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THE JOINT STRIKE FIGHTER

HEARING

BEFORE THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

MARCH 11, 2010

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THE JOINT STRIKE FIGHTER

THURSDAY, MARCH 11, 2010

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

The committee met, pursuant to the notice at 11:11 a.m., in room SR–228, Russell Senate Office Building, Senator Carl Levin (chairman) presiding.

Committee members present: Senators Levin, Lieberman, Bill Nelson, McCaskill, McCain, Chambliss, Thune, LeMieux, and Collins.

Committee staff members present: Richard D. DeBobes, staff director; and Leah Brewer, nominations and hearings clerk.

Majority staff members present: Creighton Greene, professional staff member; Gerald J. Leeling, counsel; and Peter K. Levine, general counsel.

Minority staff members present: Joseph W. Bowab, Republican staff director; Pablo E. Carrillo, minority investigative counsel; David M. Morriss, minority counsel; and Christopher J. Paul, professional staff member.

Staff assistants present: Paul J. Hubbard, Christine G. Lang, Brian F. Sebold, and Breon N. Wells.

Committee members assistants present: James Tuite, assistant to Senator Byrd; Christopher Griffin, assistant to Senator Lieberman; Joel Spangenberg, assistant to Senator Akaka; Madeline Otto, assistant to Senator Bill Nelson; Patrick Hayes, assistant to Senator Bayh; Gordon Peterson, assistant to Senator Webb; Tressa Guenov, assistant to Senator McCaskill; Roosevelt Barfield, assistant to Senator Burris; Clyde Taylor IV, assistant to Senator Chambliss; Jason Van Beek, assistant to Senator Thune; Brian Walsh, assistant to Senator LeMieux; and Rob Epplin and Molly Wilkerson, assistants to Senator Collins.

OPENING STATEMENT OF SENATOR CARL LEVIN, CHAIRMAN

Chairman LEVIN. The committee will come to order for a hearing on the F–35. I want to just check with you, Secretary Carter, do you wish to go through your entire opening statement and, if so, about how long is your opening statement?

Dr. CARTER. Mr. Chairman, I'm at your disposal. If I did give the entire statement, it would take about 10 or 12 minutes. The only reason I mention that is because of the size of the program and all the different pieces, but I'm at your disposal.

Chairman LEVIN. I understand. If you can just keep that down to 10 minutes, no more, it would be welcomed.

We're now going to shift to the second hearing of the morning, the F–35 Joint Strike Fighter (JSF) program. First, I want to thank Senator McCain for suggesting that we have a hearing on the JSF program promptly, for keeping a focus on this program so that we can get on top of what the Department of Defense (DOD) found in various independent reviews of the JSF program, what actions the DOD has taken to ameliorate problems that it found with the program, and what is the best judgment available as to how effective these actions will be in preventing problems with the program, including cost overruns and delays.

We have with us today Dr. Ashton Carter, Under Secretary of Defense for Acquisition, Technology, and Logistics; Christine Fox, Director of the Office of Cost Assessment and Program Evaluation (CAPE); Michael Gilmore, Director, Operational Test and Evaluation (OT&E); General Clyde Moore II, the Air Force Acting Program Executive Officer for the JSF program; and Michael Sullivan, Director, Acquisition and Sourcing Management Team of the U.S. Government Accountability Office (GAO).

So first, let me extend a welcome to our witnesses. We thank each of you for coming before this committee today.

We had a closed briefing for the committee on the JSF program in December 2009 in which Secretary Carter and Director Fox briefed the committee. We discussed the JSF program, the potential scope of the problems facing the DOD, and some of the options DOD had for dealing with these problems.

While both Senator McCain and I would have preferred to have an open hearing at that time, we agreed to hold a closed briefing mainly because of the sensitive nature of some of the contractor data that was discussed.

The F–35 JSF program is currently the largest acquisition program within the DOD's portfolio with an expected acquisition cost before the recent announced cost growth of nearly $300 billion.

Any perturbation of the cost, schedule, or performance of a program that intends to buy more than 2,400 aircraft for Air Force, Navy, and Marine Corps will have significant implications for the rest of DOD's acquisition programs and for the DOD budget as a whole.

I would also note that this committee's strong effort on acquisition reform, which became law on May 22 of last year, included changes to the acquisition procedures requiring implementation of the Weapons Systems Acquisition Reform Act (WSARA), will not be judged positively unless we can demonstrate some success with the largest of the DOD's acquisition programs.

Merely to say that the F–35 program started before we enacted the acquisition reform is not going to be an acceptable answer if there continues to be major disruptions and cost overruns in the program. Delays in producing the F–35 developmental aircraft have caused an estimated 13-month slip in the program for completing the testing.

We have heard estimates that the delay in initial operating capability in the Air Force could slip by as much as 2 years. That delay has both cost implications for the F–35 program itself and cost implications for the Services as they try to manage their current force structure of legacy aircraft.

We know that Secretary Gates announced that he's asking that Lockheed Martin and the rest of the F–35 contractor team share in paying for cost growth in the program. We want to hear more about the situation and whether this might be a way of ensuring that contractor teams will be more cautious before bidding low on future acquisition programs with the hope that they'll be more than able to make it up at the government's expense later on down the road in that program.

It's not enough merely to say that the JSF program will live within its means by shifting production funding to pay for the increased development costs because delayed deliveries of aircraft and/or buying fewer aircraft will have a seriously negative impact on unit procurement costs as well as a significant effect on our ability to support the current force structure.

For instance, the Department of the Navy is already facing a potential shortfall that last year could have totaled some 250 aircraft in the middle of the next decade. A shortfall that's large enough that if it were realized could cause us to tie up aircraft carriers at the pier for lack of aircraft to send with them.

Two years ago the Air Force testified that they could be facing shortfalls even larger than the Navy's in the 2024 timeframe, with a fighter shortage of as many as 800 aircraft. Secretary Gates specifically mentioned last year that the Quadrennial Defense Review (QDR) was going to evaluate fighter requirements so that could have caused those deficits to change somewhat.

However, the QDR did not change the force structure requirements, and even if the DOD were to decide that requirements should be changed, that is unlikely to erase those kinds of deficits. We need to understand what some of the options are that the DOD may be evaluating to deal with those problems.

Another particularly troubling matter was revealed in some of the documentation from the various independent reviews of the JSF program. One observation from the Independent Manufacturing Review Team (IMRT) Report on the JSF program said the following: "Affordability is no longer embraced as a core pillar."

Well, that surely raises great concerns not only about the potential for a Nunn-McCurdy breach now, but for continuing problems for the JSF program. This committee has been a strong supporter of the JSF program from the beginning. However, people should not conclude that we're going to be willing to continue that strong support without regard to increased costs coming from poor program management or from a lack of focus on affordability. We cannot sacrifice other important acquisitions in the DOD investment portfolio to pay for this capability.

Those are a few issues that this committee will be hearing more about today. I now call on Senator McCain.

STATEMENT OF SENATOR JOHN MCCAIN

Senator MCCAIN. Thank you, Mr. Chairman. I would ask that my full statement be included in the record and I want to thank the witnesses. I'll try to be brief.

I've been a strong supporter of this aircraft and this weapon system, but I'm deeply concerned about the cost overruns and the problems that have been associated with the JSF.

Could I just remind you that just last August, after meeting with the program's prime contractor in Texas, Secretary Gates said that his impression is that, "most of the high risk elements associated with JSF's developmental program are largely behind us," and he went on to say that, "there was a good deal of confidence on the part of the leadership here that the manufacturing process, the supply chain, and the issues associated with all of these have been addressed or are being addressed." That was certainly not the impression that we got in the closed meeting that we just had in December.

Press reports are saying that the program would need at least $15 billion more in funding through fiscal year 2015; that the aircraft test and production would slip by at least 2 years; that the JSF program would most certainly suffer a Nunn-McCurdy cost breach. The media reports, Mr. Chairman, have been very stark. Whereas this committee, although our staff has been briefed from time to time, has certainly not been notified.

Now, according to Secretary Carter's statement, it's a comprehensive statement, but it should have been the opening paragraph, I would say, Secretary Carter, this means that the average price of a JSF aircraft as estimated by the Joint Estimating Team (JET), the overall cost of the program averaged over all the years of production divided by the number of aircraft would be more than 50 percent higher in inflation-adjusted dollars than it was projected to be back in 2001 when the program began. Then you go on to say, "I expect that Air Force Secretary Donley will formally notify Congress of JSF's Nunn-McCurdy breach within days."

I have to tell the witnesses that we have not been kept up to speed as much as we should have been. It's been very clear from media reports that there are serious problems, but the most important thing is, much of this was predicted.

It is so much, Mr. Chairman, in keeping with the cost overruns that we've had with literally every major weapons system lately in the last 10 years of cost overruns, being behind schedule, and the impact that has on the existing legacy aircraft, the ability to replace them, and the strain. All of those have been based on certain assumptions that clearly we are not aware of.

It's a bit frustrating to hear the Secretary of Defense as short a time ago as last August tell us that everything's okay, but when we're reading media reports that tell us they are not. I would respectfully ask, Secretary Carter, that you would begin your statement by saying how much over cost is this program going to be and what will be the delay so the American people will know.

The taxpayers are a little tired of this and I can't say that I blame them and so I thank you, Mr. Chairman, for holding this hearing, and I welcome the witnesses.

[The prepared statement of Senator McCain follows:]

PREPARED STATEMENT BY SENATOR JOHN MCCAIN

Mr. Chairman, thank you for holding this important hearing on the F–35 Joint Strike Fighter (JSF) Program.

At an expected total cost of about $1 trillion—almost $300 billion to buy nearly 2,500 aircraft and another $760 billion for future operation and support costs—the JSF program is the largest and most complex acquisition program in the Department of Defense (DOD). Even more importantly, because the JSF is the next genera-

tion fighter-bomber for the Air Force, Navy, and Marine Corps, it will serve as the backbone of the tactical combat aircraft fleet that will be used by the United States and many of our allies for decades to come.

I have been a strong supporter of the DOD and its requests for funding and accelerated development of the JSF, but I am deeply concerned about the program's stability. Much of my concern comes from conflicting information from the DOD and what I see as reluctance by senior DOD officials to share the real story about the JSF's problems in a timely manner with Congress so we can make informed decisions.

Last August, after meeting with the program's prime contractor in Texas, Secretary Gates said that "[his] impression is that most of the high-risk elements associated with [JSF's] developmental program are largely behind us" and that there was "a good deal of confidence on the part of leadership here that the manufacturing process, that the supply chain, that the issues associated with all of these have been addressed or are being addressed."

However, press reports painted a different picture. By July 2009, the Deputy Secretary of Defense had already directed a second Joint Estimating Team (JET II) reassessment of the program, which found that the JSF program would need at least $15 billion more in funding through fiscal year 2015 and that the aircraft production and test schedule would slip by at least 2 years. Soon thereafter, the media reported that another Pentagon-directed review of the program called the Independent Manufacturing Review Team found that the rate at which the program planned to ramp-up producing JSFs would likely not be achieved within the planned timeframe.

Furthermore, Secretary Gates told this committee last month that the initial operating capability (IOC) dates would not change despite restructuring and development delays in the program. Within a matter of days, however, the civilian and military leaders of the Air Force said that the IOC date for the Air Force would probably slip from 2013 to 2015 and that the JSF program would almost certainly suffer a "Nunn-McCurdy" cost breach that will require recertification of the need for the program and its affordability.

I am frustrated with the piecemeal, time-late process by which the DOD has notified the committee of the results of its risk assessments and the changes it has directed in the program. Learning about these developments first from press reports rather than from the DOD frustrates the ability of this committee to exercise proper congressional oversight and does not serve the program well.

As for the merits of DOD's restructuring of the JSF program, it appears that the DOD has embraced the major tenets of our acquisition reform legislation by putting more emphasis on developmental testing, while slowing aircraft production. Also, the DOD's strategy aims to turn the JSF program around by assigning a premium to robust systems engineering and getting reliable and independent cost estimates to better understand what is driving costs. These, too, are consistent with the principles of our acquisition reform legislation and are a move in the right direction. I am also pleased that the DOD intends to better incentivize contractor performance in this program by eliminating award fees and that it is taking steps now to ensure that a fixed-price type contract will be used for the follow-on procurement of these aircraft.

