying the Act stated that DOD should reduce program risk to the point that the use of a fixed-price contract for major weapon system development may be appropriate.

When buying products, commercial companies use business practices, such as fixed-price contracts with progress payments and the threat of competition, to incentivize manufacturers to deliver reliable products that meet cost, schedule, and performance goals. For example, commercial customers we have visited, such as Intelsat and American Airlines, expect to operate their products for 15 and 30 years, respectively. These companies focus a great deal of attention on setting performance and reliability goals that manufacturers must meet in order for them to purchase the manufacturers' products. They use fixed-price contracts for their acquisitions and make progress payments following certain key events. Final payment is not made until they are satisfied that requirements have been met. For example, Intelsat retains from 10 to 20 percent of the contract value to be paid to the manufacturer based on the performance of the satellite after it is successfully launched. According to company officials, the retained money is paid to the manufacturer over the expected life of the satellite, which is typically 15 years, when the satellite performs as expected. We also found that commercial manufacturers must develop and deliver high-quality, highly capable products to their customers on-time and at the agreed upon price or suffer financial loss. The manufacturers face competition and know that their customers can choose someone else's products when they are not satisfied. It is this competitive environment, along with fixed-price contracts that incentivizes manufacturers to implement and use best practices related to technology maturity, design stability, and production maturity to improve quality and reduce cost while delivering products on-time.

In addition, there is a discipline that is imposed on product developers in the commercial marketplace that affects how they approach new product launches, even prior to the point of entering into a contract with a customer. In the commercial marketplace, the business case for a new product basically revolves around the ability to produce that product with the right features to meet the market opportunity on schedule, with limited investment capital, and at a predictable unit cost so that the product will sell well enough to make an acceptable return on investment. Commercial firms do not recoup their development costs until a product is sold. Until that point, the firm's own money is at risk. This forces commercial firms to operate in a fixed-cost environment for product development. Because success is determined when the product is delivered to the customer, the business case for launching a program considers production realities and builds in natural curbs to overreaching for performance, cost, or schedule. A company demands considerable proof that the product will fulfill all of the business case factors and then provides full support for the program to succeed. The business case provides a very solid decision-making framework from the outset and throughout the program. Commercial companies build relatively short cycle times, keyed to meeting market demands, into their decisions to begin a product's development. These short timeframes, together with the responsibility for protecting the business case, encourage program managers to identify risks and enable them to say "no" to pressures to accept unknowns. The companies are conservative in their estimates and aggressive in reducing risk. The abundance of reliable data and experienced people from predecessor programs provides a solid factual basis for defining unknowns and assessing risks.

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