However, even after all the planned restructuring steps have been taken, there is still a lot of concurrency built into the current plan—in other words, we are still trying to design, develop, test, and build production models of the aircraft on overlapping schedules. So, I continue to be concerned about the impact on cost and schedule if we determine during testing that major redesign of this complex aircraft program is required. I am also concerned that if the Services need to replace legacy aircraft, they may be forced to accept aircraft for "initial operating capability" that don't have the operational combat capability the JSF program promised—resulting in the need to buy back capability later through expensive upgrades. Lastly, I'm concerned that delays in the program will cause real problems with our legacy fighter aircraft fleet that have been used more than what was planned over the last 20 years, resulting in the need to extend the service lives of those old airplanes or retire them without replacement—worsening what has been described as a "fighter gap."

On these and other important issues, I look forward to hearing the testimony of our witnesses.

Thank you, Mr, Chairman.

Chairman LEVIN. Thank you, again, Senator McCain, for your focus on this. It reflects the concerns of every member, surely most members of this committee and the concerns which we've talked

about in our opening comments, I hope, will be addressed in the early part of your statement, Secretary Carter, so we can summarize it and then perhaps expand, if you would, as to how are you going to deal with these questions and how did we get to where we're at.

Secretary Carter.

STATEMENT OF HON. ASHTON B. CARTER, UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS

Dr. CARTER. Thank you, Mr. Chairman, Senator. I will give a very abbreviated version of the statement, but let me just cut to the chase to follow up on what Senator McCain said.

When we met in December, I described to you that there were two estimates before the leadership in the DOD of where the program was going. One provided by the Program Office and the contractor, another one provided independently by Ms. Fox's office, the JET estimate stated that there was a wide discrepancy between those two and that we were trying to understand why it is we had one picture on the one hand and one picture on the other hand.

We came to the view and Secretary Gates came to the view that the JET estimate was credible, was carefully done, and should be the basis for our budgeting and program planning going forward and that's the gist of the report I'm going to give you today. It underlies the disappointing news that there will be a critical Nunn-McCurdy breach in this, our largest program.

If there's any kind of silver lining to this story, it is only this, that as between this story which was optimistic and the story that I painted last time of the JET estimate. By addressing the reason for this difference, why you guys say this and you guys say that, understand better what it is that is driving poor performance in the program and we have found some steps, managerial steps that we can take, some have been described by Secretary Gates, to do better.

Senator McCain mentioned one, which is steps taken to compress the development program that was stretching and costing us more money and taking more time than it ought to have. Those investments, as I think you, Mr. Chairman, noted, are investments that we don't think the taxpayer ought to assume solely and so we have asked the contractors to share in those investments required to get us back on schedule.

By beginning a process of aggressive management of this program, we're trying to get to a point where the full consequences of the JET estimate, which as I repeat, are very credible. That's a world that I believe is a realistic estimate of where this program is going.

I'd like to do better and I'd like to challenge the contractors to do better, more jets, faster, cheaper, and in the statement I'll describe the managerial steps we're trying to do to take in the development phase, in the ramp-up to full production, in full production itself, and in sustainment which, though it's many years in the future, is worth planning for now to try to do better.

Chairman LEVIN. Mr. Carter, could I ask again if you could provide us now with a cost overrun, the amount of cost overrun and the months of delay you estimate now?

Dr. CARTER. Yes, absolutely. The measure of delay that I've focused on is a good measure of the technical performance of the program and the slip in the time to completion of developmental testing.

That is the number I'm sure you've heard which originally when I first talked to you, we were projecting a 30-month slip. Now, as a result of these remedial steps that the Secretary directed there is a 13-month slip in the completion of system development and demonstration (SDD).

As regards to costs, I think I'm going to ask Ms. Fox, since she does those estimates, and I assume you're asking principally about the calculation that drives the Nunn-McCurdy breach. Which is the unit cost that is the total cost of the total program as we now project it going forward divided by the total number of airplanes.

Then secondarily, not to make it more complicated than it has to be, in every year of ramp-up, that is, as we negotiate as we are now the Low Rate Initial Production (LRIP) 4 contract, there will be a certain number of aircraft and a price. As with LRIP 5 next year, with the fiscal year 2011 funding that we are asking you for this year.

In those early years, as the ramp goes up, the order numbers are smaller. The line is immature and so the unit costs there are different and obviously higher earlier in the program. We have both the costs in the early ramp years and integrated over the entire program.

Since she is the keeper of those estimates, let me ask Ms. Fox to address that, if I may.

Ms. FOX. Certainly. Senator, the Milestone B 2001 estimated average procurement unit cost——

Senator MCCAIN. Ms. Fox, could I just ask what was the original estimate of the cost of the program and the estimate now? Could we just start with that?

Ms. FOX. Yes, sir.

Senator MCCAIN. Thank you.

Ms. FOX. I'm sorry. I was trying to do that, sir. It was $50 million per copy in 2002 dollars.

Senator MCCAIN. $50 million?

Ms. FOX. $50 million in 2002 baseline-year dollars. That was the Milestone B 2001 estimate. The current program estimate, based on JET II numbers, will be somewhere between $80 million and $95 million in constant-year 2002 baseline dollars. We are refining that estimate now. The $80 million at the bottom——

Senator MCCAIN. This will be the overall. The Air Force is asking for $205 million for one aircraft in the supplemental budget request?

Ms. FOX. Sir, I'm sorry, I can't address that.

Senator MCCAIN. All right. Go ahead, I'm sorry.

Dr. CARTER. I think I may be able to explain that. That is——

Chairman LEVIN. Is that unit costs for the 2,400 planes?

Dr. CARTER. That's unit cost but it's again at this early ramp.

Chairman LEVIN. Is that the unit cost at a particular ramp or is that the overall unit cost for the entire production?

Dr. CARTER. I think the number Senator McCain was pointing to was the unit cost in that particular lot which would have been the LRIP 3 lot.

Chairman LEVIN. Is that what you were asking for?

Senator MCCAIN. Yes, thank you.

Chairman LEVIN. Is LRIP 3 the same number of planes?

Dr. CARTER. No, the ramp goes up with every—I'm sorry, no. LRIP 3 is 30 planes.

Chairman LEVIN. Is that changed from the 2002 estimate, the number in that segment? Was it 30 planes and 30 planes now or has that number changed?

Dr. CARTER. Absolutely the ramp moved even before today.

Chairman LEVIN. I'm not talking about that. I'm talking about the number of planes in that particular segment. In other words, are you dividing by the same number of planes?

Dr. CARTER. She is, yes.

Ms. FOX. For the average unit cost, we're dividing by 2,443 planes and that has been the number we've used since 2002.

Chairman LEVIN. Okay.

Ms. FOX. The LRIP numbers, I believe, have changed, and I'm sorry I don't have those.

Senator MCCAIN. I take it because—and I'm sorry, Mr. Chairman, but I think maybe this could be helpful. I take it that the reason why that the aircraft is now $205 million in the supplemental request is because you're looking at the overall costs which means that the cost of the aircraft will decrease in later years as you ramp up production.

So the early cost of these aircraft in the first couple blocks are much, much higher, is that correct?

Dr. CARTER. That's absolutely correct.

Senator MCCAIN. Thank you, Mr. Chairman.

Chairman LEVIN. Do you have a number to compare to the $205 million? What would it have been if those early predictions held?

Dr. CARTER. Not off the top of my head, but I can get you a number, sir.

[The information referred to follows:]

The Fiscal Year 2011 Overseas Contingency Operations (OCO) Supplemental request included $205 million for one F–35A Conventional Take-Off and Landing variant aircraft, to replace an F–15 combat attrition loss. The $205 million includes the airframe, engine, electronics, support and training equipment, technical publications and contractor services required to be procured to support the weapon system. The requested aircraft would be produced as part of the Low Rate Initial Production Lot 5, which would be among the first 100 aircraft produced. Aircraft procured early in production necessarily cost more as the manufacturing process is still maturing and cost moves down the learning curve.

The Average Procurement Unit Cost (APUC) costs provide a similar comparison to the costs associated with the fiscal year 2011 OCO aircraft request, as they include all procurement costs but do not include facilities or developmental costs. The APUC for the 2,443 aircraft planned to be procured for the U.S. Services is estimated in the December 2009 F–35 Selected Acquisition Report to be between a range of $114 million to $134 million in then-year dollars.

The APUC estimate will likely be refined as part of the anticipated F–35 Nunn-McCurdy review. If the APUC estimate changes, that information will be provided to Congress with the Nunn-McCurdy certification results.

Chairman LEVIN. Good. Why don't you continue then?

Dr. CARTER. Okay. I'll just go back to the beginning and agree with what was said in both of your——

Senator MCCAIN. I'm sorry if I knocked you off script there.

Dr. CARTER. No, not at all.

Senator MCCAIN. I apologize.

Dr. CARTER. Getting to the heart is what it's about. I just wanted to agree this is the DOD's largest acquisition program. It's obviously immensely important to the DOD. It's going to be the backbone of our air combat superiority for a long time. At the same time, however, this committee and Secretary Gates have emphasized performance in our programs. Not just the necessity to have them, but that they perform.

As I'll describe in more detail, the JSF program's fallen short on performance over the last several years and this is unacceptable. It's unacceptable to the taxpayer, to the warfighters of the Air Force, the Navy, the Marine Corps, and all the international partners that are depending on this aircraft.

We described this situation preliminarily in December when we met with you and in his presentation of the President's fiscal year 2011 budget, Secretary Gates described some of the steps he has taken to restructure the program and notably to put it on a more realistic schedule and budget.

These are important steps. I will give you more detail about them today, but I'd also like to emphasize that it's taken a couple of years for the JSF program to fall behind and the DOD's going to need to aggressively manage this program years into the future and particularly in these coming critical years as it transitions from development and test and into production.

We're going to be looking for the program, as I know this committee will, to show progress against a reasonable set of objectives according to a realistic overall plan and I'll describe the elements of that plan.

The emphasis must be on restoring a key aspect of this airplane. When the JSF program was first launched over a decade ago and you've spoken this word already, Senator McCain, and that's affordability. You know that we've conducted several reviews. You and your staffs have those reviews. I won't repeat what they indicated at this time.

Just to rewind the clock a little bit and remind you that the very first JET estimate was done in October 2008. At that time it projected essentially the same thing that this one is projecting; namely, that the SDD phase of the program is taking longer and is costing more than was projected. In response to that October 8 JET estimate, Secretary of Defense Gates added $476 million in fiscal year 2010 to the SDD program for JSF in order to hopefully begin the process of catching it up.

What we got in October 2009 was JET II, the second JET analysis. It was substantially similar to the one of a year before; namely, it said that the JSF SDD program continues for a second straight year to take longer than we thought and cost more than we thought.

It was on the basis of this news 2 years in a row that we determined that we should have a department-wide in-depth review of the program to try to get to the bottom of what was going on and

why there was this vast difference between the JET II estimate and what we were hearing from the Joint Program Office (JPO) and the contractor at that time.

It was also abundantly clear now that back in October and November that if the JET estimate were true, as we have come to believe, that it was credible that the JSF program would be in critical Nunn-McCurdy breach. So that review started in November and I had the opportunity to meet with you and give you some of the results in December.

The Secretary of Defense gave you some of his decisions based on that review and I'd like to briefly recap them in three phases. First, the JSF development phase, then the transition to full-rate production, as one comes up the ramp, and then the full-rate production itself.

Just to repeat, the JET II forecasted, speaking now to the development program, a longer by 30 months and more expensive by $3 billion over the Future Years Defense Program (FYDP) development phase than the JPO was forecasting last summer.

As I indicated, Secretary Gates determined that the JET II estimate regarding the development program was credible. He directed several steps to try to partially restore the SDD schedule to what it was supposed to be.

He didn't get all the way there but, first, he directed the procurement of an additional carrier version aircraft to be used for flight testing. If you have more aircraft for flight testing, obviously you can get through all the tests you need to get done faster, so that's just a matter of adding resources to the test program.

Second, he directed that we take three early production jets that were planned for operational tests and loan them to developmental tests, again, with the objective of hastening the developmental tests.

Third, he directed that the JPO and the contractor add another software integration line to the program. This was to prevent a situation in which we compressed, again, the flight test program but then found that the long pole in the tent was the delivery of mission systems software. We didn't want to get into that situation, so we wanted proactively to add to the software integration capability of the contractor so that that wouldn't become a limiting factor in the future and the Secretary of Defense did that.

On that basis the JET Team said now let's look at that program as restructured by Secretary Gates. Let's go through the math again and when they did that same methodology, they found that the slip was 13 months rather than 30 months. So a 13-month slip is better than the 30-month slip but it's not as good as no slip, but that's as far back as we could get.

Let me just emphasize something I said earlier. It didn't seem reasonable to the Secretary or to any of us that the taxpayer should bear the entire cost of this failure of the program to meet expectations. These additions of additional aircraft and software integration capability, it seemed that costs should be shared between us and the contractor and that is the reason why the Secretary decided to withhold $614 million in award fee from the Lockheed Martin SDD contract.

The second thing I ought to say on this development phase before getting to the early production, is that while it's a constructive result of this JET process that we got 30 months down to 13 months. I just want to emphasize that these are still estimates and reality gets a vote here. However good we are and they are very good in Ms. Fox's shop at estimating, reality gets a vote.

The next 2 years are going to be critical ones, lots of activity in the JSF program. We have delivery of test aircraft at Patuxent River Naval Air Station and Edwards Air Force Base, completion of the analysis of hundreds of test flights and commencement of flight training at Eglin Air Force Base just this year.

If we go on to 2011, that is when we'll have the first short takeoff and vertical landing (STOVL) training and sea trials aboard an actual amphibious ship. The STOVL version is the Marine Corps version, completion of land-based catapult, Senator McCain will appreciate this better than I can, but catapult and arrested landing testing at Lakehurst Naval Air Station and Patuxent River, release of the Block II software to flight test which is a critical software-related milestone, completion of static structural testing of all three of the variants, and so forth. So both 2010 and 2011 are event-filled years and as I said reality gets a vote.

The current program plan, now estimated, as revised, stands up the first training squadron at Eglin in 2011 and delivers production aircraft to the Marine Corps in 2012, Air Force in 2013, and Navy in 2014. Those are the first delivery of aircraft. That is not IOC and I want to address, if I may, Mr. Chairman, IOC simply because there's been so much confusion surrounding what IOC is in the press.

The IOCs are determined by the Services based on both the program's performance and how each of the Services define IOC. Each Service has a somewhat different definition, depending on what capabilities they intend to have at IOC, their operational test and training requirements, and the number of aircraft they require for IOC, and since the restructuring, the Services have specified these definitions.

At this time, based on the revised JET II schedule for the end of developmental and operational tests and their definitions of IOC, the Services are estimating IOCs of 2012 for the Marine Corps and 2016 for the Air Force and Navy.

Let me now speak to the initial production process. The IMRT Report which my office commissioned was mentioned already. That report examined this critical transition from development to full-rate production as one goes up the ramp. The JSF has an unprecedented amount of concurrency in the program. That is a period of time in which the development activities are still continuing and testing even as production begins.

What the IMRT, when it reported back, said in essence that there were a large number of conditions that would have to be met for this program to achieve the ramp that was then planned and they recommended a somewhat flatter and smoother ramp.

That, together with the slip in SDD, means that we are now, and this is the essence of the CAPE projection for this phase of the program, expecting a later and somewhat lower production ramp. Secretary Gates, accordingly, decided to budget to this revised JET II

production ramp and that is why the fiscal year 2011 budget submission forecasts a later, slower ramp.

We are, therefore, budgeting to an independent cost estimate (ICE). This is consonant with your legislation, the WSARA; and doing so has three important consequences for this program.

First, it reduces risk because it reduces concurrency.

Second, the earlier aircraft will be more expensive since they are produced in smaller annual lots.

Third, this is, just to say it again, an estimate.

Obviously, we would like the program to perform better than the revised JET II estimate. That's why we're protecting the option to produce 48 aircraft and not 43 in fiscal year 2011.

This will be determined in negotiations with the contractor which are ongoing. These negotiations include the transitioning of the LRIP contracts for JSF to a fixed price at an earlier date. This is again something this committee in the acquisition reform legislation emphasized.

Obviously, we think the taxpayer would want us to get more and cheaper aircraft in those years than the JET II estimates. So we're going to try to do better in our negotiations with the contractor than the estimate.

Finally, I'll conclude on this point, we go up the ramp and then we're in full-rate production. After several years of LRIP, the program will enter full-rate production and, as was noted earlier, that's 2,443 American jets and 730 jets for our international partners.

The JSF program's been approaching the Nunn-McCurdy threshold for several years and, as I mentioned earlier, it was obvious back in November that if the JET II estimate was accepted, then it would, indeed, breach the Nunn-McCurdy threshold.

Since we do accept and the Secretary accepts the revised JET II estimate as credible and the basis of our program plan, the Secretary of the Air Force will inform Congress within days of a Nunn-McCurdy breach and we will then begin the process of considering the certification of the JSF program.

I guess the only good thing I can say about it at this juncture is that what the thorough process called for in the Nunn-McCurdy legislation, is the very process we began back in November. We have been acting as though we're in Nunn-McCurdy breach since we realized back in November that that's probably where we are going to end up.

We have some of the work behind us and some of that work is represented in what I'm able to tell you today. Ms. Fox can describe all the factors that go into the cost growth. There are a number of them in the airframe, in the engines, in the materials, and other things. Many factors go into that cost growth.

Let me just conclude by looking ahead now. Several management measures are going to be critical over the next few years and Secretary Gates has elevated the position of JSF program Executive Officer (PEO) to three-star rank to reflect this need for experienced and vigorous management.

The JPO, with oversight from the Office of the Secretary of Defense (OSD), will need to take a number of critical steps in the next

few years and once again I divide them into development, ramp-up, and addressing Nunn-McCurdy.

In regard to the developmental test program, the lead up to IOC, it's important to provide the new test assets and software capability to the development program as directed by Secretary Gates so that there won't be any further delays.

Second, the contractor must be held to account to meet or exceed a defined set of milestones connected to earn fee on the development contract. All those events in 2010 and 2011 that I named are now on a schedule and they constitute a set of targets for the program. The remaining fee on the SDD contract will be tied to the achievement of all of those milestones and those negotiations are underway.

Finally, the program's going to need to deal promptly with the issues that arise during flight testing. We're going into flight testing and experience shows that issues will surface in flight testing.

With respect to the ramp-up to full-rate production, the LRIP 4 contract, which covers fiscal year 2011, should provide for pricing that meets or exceeds the JET II-based plan of 43 aircraft and these negotiations are also underway.

LRIP contracts should transition, as I mentioned earlier, to a fixed price structure, reflecting the need for the contractor to control costs and not simply pass them on to the government.

The Director of Defense Procurement and Acquisition Policy, who's with me here today, will be conducting a should-cost analysis in preparation for LRIP 5 so that we, too, on the government side will have a view on what the aircraft should cost in LRIP 5 which will be the fiscal year 2012 buy.

In regard to addressing the Nunn-McCurdy cost growth, affordability must be aggressively and relentlessly pursued by all three airframe contractors, Lockheed Martin, Northrop Grumman, BAE Systems, and the F135 engine prime which is Pratt & Whitney. We will be looking at the cost structure of the JSF in all its aspects; assembly, part supplies, staffing, overheads and indirect costs, cash flows, contract structures, fees, and life cycle costs.

More fundamentally, the program management contractors in the DOD need to surface candidly and openly issues with this program as they arise so that we can deal with them managerially, so that Congress is aware of them and they can be addressed.

I pledge that we will keep this committee fully and promptly informed of this program's progress. We will keep our international partners fully and promptly informed. As I said, the program will benefit from the fresh eyes and experienced managerial hand of a three-star PEO.

Military capability of JSF will ensure that this aircraft will be the backbone of U.S. combat air superiority for the next generation and, as I stated earlier, the technological capabilities of the aircraft are sound, but its affordability must be restored.

Thank you.

[The prepared statement of Dr. Carter follows:]

PREPARED STATEMENT BY DR. ASHTON B. CARTER

Mr. Chairman, Senator McCain, members of the committee: I am pleased to meet with you and my colleagues to discuss the F–35 Joint Strike Fighter (JSF) program.

The JSF is the Department of Defense's (DOD) largest acquisition program, and its importance to our national security is immense. As Secretary Gates has said publicly, "we cannot afford, as a nation, not to have this airplane." The JSF will form the backbone of U.S. air combat superiority for the next generation. It will replace the legacy tactical fighter fleets of the Air Force, Navy, and Marine Corps with a dominant, multi-role, fifth-generation aircraft, capable of projecting U.S. power and deterring potential adversaries. Furthermore, the JSF will have the capability to effectively perform missions across the full spectrum of combat operations. For our international partners who are participating in the program, the JSF will become a linchpin for future coalition operations and will help to close a crucial capability gap that will enhance the strength of our security alliances.

At the same time, Secretary Gates has insisted upon performance in acquisition programs, as has this committee. The JSF program has fallen short on performance over the past several years. This is unacceptable to the taxpayer and to the warfighters of the U.S. Air Force, Navy, and Marine Corps, and to the international partners who also plan to deploy the JSF. We described this situation to the committee when we met with you in December 2009.

In his presentation of the President's fiscal year 2011 defense budget, Secretary Gates described some of the steps he has taken to restructure the program, and, notably, to put it on a more realistic schedule and budget. These are important steps, and we will be giving the committee more detail on them today. But I would like to emphasize that it has taken a couple of years for the JSF program to fall behind, and the DOD will need to aggressively manage the program over the coming critical years as it transitions from development and test into production. The DOD will be looking to the program, as I know this committee will, to show progress against a reasonable set of objectives according to a realistic overall plan. The emphasis must be on restoring a key aspect of this airplane when the JSF program was first launched over a decade ago: affordability.

REVIEWS OF THE JSF PROGRAM

DOD has conducted several reviews of the JSF program: two Joint Estimating Team (JET) reviews, an Independent Manufacturing Review Team (IMRT) review, and a F135 Joint Assessment Team (JAT) review. Let me clear up something right at the beginning: all of these reviews have been provided to your staffs.

The Cost Assessment and Program Evaluation (CAPE) office led the JET I and II reviews. Ms. Fox can describe the documentation and briefings made available to your staff. Acquisition, Technology, and Logistics commissioned the IMRT and the JAT.

In October 2008, the JET I estimate projected that the System Development and Demonstration (SDD) phase of the program would take longer and cost more than both the JSF Joint Program Office (JPO) and the contractor were projecting. Based on the JET I estimate, Secretary Gates directed in October 2008 that $476 million be added to the SDD program in fiscal year 2010 to mitigate the schedule risk and cost growth forecast.

In July 2009, Deputy Secretary Lynn directed that a second JET estimate, JET II, be prepared by October 2009. The JET II estimate was substantially similar to the JET I estimate. It found that the factors noted in the JET I estimate in October 2008 had persisted for another year. These factors were driven by substantially higher contractor Class 2 change traffic (that is, changes in design not resulting from changes in requirements or capability), which led to increased engineering and software staffing, extended manufacturing span times, and delayed delivery of aircraft to flight test. The overall effect of these factors, the JET II said, would be a 30-month slip in the completion of flight test relative to the JPO plan from the summer of 2009.

Additionally, the IMRT review identified a large number of conditions that would need to be satisfied in order for the production ramp-up planned at that time by the JPO and the contractor to be achieved. At about the same time, the JAT review noted substantial cost growth in the F135 JSF engine program and identified measures to arrest, and possibly reverse, that cost growth.

None of these reviews discovered fundamental technological or manufacturing problems with the JSF program, or any change in the aircraft's projected military capabilities. However, all of these inputs suggested that a DOD-wide review of the JSF program was warranted. Further, it was clear that if the JET II estimate was correct, the JSF program would have a critical Nunn-McCurdy breach.

The review, which began in November 2009, was therefore undertaken as though JSF was in Nunn-McCurdy breach. I will describe some of the findings of the review and the management steps taken to date as a result. Most of the important ones

were described by Secretary Gates in his budget testimony to this committee. They are organized according to their respective stages in the life of the program: development, initial production, and full-rate production. I will also describe how the actions we are taking reflect the DOD's acquisition reform focus, and the intent of the Weapon Systems Acquisition Reform Act (WSARA) spearheaded by this committee.

JSF DEVELOPMENT PROGRAM

When we met with the committee in December, we described how the DOD's leadership was presented with two different forecasts about how the JSF program would unfold in the next few years: one from the JPO and contractor, and another from the CAPE-led JET II.

The JET II forecasted, among other things, a longer (by 30 months as measured to the end of developmental flight testing) and more expensive (by $3 billion over the Future Years Defense Program) development phase than the JPO. We explained that the DOD was trying to reconcile these two forecasts.

As part of the budget process, Secretary Gates determined that the JET II estimate, suitably revised, was the more realistic forecast to use for budgeting purposes and directed that the program be restructured around the JET II forecast. The use of this independent cost estimate (JET II) is consistent with the WSARA of 2009.

Secretary Gates also directed several steps to partially restore the SDD schedule. First, he directed the procurement of an additional carrier version aircraft to be used for flight testing. This additional asset will help complete the required flight tests sooner and more efficiently. Second, he directed that three early production jets planned for operational test be loaned to developmental test, adding further assets to the flight test program. We are still working on the details of this loan of aircraft to ensure that it does not have an impact on operational test, as Dr. Gilmore will discuss.

Third, Secretary Gates directed the addition of another software integration line to the program. This is intended to prevent the building of the mission systems software from becoming a limiting factor on the development schedule.

The JET II team estimates that these three steps, taken together, can restore 17 months to the development schedule; that is, reverse what would have been a forecasted 30-month delay in the completion of flight test to 13 months, meaning that it will complete in March 2015. This revised JET II forecast, then, became the final basis for the DOD's budget submission.

I would like to emphasize two things about this restructuring of the development program. First, adding aircraft, software engineering capability, and other resources to the development program to arrest the trend identified by the revised JET II forecast costs money. It did not seem reasonable that the taxpayer should bear the entire cost of this failure of the program to meet expectations. That is why Secretary Gates decided to withhold $614 million in fee from the Lockheed Martin SDD contract.

Second, while recovering 17 of the 30 months of projected development program timeline stretch is a constructive result of the JET process's look over the past 2 years of the JSF's performance, these are estimates, and reality will get a vote. The next 2 years will be critical ones for JSF, with delivery of test aircraft to Patuxent River and Edwards AFB, completion and analysis of hundreds of test flights, and commencement of flight training at Eglin AFB this year, and a number of key milestones in 2011, including:

- Initial Marine Short Take Off and Vertical Landing (STOVL) sea trials with Navy amphibious assault ship (Landing Helicopter Dock);
- Completion of initial land-based carrier catapult and arrested landing testing at Lakehurst, NJ and Patuxent River, MD.
- Release of Block 2 software to flight test;
- Completion of static structural testing of all three variants;
- Mission training initiated at Eglin AFB with Block 1 software;
- Delivery of all LRIP 2 (12 aircraft) and at least 13 of 17 LRIP 3 U.S. and Partner aircraft.

The DOD has challenged the contractor to improve upon the revised JET II estimate, and they have accepted that challenge. The current program plan, as revised, stands up the first training squadron at Eglin AFB in 2011, and delivers operational aircraft to operational squadrons for the Marine Corps 2012, the Air Force in 2013, and the Navy in 2014.

One final note regards Initial Operating Capability (IOC). The IOCs are determined by the Services based on both the program's performance and how the Services define IOC. Each Service has a somewhat different definition, depending on what capabilities they intend to have at IOC, their operational test and training re-

quirements, and the number of aircraft they require for IOC. Since the restructuring, the Services have specified these definitions.

At this time, based on the revised JET II schedule for the end of developmental and operational test, and their definitions of IOC, the Services are projecting IOCs of 2012 for the Marine Corps, and 2016 for the Air Force and Navy.

JSF INITIAL PRODUCTION

The IMRT examined the transition from development to production. For JSF, there is a great deal of "concurrency," meaning that development activities like flight testing are still going when production begins. The IMRT identified a large number of conditions that would have to be satisfied in order for the planned production ramp to be achieved, and recommended that the program adopt a somewhat flatter and smoother ramp. The JET II accepted this revised ramp and then moved it later in time in accordance with the delayed progress of the development program.

Secretary Gates decided to budget to the revised JET II ramp, and the fiscal year 2011 budget submission reflects this later, slower ramp-up to full-rate production for JSF. As mentioned above, budgeting to this revised JET II estimate is consonant with the WSARA. This approach has three consequences:

First, it lowers risk by reducing concurrency.

But second, the early aircraft will be more expensive, since they will be produced in smaller annual lots.

Third, this is—again—an estimate. Obviously we would like the program to perform better than the revised JET II estimate. That is why we are protecting the option to produce 48 aircraft, not 43, in fiscal year 2011. This will be determined in negotiations with the contractor, which are ongoing. These negotiations include the transitioning of the LRIP contracts for JSF to fixed price at an earlier date. Obviously we think the taxpayer would want us to get more and cheaper aircraft than the JET II estimates.

The pattern here is the same as noted above for development: DOD is budgeting to the independent cost estimate, but challenging the contractor to do better than the estimate.

JSF FULL-RATE PRODUCTION AND NUNN-MCCURDY BREACH

Finally, I would like to address full-rate production and the JSF program's breach of the critical Nunn-McCurdy threshold for unit cost.

After several years of low-rate initial production (LRIP), JSF will enter full-rate production and produce 2,443 jets for the U.S. and 730 for international partners.

The JSF program has been approaching the Nunn-McCurdy threshold for several years. As the DOD began reviewing the program in detail in November 2009, it became apparent that if the JET II estimate was right, the cost increases it was projecting, together with other factors, would cause the JSF program to breach the threshold.

This means that the average price of a JSF aircraft as estimated by the JET—the overall cost of the program averaged over all the years of production divided by the number of aircraft—would be more than 50 percent higher (in inflation-adjusted dollars) than it was projected to be back in 2001 when the program began.

I expect that Air Force Secretary Donley will formally notify Congress of JSF's Nunn-McCurdy breach within days. The thorough review of a program required under the Nunn-McCurdy law will be a continuation of the process begun in November, when the JET II estimate indicated the shortcomings of the program over the past years.

There are a number of factors contributing to the cost growth estimate: larger than-planned development costs driven by STOVL variant weight growth and longer forecasted development schedule; increase in labor and overhead rates; degradation of airframe commonality; lower production quantities; increases in commodity prices (particularly titanium); and major subcontractor cost growth. Ms. Fox will describe the CAPE's estimate of these costs during her testimony.

THE WAY FORWARD

Mr. Chairman, Senator McCain, and members of the committee, clearly the JET II and other studies conducted over the past year indicate that the JSF program fell short of expectations and must be restored to affordability and a stable schedule.

Looking ahead to the coming years, several management measures will be critical, and Secretary Gates has elevated the position of the JSF Program Executive Officer to three-star rank to reflect a need for experienced, vigorous management. The JPO, with oversight from the Office of the Secretary of Defense, will need to take a number of critical steps in three areas:

1. The developmental test program and the lead-up to IOC.
2. The ramp-up to full-rate production; and
3. Addressing the Nunn-McCurdy cost growth.

In regard to the developmental test program and the lead up to IOC: First, as I noted earlier, it is important to provide the new test assets and software capabilities to the development program, as directed by Secretary Gates, so there will not be further delays in the completion of flight test. Second, the contractor must be held to account to meet or exceed a defined set of milestones connected to fee on the development contract. These negotiations are underway. Third, the program will need to deal promptly with issues that arise during flight testing—and experience shows there will be such issues.

In regard to the ramp up to full-rate production: the LRIP 4 contract covering fiscal year 2011 should provide for pricing that meets or exceeds the JET II-based plan of 43 aircraft. These negotiations are also underway. LRIP contracts should transition to a fixed-price structure reflecting the need for the contractor to control costs and not simply pass them on to the DOD. The Director of Defense Procurement and Acquisition Policy will be conducting a "should-cost" analysis to prepare for LRIP 5.

In regard to addressing Nunn-McCurdy cost growth: Affordability must be aggressively and relentlessly pursued by all three airframe contractors—Lockheed-Martin, Northrop Grumman, and BAE Systems—and the F135 engine prime, Pratt & Whitney. As part of our continuing "should cost" analysis, we will be looking at the cost structure of JSF in all its aspects—assembly, parts supplies, staffing, overheads and indirect costs, cash flows, contract structures, fees, and lifecycle costs.

More fundamentally, the program management, contractors, and the DOD need to surface candidly and openly issues with this program as they arise, so that Congress is aware of them and they can be addressed. I pledge that we will keep this committee fully and promptly informed of this program's progress. We will also keep our international partners fully and promptly informed. The program will benefit from the fresh eyes and experienced managerial hand of a three-star Program Executive Officer.

The military capability of JSF will ensure that this aircraft will be the backbone of U.S. combat air superiority for the next generation and, as I stated earlier, the technological capabilities of the aircraft are sound. But its affordability must be restored.

Thank you and I look forward to answering any questions you might have.

Chairman LEVIN. Thank you, Secretary Carter. Are there any other opening statements from any of the other panelists?

Ms. Fox.

STATEMENT OF HON. CHRISTINE H. FOX, DIRECTOR OF COST ASSESSMENT AND PROGRAM EVALUATION, DEPARTMENT OF DEFENSE; ACCOMPANIED BY FRED JANICKI, DIRECTOR, WEAPON SYSTEMS COST ANALYSIS DIVISION, COST ASSESSMENT AND PROGRAM EVALUATION, DEPARTMENT OF DEFENSE

Ms. FOX. Thank you, Mr. Chairman. Mr. Chairman, Senator McCain, and distinguished members of the committee, thank you for the opportunity to appear before you to discuss the analytic basis for the restructuring of the JSF program that Dr. Carter has just described.

The analysis has been led by the CAPE directorate and the study team's lead, Fred Janicki, is here with me. Today I will——

Chairman LEVIN. Let me interrupt you if I could.

Ms. FOX. Yes, sir.

Chairman LEVIN. Give us an idea as to how long your opening statement will be?

Ms. FOX. Less than 5 minutes, sir.

Chairman LEVIN. Are there any other opening statements?

Ms. FOX. Yes, sir.

Chairman LEVIN. One other opening?

Dr. GILMORE. Less than 5 minutes.

Chairman LEVIN. Less than 5 minutes.

Dr. GILMORE. I can do it in a minute if that's what you want.

Chairman LEVIN. That would be fine. Is that all right?

If you can boil them down and as I mentioned before, in terms of the Senators, we're going to call on Senators in the same order as they arrived for the first hearing, so everybody's not confused hopefully by the order of recognition.

So, Ms. Fox, please.

Ms. FOX. Let me try to shorten my statement, sir. A couple things about the ICE process that I would like you to know. We built, of course, on the methodologies that the CAPE and former Cost Analysis Improvement Group organization have used for many years, but for JSF, I think it's important for you to know that we went one step further and built a team of experts from the defense tactical aircraft community.

So this review was not done just in CAPE alone, but instead we involved multi-governmental experts drawn from the Navy, Air Force, and OSD staffs. The members of that team provided technical expertise across the areas of air vehicle and mission systems engineering, test, and cost estimation. So this was quite an expert team that looked at this.

Dr. Carter has gone through the JET I/JET II history, so I won't do that again, but I would like to talk about what the estimate actually means. It is difficult to mathematically calculate the precise confidence levels associated with ICEs prepared for major acquisition programs.

Based on the rigor of the methods used in building the estimate, the strong adherence to the collection, use of historical cost information, and the review of applied assumptions, we project that it is about equally likely that the JET II estimate will prove too low or too high for execution of the restructured program as described.

I would also like to comment here on the documentation of the JET II work. Normally, we would document the results of an ICE, such as JET II, in a written report. In the case of JET II, however, we pulled the results into a summary-level briefing as quickly as possible to present to DOD leadership.

That briefing, the same briefing that has been provided to you, immediately prompted Dr. Carter to create a JSF Task Force. From that point forward, these same analysts were deeply engaged in guiding the program restructuring and have not been given the opportunity to write a report.

I believe that this combination of cost estimation as an independent activity and then using it to guide the program restructuring is a direct result of the WSARA legislation and something new for CAPE to grapple with. We prefer to document our work in written reports and hope to return to that practice in the future as we add staff and time permitting.

I was going to briefly summarize the restructuring that Dr. Carter has already gone through, but in the interest of time, let me focus just a minute again on the costs, just to be sure that my answer earlier was clear, if I might.

The program restructuring, based on the JET II cost estimate and the production rates estimated by the IMRT, will result in a

critical Nunn-McCurdy breach of greater than 50 percent when measured from the original acquisition program baseline established for the program in 2001.

We have been preparing for this breach ever since the JET II results became available in October 2009. Even though that formal declaration has not been made to you, we anticipate it will be made to you within days and the DOD plans to complete the recertification review of the restructured program by June 2010.

Let me go over some of these numbers again. In 2001, at the time of the Milestone B approval for the program, the JSF average procurement unit cost was projected to be $50.2 million in constant base-year 2002 dollars. This figure was based on a total anticipated U.S. procurement of 2,852 JSF aircraft, including all three variants, Air Force, Navy, Marine Corps.

The number to be procured was revised in August 2002 to 2,443. That number, 2,443, holds to this day. The revision was in response to Navy/Marine Corps tactical aircraft (TACAIR) integration. The latest JSF acquisition program baseline, dated March 2007, projected an average procurement unit cost of $69.2 million in baseline 2002 dollars.

We currently anticipate that that average procurement unit cost for the restructured program, based on the total still of 2,443 jets, will fall in the range of $80 to $95 million base year 2002. We are in the process of determining that number and it will be included in the restructured program in the Nunn-McCurdy review that has been initiated already.

I would like to focus a minute on the perceptions of the program that result from the restructuring and make clear to you that the projected delay in completion of the Developmental Flight Test Program in our view in CAPE should not be interpreted as a signal that the JSF program has insurmountable technical problems. The result of our reviews instead reflect the program's complexity and the risks remaining in its development activities.

I know that this is not the goal. However, development delays such as the ones that JSF is experiencing have been experienced by other aircraft programs, and these programs ultimately produced aircraft that are valuable to the DOD.

For example, the C–17 experienced significant development problems beginning in the late 1980s and continuing through the 1990s. These problems raised questions about cost effectiveness. In response, DOD restructured the program and reduced the aircraft order until the problems were resolved in the mid-1990s.

Similarly, the F–22 program repeatedly failed to meet key performance, schedule, and cost goals. In response, DOD restructured the development program and reduced production aircraft quantities. Ultimately, the contractor was able to overcome these challenges and produce a capable aircraft.

We are restructuring the JSF program in a very early stage, and we believe that is consistent with the goals of WSARA. The ICEs and the results of the IMRT were taken very seriously and were acted upon by Secretary Gates as soon as we heard about them. DOD now has a realistic fiscal path and plan for this important TACAIR program.

Thank you again for the opportunity to appear before you.

[The prepared statement of Ms. Fox follows:]

PREPARED STATEMENT BY CHRISTINE H. FOX

Mr. Chairman, Senator McCain, and distinguished members of the committee, thank you for the opportunity to appear before you to discuss the analytic basis for the restructuring of the JSF program. The analysis has been led by analysts and managers in Cost Assessment and Program Evaluation (CAPE). Today, I will give you a sense for how the analysis was conducted, its overall findings, and the implications for the program going forward.

CAPE conducts independent cost estimates for major weapons systems. Your Weapons System Acquisition Reform Act recently increased the responsibility and authority of our organization in the conduct of these independent cost estimates. Our work is building on the experience and expertise of the Cost Analysis Improvement Group, who has been conducting these reviews since 1972. Independent cost estimates are conducted by using a combination of historical precedence, results of extensive site visits for all major components of the program, and the actual performance of that program to date. It is a careful, painstaking analysis that looks at all aspects of a program.

For JSF, we went one step further and built a team of experts from the defense tactical aircraft community. Specifically, the Joint Estimating Team (JET) was composed of multifunctional government experts drawn from the Navy, Air Force, and OSD staffs. The members of the team provided technical expertise across the areas of air vehicle and mission systems engineering, testing, and cost estimation.

The JET conducted two reviews. The first, JET I, was conducted in 2008. The results of JET I informed the fiscal year 2010 President's budget. The full cost of development in fiscal year 2010 as predicted by JET I was submitted in the fiscal year 2010 President's budget. To inform the 2011 program review and budget submission, the Deputy Secretary of Defense asked CAPE to lead an update of the original JET report last summer. This team, JET II, began its review in July 2009. Given that the aircraft is still in the early stages of flight testing, the group focused its efforts on examining the resources required by, and the planned schedule for completing, the System Development and Demonstration (SDD) phase of the program. Additionally, the team updated the previous JET estimates of JSF production, fielding, and support costs. Consistent with the methodologies used in independent cost estimation, the JET II conducted comprehensive on-site reviews with the prime contractor and each of the major subcontractors in the JSF program. Through those discussions, the team obtained detailed information on the program's progress to date, enabling it to incorporate the most current information into its cost estimate. The team compared the data gleaned from these interviews with the development and production costs and schedules of previous Department of Defense (DOD) manned tactical fighter aircraft programs. As with any cost estimate developed in CAPE, our objective was to forecast the likely path of events going forward, given the capability requirements and the current status of the program. The JSF cost and schedule estimates developed by the JET II team are based directly on DOD's experience in developing and procuring comparable manned tactical fighter aircraft such as the F–22 and the F–18, adjusted to reflect the actual costs incurred in the JSF program to date and the program's projected acquisition schedule.

It is difficult to calculate mathematically the precise confidence levels associated with CAPE life-cycle cost estimates prepared for major acquisition programs. Based on the rigor in methods used in building CAPE estimates, the strong adherence to the collection and use of historical cost information, and the review of applied assumptions, we project that it is about equally likely that the JSF joint estimate will prove too low or too high for execution of the restructured program as described.

I would like to comment here on the documentation of the JET II work. Normally, we would document the results of an important independent cost estimate such as JET II in a written report. In the case of JET II, however, we pulled the results into a summary level briefing as quickly as possible to present to DOD leadership. This briefing, the same briefing that has been provided to your staff, prompted Dr. Carter to create a JSF Task Force as soon as the JET II results became available. From that point forward, these same analysts were deeply engaged in guiding the program restructuring and have not been given an opportunity to write a report. We prefer to document our work in written reports and hope to return to that practice for the JSF program in the future, time-permitting.

The restructuring led by CAPE also considered results of the Independent Manufacturing Review Team, commissioned by the Under Secretary of Defense for Acquisition, Technology, and Logistics, and discussed in Dr. Carter's testimony. In summary, the Independent Manufacturing Review Team assessed that the rate of pro-

duction of F–35s in the Future Years Defense Program (FYDP) years should be slower than originally planned, and that fewer aircraft should be acquired in the early years until specific manufacturing processes and management tools are put in place and demonstrated in the program. Like the JET estimate, the IMRT ramp is an estimate and we would like the contractor to exceed that ramp if possible.

Given the results of both JET I and JET II as well as the IMRT, we found it necessary to significantly restructure the program in the preparation of the fiscal year 2011 President's Budget request. Specifically, we:

1. Extended the development phase through completion of developmental testing to March 2015.

This is a 13-month extension over the contractor's development schedule plans from Summer, 2009. We included the acquisition of one additional developmental carrier-based JSF test aircraft, allocated three additional production aircraft to the JSF development program to accelerate completion of developmental flight testing, and provided funding for an additional software development and testing line in the program. These actions are all necessary to achieve the new March 2015 date for completion of the development testing. The additional cost to this development phase of the program is $2.8 billion. The contractor will incur a portion of these additional costs as Dr. Carter described.

2. Delayed an increase in the production ramp.

In accordance with the IMRT recommendations, we reduced the planned procurement of JSFs by 122 aircraft in the fiscal years 2011–2015 FYDP. Given the additional time necessary for the development program, this reduction in aircraft procurement quantities in the FYDP reduces the number of aircraft delivered prior to completion of testing. The contractor team will be given the opportunity to exceed this prediction and produce more aircraft than planned in the restructured program based on demonstrated progress in implementing and maturing manufacturing processes, and a demonstrated ability to produce and deliver JSF aircraft to the government at lower cost.

3. Will declare a critical Nunn-McCurdy breach.

The program restructuring, based on the JET II cost estimate and the production rates recommended by the IMRT, will result in a critical Nunn-McCurdy breach of greater than 50 percent when measured from the original acquisition program baseline established for the JSF program in 2001. We have been preparing for this breach ever since the JET II results became available in October 2009. The formal declaration of the breach to Congress is anticipated by April 1, and DOD plans to complete certification review of the restructured JSF program by June 2010.

In 2001, at the time of Milestone B approval for the program, the JSF average procurement unit cost was projected to be $50.2 million in constant, base-year 2002 dollars. This figure was based on a total anticipated U.S. procurement of 2,852 JSF aircraft, including all three variants—for Air Force, Marine Corps, and Navy. The number of aircraft to be procured was revised in August 2002 to 2,443. This revision was in response to plans for Navy/Marine Corps tactical aircraft integration. The latest JSF acquisition program baseline, dated March 2007, projected an average procurement unit cost figure of $69.2 million (budget year 2002 $).

We currently anticipate that average procurement unit cost figure for the restructured JSF program in the fiscal year 2011 President's budget, based on a total planned U.S. procurement of 2,443 JSFs, including all variants, will fall in the range of $80–$95 million (BY 2002 $). DOD is in the process of determining the specific average procurement unit cost figure to be included in the restructured JSF program baseline based on the Nunn-McCurdy review process that has already been initiated in DOD. The specific average procurement unit cost figure will be determined based on review of the latest program plans and cost information for those aspects of the program that affect primarily the years beyond 2015—including requirements for full-rate production tooling, support equipment, sparing of critical subsystems, and the effects of high annual procurement and production rates on efficiencies and costs. The specific APUC figure will be included in the final JSF Nunn-McCurdy certification package to be delivered to Congress in early June 2010.

Finally, I would like to focus a minute on the perceptions of the JSF program that result from this restructuring. The projected delay in completion of the developmental flight test program should not be interpreted as a signal that the JSF program has insurmountable technical problems. The results of our reviews instead reflect the program's complexity and the risks remaining in its development activities.

Development delays such as the ones the JSF program is currently experiencing have been experienced by other aircraft programs. These programs ultimately produced aircraft that are valuable to the DOD. For example, the C–17 program experi-

enced significant development problems beginning in the late 1980s and continuing through the early 1990s. These problems raised questions about cost effectiveness. In response, DOD restructured the program and reduced the aircraft order until the problems were resolved in the mid-1990s. Similarly, the F–22 program repeatedly failed to meet key performance, schedule, and cost goals throughout its development program. In response, DOD restructured the development program and reduced production aircraft. Ultimately, the contractor was able to overcome these challenges and produce a capable aircraft.

We believe that the restructuring of the JSF program at this early stage is consistent with the goals of WSARA. The independent cost estimates and the results of the IMRT were taken very seriously and acted upon by Secretary Gates. DOD now has a realistic fiscal plan for this important tactical aircraft program. Thank you again for the opportunity to appear before you today.

Chairman LEVIN. Thank you very much, Ms. Fox. Dr. Gilmore, you wanted to go next.

Dr. GILMORE. I will make it brief.

Chairman LEVIN. Thank you.

STATEMENT OF HON. J. MICHAEL GILMORE, DIRECTOR OF OPERATIONAL TEST AND EVALUATION, DEPARTMENT OF DEFENSE

Dr. GILMORE. Mr. Chairman, Senator McCain, members of the committee, my primary concern has been assuring that we can begin operational testing on whatever schedule was contemplated. Currently, that would be right around January 2015, completed in a reasonable amount of time.

Currently, we'd anticipate completing it in April 2016, and that the testing can be sufficiently robust to demonstrate that the Air Force, Navy, and Marine Corps are getting aircraft that will provide the combat capability they need.

To do that, we'd need to make sure that we have a robust developmental test program. If we do not have that robust developmental test program, the problems that should have been discovered in developmental testing and fixed in developmental testing will instead be discovered during operational testing which, unfortunately, has been the case in many of our programs when they are much more expensive and time consuming to fix.

In that regard, the direction that Secretary Carter has given to provide additional flight test aircraft, provide additional resources and time to develop, deliver, and test software effectively and to account realistically in the restructured program for the inevitable discovery of problems during flight test. To provide the additional engineering and other resources needed to maintain an adequate pace of testing are just absolutely key. The 13-month schedule extension in the restructured program is absolutely key, in my view, to having that robust developmental test program that will enable us to not discover a bunch of problems at operational testing.

Thank you.

[The prepared statement of Dr. Gilmore follows:]

PREPARED STATEMENT BY DR. J. MICHAEL GILMORE

Good morning Mr. Chairman, Senator McCain, and members of the committee. Thank you for the opportunity to appear before you today to discuss the Joint Strike Fighter (JSF) program.

In my view, the primary issues in the JSF program have been late delivery of test aircraft and the failure to adjust to that reality by building and resourcing realistic system development and test plans, as well as plans for producing and delivering aircraft. These problems have increased concurrency between testing and pro-

duction beyond what was originally expected and beyond historical precedent. The resultant delays relative to unrealistic plans and the associated increase in costs to complete development created the need to restructure the program, which is in progress. In my fiscal year 2009 Annual Report, I assessed that completion of Initial Operational Test and Evaluation (IOT&E) of the most capable combat capability now formally planned (the so-called Block 3 aircraft) could occur in early to mid-2016, provided certain changes are made to specific aspects of the program. Key changes needed include providing sufficient flight test aircraft, providing the resources and time needed to develop, deliver, and test effective software, accounting realistically for the inevitable discovery of problems during flight testing, and providing the engineering and other resources needed to maintain an adequate pace of testing. I would like to review the status of these issues as I understand them today:

- Sufficient flight test aircraft. In the past fiscal year the program failed to meet the planned goals for testing, primarily due to the late delivery of test aircraft. As of today, 3 of the 12 previously planned flight test aircraft operate at one of the government test centers. Expectations at this time last year were that 10 flight test aircraft would have begun productive flight test activity by now, with the final 2 following in the next 90 days. The program office now projects that all 12 of the previously planned developmental flight test aircraft will ferry to test centers by February, 2011. More test aircraft, generated from production lots, are needed to complete Block 3 development. I agree with the assessment of the Joint Estimating Team that 2 C-model aircraft, 1 A-model aircraft, and at least 1 B-model aircraft are needed in addition to the 12 previously planned developmental test aircraft to complete developmental testing in March 2015. Using production aircraft as developmental flight test assets, however, needs to be carefully managed to assure the original purposes for those aircraft, including operational test and evaluation, can still be met, either by returning the borrowed aircraft, or replacing them with other production aircraft.
- Software development and test. The delivery schedules for the remaining mission systems software Blocks 1, 2, and 3 have recently been extended by more than 1 year each compared to the plans existing at this time last year. The late delivery of test aircraft has, so far, masked the effect of delays in software development. Extending the Cooperative Avionics Test Bed availability through the end of developmental testing was a good decision, as the test bed will continue to provide risk reduction. I understand the contractor has also proposed creating a new, additional software integration and test line. Although a lack of software integration and test resources was not identified previously as a problem by program management, the new test line will be very useful provided the contractor has the manpower to operate it and simultaneously accomplish multiple integration activities. However, the reality is that flight test of the essential warfighting capabilities has yet to start. Mission systems flight test in F–35 aircraft begins when aircraft BF–4, the first of four previously planned mission systems test aircraft, ferries to a test center. This is currently planned to occur in May of this year. Only one of the remaining three previously planned aircraft is expected to ferry before the end of 2010, with the final two delivering early in 2011. By mid-2011, flight test is planned to transition from Block 1 to Block 2 capabilities—this will be an important point where the program will deal with the realities of software performance in the first significant combat capability available. Throughout this testing, the program needs to assure software is released to flight test only when it is ready and prepare to cope with the many problems that will be discovered during flight testing; this has been the case with all complex programs of this kind.
- Realistic Schedules and Sufficient Resources. The program's ability to maintain an adequate pace of testing is dependent on how the government and contractors manage several aspects of the planned verification strategy.
    - Integration of multiple test venues. The fundamental test strategy is to integrate multiple test venues, including the corporate labs and the Cooperative Avionics Test Bed, while using F–35 flight test as a "capstone" event. Effective orchestration of these venues and this build-up process is critical to assure efficient use of flight test sorties. We have yet to see how the process being put in place will cope with multiple events for three different variants operating at two flight test centers. Ultimately, those responsible for issuing, or rescinding, flight clearances will need time and resources to examine the data and, if necessary, request and receive additional information. This has already been the case with the Short-Takeoff/Vertical-Landing (STOVL) aircraft testing being conducted at Patuxent River. The con-

tractor predicted early last December that full STOVL flight clearance would be achieved by the end of 2009. That clearance had not yet been achieved as of March 9, 2010, although we hope it is imminent. The decision cycle for understanding flight test results and achieving flight clearance will be under considerable pressure in the coming months, and will require continual supervision in order to meet test goals.

- Accreditation of models. The testing strategy puts a high premium on accreditation of the labs and models that the program plans to use in the build-up to flight test. As of November 2009, about 40 percent of the currently-planned model accreditation activities are planned to complete in 2013 or thereafter. While this gives the program time to incorporate performance data from flight tests in the accreditation process, it also highlights the limited margin available if the models and labs cannot play the intended role of limiting flight test sorties to a minimum amount.
- Resources at the flight test centers. Flight test center resources are also a specific area for continued examination. Adequate spare parts, trained personnel, and training/mission rehearsal tools are essential to reaching the eventual pace of flight test events totaling over 140 per month. While early results in the area of spare parts usage and availability for the three aircraft now flying at Patuxent River are encouraging, managing adequate resources at two flight test centers after the upcoming test aircraft deliveries requires considerable focus and early response as issues arise; again, this has been the case with other programs of this complexity. A high fidelity mission simulator located at the primary flight testing center, which I understand is being considered by the program office, will also be key to sustaining an adequate pace of testing.
- Margin for discoveries. While it is difficult to determine what level of additional schedule is needed for issues yet to be identified, it is important to acknowledge that this is the reality of testing—we will discover problems and need to make adjustments. Engine performance in ground tests, deficiencies in the flight control surface actuators, and slow progress towards the first vertical landing are examples that have already occurred. A more recent example is the need to modify C-model test aircraft and change the design of the keel beam area for production aircraft. I understand the program is now incorporating short periods of downtime in its revised test plans for modifying test aircraft based on discovery of problems. Combined with planning for a realistic number of refly and regression test sorties, these components of planning are the margin for discovery. I note that, while the planned flight testing refly and regression rates were recently increased by a modest amount, they remain below historical experience.

I want to briefly mention a system vulnerability issue. The program office is executing a comprehensive, robust, and fully funded live fire test plan. However, the program's recent removal of shutoff fuses for engine fueldraulics lines, coupled with the prior removal of dry bay fire extinguishers, has increased the likelihood of aircraft combat losses from ballistic threat-induced fires. F–35 live-fire testing to date has shown that threat impact into fuel tanks results in sustained fires. In addition, the F–35 will be more vulnerable to typical non-combat fires caused by fuel leaks and other system failures without the fire-suppression systems. At present, only the integrated power plant bay has a fire suppression system. Though the configuration control process has approved the program office's request to remove these safety systems as an acceptable system trade to balance weight, cost, and risk, I remain concerned regarding the aircraft's vulnerability to threat-induced and safety-related fires.

In conclusion, establishing realistic plans and adjusting to new realities revealed through flight test is essential as we move forward in the JSF program. Restructuring the test program and funding development consistent with the Joint Estimating Team's analysis are essential steps being taken now. In my view, the program needs to adjust continually to balance the pressure to complete testing on schedule and the need to demonstrate that the combat performance needed by the Navy, Marines, and Air Force has been achieved. The demonstrated performance of the aircraft should have the greatest influence on the decisions and adjustments that need to be made as the program progresses.

[The prepared statement of General Moore follows:]

PREPARED STATEMENT BY MAJ. GEN. C.D. MOORE, USAF

Mr. Chairman and distinguished members of the committee, I appreciate your invitation to present an update on the F–35 Lightning II Program status.

The F–35 is the Department of Defense's (DOD) largest cooperative program, with eight other Partner countries participating under Memorandums of Understanding for System Development and Demonstration (SDD) and for Production, Sustainment and Follow-on Development. The eight Partner countries include the United Kingdom, Italy, The Netherlands, Turkey, Canada, Australia, Denmark, and Norway. In addition, Israel submitted a Letter of Request in July 2009 for unique development scope and acquisition of 75 aircraft beginning no earlier than Low Rate Initial Production (LRIP) 6. Several other Foreign Military Sales type study efforts continue for other nations outside the Partnership. Through fiscal year 2010, the eight International Partners will have provided approximately $4.4 billion of their $4.5 billion commitment to the SDD phase of the program.

The F–35 program has made progress towards providing the Air Force, Navy and Marines as well as our Partners a stealthy, long-range, multi-role 5th generation fighter. As a multi-role fighter, the F–35 will greatly enhance operational capability and tactical flexibility of the combatant commanders by providing a 5th generation fighter family that can be deployed from main operating bases, austere bases and aircraft carriers. The F–35's design incorporates leading edge stealth, propulsion, mission systems sensors, interoperability and supportability technology. It is these technologies and capabilities that will provide the warfighters with a long-range, day-one, strike fighter that is capable of executing the essential missions of Strategic and Tactical Suppression/Destruction of Enemy Air Defenses, Strategic Attack, Interdiction, Offensive and Defensive Counter Air, Tactical Intelligence, Surveillance and Reconnaissance and Close Air Support.

The F–35 is in its ninth year of the SDD phase. The program continues technical progress focused on developing and delivering a phased block implementation of software-intensive mission systems capabilities. Technical risks are understood and being addressed. All variants are projected to meet their respective key performance parameters. The program has issued procurement contracts for three lots of LRIP aircraft and will commence LRIP 4 negotiations soon. We have experienced manufacturing delays in completing the developmental test aircraft; however, the metrics indicate the production line is maturing and we expect deliveries to recover to contractual schedule by LRIP 3 completion in late 2011. We also expect to start training operations at Eglin Air Force Base in late 2010 with LRIP 1 aircraft.

Along with many important accomplishments, the program has experienced challenges and disappointments in the transition from development to production. Development program shortfalls, notably late delivery of aircraft to flight test and related test schedule delays, drove the program restructure announced last month. Key aspects of the restructure include: extending the development test schedule to March 2015 and moving Milestone C (Full-Rate Production) to April 2016, commensurate with completion of Initial Operational Test and Evaluation; extending LRIP production further; adding one incrementally funded carrier variant to the SDD program in order to expand development testing capacity; expanding JSF software integration capability by adding an additional software integration line; utilizing three LRIP aircraft in support of development testing; fully funding the SDD program to the OSD Joint Estimating Team's (JET) estimate; and lowering the planned procurement quantity profile through 2015. The remaining fee pool on the SDD air system prime contract will be converted to a performance incentive construct. The new fee construct will establish a balanced and objective incentive structure based on the contractor's performance in attaining milestone schedule events and cost targets. It is important to note that the DOD did not uncover any technology or manufacturing show-stoppers in its review, and did not descope performance requirements during the restructure process.

I'm confident and optimistic in the wake of the restructure—technical progress remains sound based on all key indicators, and I believe the added time and resources will alleviate schedule pressures that have been building for the past few years. The program's near-term focus will be refinement of the restructure to include establishing a revised flight test schedule, negotiating over target baselines with the prime contractors, and incentivizing them to meet their commitments below target costs.

A snapshot of technical progress follows:

- SDD airframe and vehicle systems design is 100 percent complete.
- Five SDD jets have flown a total of 216 hours over 160 flights through March 8, 2010.

• Fifteen of the 19 ground and flight test articles have completed fabrication and been delivered from the factory to final assembly or the test team at Fort Worth, and all SDD aircraft will be ferried to their respective test centers inside the coming year. In total, 43 SDD and LRIP aircraft (including 3 International Partner LRIP jets) are completed or in-work. We await Defense Acquisition Board approval for LRIP 4 full funding this spring.
• Approximately 82 percent (15.4M lines of code) of all F–35 software is coded. The first SDD aircraft (AA–1) with its Block 0.1 configuration has more code than was developed for the F–22 during its SDD phase. We have completed the qualification testing for the avionics and flight systems components for the three variants, and are 63 percent complete with the full life durability testing of those components. Systems integration testing continues on plan via the flying test beds, a Cooperative Avionics Test Bed, and extensive ground-lab testing, with over 150,000 hours of ground-lab testing completed to date. Those facilities, part of the large upfront investment in F–35 design and development, are reducing risk faster than any previous legacy program at the same point. Specifically:
• All variants are within the 3 percent weight growth projection.
• BG–1, the STOVL structural test article, has completed test faster than legacy systems with only one minor finding.
• AG–1, the conventional take-off and landing structural test article began testing 31 July 2009 and is now 76 percent complete with no problems discovered to date.
• The full-scale pole model has completed testing with no issues, and has verified the accuracy of the F–35 signature predictions and indicated satisfactory margin to the key performance parameter for signature.
• Software productivity has surpassed expectations according to all measures including the JET's assessment, and is demonstrating orders of magnitude better software stability at equivalent points compared to legacy programs.
• The F135 engine development program has completed over 13,000 ground test hours and has flown without incident over 160 times. The prior third-turbine blade failure has been effectively addressed as have other lesser significant test findings. In addition, we are executing the F136 engine development program in accordance with appropriated funding while recognizing that DOD does not intend to continue the development next year. The F136 pre-SDD engines have completed over 500 hours of test to reduce risk on their design; the first two SDD engines, while experiencing some test problems last year, have now completed 114 hours of test and advanced the knowledge of their design.

There is no doubt that the initial SDD jets have taken longer to build and ferry to the test centers than originally planned. I believe, however, the prime contractor teams have improved their manufacturing processes and are poised to demonstrate stable and efficient production, a robust design, a highly reliable and sustainable system, and most importantly, an extremely lethal and survivable 5th generation fighter.

Joint development of the F–35 is providing the Services and coalition partners with an affordable weapon system that meets the needs of the warfighters. Analyses show F–35 will exceed legacy capability before delivery of our final software spiral.

Thank you again for this opportunity to appear today. I am looking forward to working with you on behalf of the entire F–35 team and more importantly, our ultimate customer, the F–35 warfighter.

Chairman LEVIN. Thank you very much.

Mr. Sullivan.

STATEMENT OF MICHAEL SULLIVAN, DIRECTOR OF THE ACQUISITION AND SOURCING MANAGEMENT TEAM, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. SULLIVAN. Thank you. I'll be very brief, as well.

GAO has looked at the restructuring efforts that DOD has undertaken and we think they do go a long way to getting at what the problems are.

However, we still believe there's substantial overlap across development, test, and production activities and there's still significant

risk on the program. Slowed by late aircraft deliveries, technical problems, and low productivity, the flight test program, for example, only completed 10 percent of the sorties that they had planned for in 2009.

The problem that we see with the aircraft now is not necessarily technological in nature and it's not necessarily unknowns, if you will, but it's about manufacturing the aircraft. The estimates that they had for the time and the manpower it would take to manufacture the aircraft were very optimistic.

I think the JET analysis is finally getting the actuals that they have in the program now are finally beginning to appear more—I think the cost and schedule estimate is now a lot more reasonable.

I will just throw one metric out. Back when they started engineering and manufacturing development in 2001, I think that they were estimating somewhere around a million labor hours to complete the development program and manufacture aircraft and the estimate is well over 2 million labor hours today. So that's one example of what's happened on this program.

The flight test program is still nascent, it hasn't really begun and once that begins, there's going to be more design changes. There will probably be more delays as a result of that.

So just to summarize, I think that the JET Team got as realistic as they can get at this time. However, there's still a lot of risks in the manufacturing of development aircraft. One other thing I think that's important is that the DOD did take more aircraft out of the near-term years which we think is a way to mitigate risk. However, they're still going to be purchasing about 300 procurement aircraft before they're done with development tests.

[The prepared statement of Mr. Sullivan follows:]

PREPARED STATEMENT BY MICHAEL SULLIVAN

Mr. Chairman and members of the committee:

Thank you for the opportunity to discuss our work on the F–35 Lightning II, also known as the Joint Strike Fighter (JSF). The JSF is the Department of Defense's (DOD) most costly and ambitious aircraft acquisition. DOD is seeking to simultaneously develop and field three aircraft variants for the Air Force, Navy, Marine Corps, and eight international partners. The JSF program is to provide critical replacement aircraft that will serve as the heart of future tactical air forces. It will require a long-term commitment to very large annual funding outlays. The current estimated investment is $323 billion to develop and procure 2,457 aircraft.

Through March 2009, GAO has issued five annual reviews of the JSF program under congressional mandate.[1] We have consistently reported on the elevated risk of poor program outcomes from the substantial overlap of development, test, and production activities and our concerns about the Government investing in large numbers of production aircraft before variant designs are proven and performance verified in testing. In our March 2009 report,[2] we again noted development cost increases, additional delays in manufacturing and testing schedules, and the government's increased financial risk from plans to increase procurement in advance of testing. DOD concurred with, but has not yet implemented, our two recommendations to report on plans for transitioning from cost-reimbursement to fixed-price contracts for aircraft procurement and to ensure that the prime contractor performs detailed schedule risk analyses to provide important insight into use of management reserve funds and manufacturing progress.

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[1] Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005, Pub. L. No. 108–375, § 213 (2004).

[2] GAO, Joint Strike Fighter: Accelerating Procurement before Completing Development Increases the Government's Financial Risk, GAO–09–303 (Washington, DC: Mar. 12, 2009).

This testimony is based on our sixth annual review, which will be released later this month. GAO's work for this report began under a request from the Chairman and Ranking Member of the House Armed Services Air and Land Subcommittee. Subsequently, we received a new mandate in the National Defense Authorization Act for Fiscal Year 2010 to annually review the JSF program through 2015.[3] We examined: (1) program cost, schedule, and performance; (2) manufacturing plans and results; and (3) test plans and progress. To conduct this work, we tracked and compared current cost and schedule estimates with those of prior years, identified changes, and determined causes. We obtained program status reports, manufacturing data, and test planning documents. We conducted our own analyses of the information. We discussed results to date and future plans to complete JSF development and move further into procurement with DOD, JSF, and contractor officials. We conducted this performance audit from May 2009 to March 2010. Our work was performed 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.

In brief, Mr. Chairman, our work has found that, although the department has recently directed a number of strong actions that should improve JSF program outcomes in the future, development costs have continued to increase and key events were missed. Although improving, manufacturing inefficiencies and parts problems persist, slowing delivery of test aircraft and, in turn, delaying development flight tests. DOD's restructuring actions should help, but there is still substantial overlap of development, test, and production activities while DOD continues to push ahead and invest in large quantities of production aircraft far ahead of completing testing. In light of these circumstances, we are recommending in our forthcoming JSF report that DOD: (1) make a new, comprehensive and independent assessment of the costs and schedule to complete the program, including military construction, JSF-related expenses in other budgets, and life cycle costs; and (2) reassess warfighter requirements and, if necessary, defer some capabilities to future increments. GAO will also suggest that Congress consider requiring that DOD establish a management tool for tying annual procurement requests to demonstrated progress in testing and manufacturing. The report is currently at DOD for comment which we expect to receive soon.

COST INCREASES AND SCHEDULE DELAYS INCREASE RISK OF NOT MEETING WARFIGHTER REQUIREMENTS ON TIME

The JSF program continues to struggle with increased costs and slowed progress—negative outcomes that were foreseeable as events have unfolded over several years. Total estimated acquisition costs have increased $46 billion and development extended 2½ years, compared to the program baseline approved in 2007. DOD is now taking some positive steps that, if effectively implemented, should improve outcomes and provide more realistic cost and schedule estimates. Officials increased time and funding for system development, added 4 aircraft to the flight test program, and reduced near-term procurement quantities by 122 aircraft. Restructuring is not done and further cost growth and schedule extensions are likely. There is a substantial risk that the program will not deliver the expected number of aircraft and required capabilities on time. Dates for achieving initial operational capabilities may have to be extended or some requirements deferred to future upgrades. Also, aircraft unit costs will likely exceed the thresholds established by the statutory provision commonly referred to as Nunn-McCurdy[4] and require the Department to certify the need for the JSF to Congress. Program setbacks in costs, deliveries, and performance directly impact modernization plans and retirement schedules of the legacy aircraft the JSF is slated to replace.

Table 1 summarizes changes in program cost, quantities, and schedules at key stages of acquisition. The 2004 replan estimates reflect a quantity reduction and a major restructuring of the program after integration efforts and design review identified significant weight problems. The 2007 data is the current approved acquisition baseline and the 2011 budget request reflects cost increases stemming from a major

[3] National Defense Authorization Act for Fiscal Year 2010, Pub. L. No. 111–84 § 244 (2009).

[4] 10 U.S.C. § 2433 establishes the requirement for DOD to perform unit cost reports on major defense acquisition programs or designated major defense subprograms. If a program exceeds cost growth thresholds specified in the law, this is known as a Nunn-McCurdy breach. DOD is required to report breaches to Congress and, in certain circumstances, DOD must reassess the need for the program and submit a certification to Congress in order to continue with acquisition.

reassessment of the program by a joint team comprised of OSD, Air Force, and Navy representatives.

Table 1: Changes in Reported JSF Program Costs, Quantities, and Deliveries

	October 2001 (system development start)	December 2003 (2004 Replan)	March 2007 (Approved Baseline)	Fiscal Year 2011 Budget Request
Expected quantities				
Development quantities	14	14	15	14
Procurement quantities (U.S. only)	2,852	2,443	2,443	2,443
Total quantities	2,866	2,457	2,458	2,457
Cost Estimates (then-year dollars in billions)				
Development	$34.4	$44.8	$44.8	$49.3
Procurement	196.6	199.8	231.7	273.3
Total program acquisition (see note)	$231.0	$244.6	$276.5	$322.6
Unit Cost Estimates (then-year dollars in millions)				
Program acquisition	$81	$100	$113	$131
Average procurement	69	82	95	112
Estimated delivery dates				
First operational aircraft delivery	2008	2009	2010	2010
Initial operational capability	2010-2012	2012-2013	2012-2015	2012-2015

Source: GAO analysis of DOD data.

Note: Military construction costs, typically part of total program acquisition costs, are not included in this table. Construction costs associated with the JSF program are incomplete and have been inconsistently portrayed at various stages.

Table 2 shows the extension of major milestone dates for completing key acquisition activities. The February 2010 restructure reflects the direction ordered by the Secretary in an acquisition decision memorandum issued on February 24 and revised on March 3. Completing system development and approving full-rate production is now expected in April 2016, about 2½ years later than planned in the acquisition program baseline approved in 2007.

Table 2: Changes in Major Milestones

Major Milestones	Program of record December 2007	Program of record December 2008	Restructure February 2010
Development Testing Complete	October 2012	October 2013	November 2014
Initial Operational Test and Evaluation Complete	October 2013	October 2013	January 2016
System Development and Demonstration Phase Complete	October 2013	October 2014	April 2016
Full-Rate Production Decision	October 2013	October 2014	April 2016

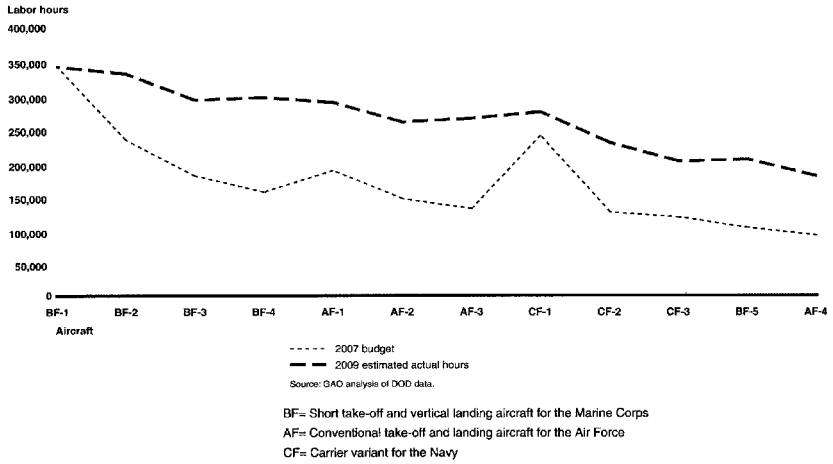
Source: GAO analysis of DOD data

MANUFACTURING AND ENGINEERING CHALLENGES CONTINUE TO SLOW AIRCRAFT DELIVERIES AND HOLD THE PRODUCTION SCHEDULE AT RISK

Manufacturing JSF test aircraft continues to take more time, money, and effort than budgeted. By December 2009, only 4 of 13 test aircraft had been delivered and total labor hours to build the aircraft had increased more than 50 percent above earlier estimates. Late deliveries hamper the development flight test program and affect work on production aircraft, even as plans proceed to significantly ramp-up annual procurement rates. Some improvement is noted, but continuing manufacturing inefficiencies, parts problems, and engineering technical changes indicate that de-

sign and production processes may lack the maturity needed to efficiently produce aircraft at planned rates. An independent manufacturing review team determined that the planned production ramp rate was unachievable absent significant improvements. While the restructuring has reduced near-term procurement, annual aircraft quantities are still substantial. In addition, the program is procuring a substantial number of low rate production (LRIP) aircraft using cost-reimbursement contracts, a contract type that places most of the cost risk on the government.[5] Continued use of cost reimbursement contracts beyond initial LRIP quantities indicate that uncertainties in contract performance exist that do not permit costs to be estimated with sufficient accuracy for the contractor to assume the risk under a fixed-price contract. Figure 1 compares labor hour estimates for test aircraft in 2007 and the revised manufacturing plan in 2009.

Figure 1: JSF Labor Hours for Manufacturing Test Aircraft



LITTLE PROGRESS IN DEVELOPMENT TESTING WHILE PROGRAM CONTINUES TO FACE TECHNICAL CHALLENGES

Although DOD's restructuring actions should help, there is still substantial overlap of development, test, and production activities while DOD continues to push ahead and invest in large quantities of production aircraft before variant designs are proven and system performance verified. Given the extended development time and reduced near-term procurement, DOD still intends to procure up to 307 aircraft at an estimated cost of $58.2 billion before completing development flight testing by the beginning of fiscal year 2015 (see figure 2). At the same time, progress on flight testing is behind schedule—slowed by late aircraft deliveries and low productivity, the flight test program completed only 10 percent of the sorties planned during 2009. Other technical challenges include: (1) relying on an extensive but largely unproven and unaccredited network of ground test laboratories and simulation models to evaluate system performance; (2) developing and integrating very large and complex software requirements; and (3) maturing several critical technologies essential to meet operational performance and logistical support requirements. Collectively, testing and technical challenges will likely add more costs and time to development, slowing delivery of capabilities to warfighters and hampering start up of pilot and maintainer training and initial operational testing.

[5] According to the Federal Acquisition Regulation, this contract type is suitable for use only when uncertainties in contract performance do not permit costs to be estimated with sufficient accuracy to use a fixed-price contract. Federal Acquisition Regulation § 16.301–2.

Figure 2: JSF Procurement Investments and Progress of Flight Testing

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Cumulative procurement (billions of dollars)	$0.9	$3.6	$7.1	$14.4	$23.6	$33.2	$45.2	$58.2	$72.4
Cumulative aircraft procured	2	14	28	58	101	146	217	307	420
Development flight testing schedule									

Source: GAO analysis of DOD data.
Note: U.S. Investments Only.

CONCLUDING REMARKS

The JSF is DOD's largest and most complex acquisition program and a linchpin of the United States and its allies' long-term plans to modernize tactical air forces. It will require exceptional levels of funding for a sustained period through 2034, competing against other defense and non-defense priorities for the federal discretionary dollar. DOD leadership has taken some recent positive steps that, if effectively implemented, should improve outcomes and provide for a more realistic, executable program. However, we believe additional steps are needed to ensure the JSF program is able to meet warfighter expectations. To date, the Department does not have a full, comprehensive cost estimate for completing the program. Credible cost and schedule estimates are critical because they allow DOD management to make sound trade-off decisions against competing demands and allow Congress to perform oversight and to hold DOD accountable. Because of the significance that the JSF is expected to have on the future of the tactical aircraft fleet, the services should have a high degree of confidence in their ability to meet their initial operational capability requirements and to acquire JSFs in quantity so that DOD can plan its overall tactical aircraft force structure strategy. However, the Department has not defined what are reasonable expectations for achieving initial operational capabilities for each of the services given the substantial changes to the program already experienced and future changes directed by the recent restructuring.

Finally, while the Department has reduced near-term procurement quantities, there is still substantial overlap of development, test, and production activities now stretching into 2016. Constant program changes and turbulence have made it difficult to accurately and confidently measure progress and maturity of the aircraft system. The program has often fallen short of expectations in regards to its annual plans. Tying annual investments more directly to demonstrated progress in developing, testing, and manufacturing aircraft may be a prudent fiscal measure for ensuring government funds are invested wisely.

In light of these circumstances, we are recommending in our forthcoming JSF report that DOD: (1) make a new, comprehensive and independent assessment of the costs and schedule to complete the program, including military construction, JSF-related expenses in other budgets, and life cycle costs; and (2) reassess warfighter requirements and, if necessary, defer some capabilities to future increments. GAO may also have a matter for congressional consideration to address some of the issues raised in this testimony.

Mr. Chairman, this completes my prepared statement. I would be pleased to respond to any questions you or other members of the committee may have.

For further information on this statement, please contact Michael Sullivan at (202) 512–4841 or sullivanm@gao.gov. Contact points for our Office of Congressional Relations and Public Affairs may be found on the last page of this statement. Individuals making key contributions to this statement are Bruce Fairbairn, Ridge Bowman, Charlie Shivers, David Adams, Lindsay Taylor, W. Kendal Roberts, Matt Lea, and Greg Campbell.

Chairman LEVIN. Thank you very much, Mr. Sullivan. Let's try an 8-minute first round and I'll yield to Senator McCain.

Senator MCCAIN. I thank you, Mr. Chairman, and I appreciate it.

Very briefly, Ms. Fox, you give as examples of success the C–17 and the F–22. Both of them had significant cost overruns, but you also mention that they resulted in decreased production numbers.

Do you anticipate the same thing to happen with the JSF?

Ms. FOX. Sir, I'm not trying to suggest that we're going to decrease production.

Senator MCCAIN. You suggested that they were successful programs and both of them resulted in less numbers produced and higher unit costs.

Ms. FOX. Yes, sir, absolutely. The only comparison was that the program is not based on a technical problem. Those programs looked very troubled in the same stages and they developed capable aircraft in the end game.

Senator MCCAIN. They developed capable aircraft, Ms. Fox, but with incredibly high costs, far higher than initial estimates which is one of the reasons why we've been as engaged as we have. I'm astonished you would use that as some kind of success story because they overcame technical problems but the unit costs almost doubled or more, is that right, Mr. Sullivan?

Mr. SULLIVAN. Well, I——

Senator MCCAIN. Of the F–22 and C–17 and the delays were enormous.

Mr. SULLIVAN. Yes, sir.

Senator MCCAIN. So you know, I don't get it.

Ms. FOX. Sorry, sir. I was not trying to suggest that this is the goal. In fact, I tried to say the cost is clearly a tremendous problem and I believe that the costs that we have estimated are as realistic as we can be and are trying to put that forward for everyone to look at. It's merely that the JSF program is producing technically capable aircraft.

Senator MCCAIN. If you follow the example of the F–22 and the C–17, the units' numbers produced go down and the unit costs continues way up.

Mr. Sullivan, you indicated in your remarks that basically this reduction in official timeline to 17 months versus the 30-month delay savings is fraught with risk, is that correct?

Mr. SULLIVAN. Yes. What the GAO has looked at is that there's still incredible risk in just manufacturing the aircraft and in having a test program that really hasn't started yet.

Senator MCCAIN. Basically what we're doing here to reduce this delay is putting aircraft out into operational mode without having completed the originally planned testing and evaluation, is that correct?

Mr. SULLIVAN. I think as they ramp up, as I said, they'll have procured about 300 aircraft, even given the restructuring here, before they've completed developmental flight testing. So to us, that's still significant risk in the program.

This is a mitigated risk, I think, because they added—the other thing they did was they added test assets. So they'll be able to burn down the test points, the tasks, probably a little bit faster but still very risky.

Senator MCCAIN. Could I just again go through this cost thing, you're asking $205 million for one strike fighter in the additional budget request, yet we're alleging that the cost will be $80 to $90 million per copy.

Isn't it a bit elusive to say that when clearly in the first couple of blocks the costs will be very high and the examples that Ms. Fox just stated, we will purchase less than we had originally planned. Easily these unit costs could not be at $85 or $90 million, they would be dramatically higher, if precedent holds true here?

Mr. SULLIVAN. I would argue that they really don't know yet because one good indicator of that at this point is that they're still operating under cost-plus contracts to procure these aircraft. That means that the contractor's not willing to commit to a unit price at this time.

Senator MCCAIN. I wonder, Secretary Carter, when the contractor is willing to submit a unit cost?

Dr. CARTER. It's a good question and a good indicator of how—of the contractor's own estimation of the stability of the line and we're in discussions about that. Not later than LRIP 5 will I require a fixed price.

Senator MCCAIN. How long will that be?

Dr. CARTER. That will be next year. So you're right. Up until now, the LRIP contracts have been cost-plus. I think it's time, and good discipline suggests, that we transition the LRIP contracts to fixed price.

That puts a burden, obviously, on the manufacturer to control costs and to be able to know what these unit costs are because then if they overrun, it's on their budget, not on our budget, which is the whole point of fixed-price contracting at this stage. It's the healthy thing to do.

Senator MCCAIN. I thank the chairman for allowing me this time.

General Moore, you're confident in the plans that have been described to this committee, that you're going to buy 2,400 planes and then some and that the unit costs will not increase further, and you will have the OT&E successfully completed while the aircraft are in an operational mode without having to go back and retrofit it rather significantly and expensively?

General MOORE. Senator, if I can take on those questions. First of all, for the unit cost. I am confident as the program manager that we will be able to do better based on those cost estimates. That's what I've been challenged to do by the DOD and I intend to do so.

Senator MCCAIN. You're confident we will buy this number?

General MOORE. I'm sorry, sir?

Senator MCCAIN. You're confident we will buy this number of aircraft?

General MOORE. I'm confident that we'll be able to continue reducing the costs, as we've projected, as we negotiate the future contracts as we're doing right now with LRIP 4.

Senator MCCAIN. You're confident there will be no further delays?

General MOORE. I'm confident that, given the schedule that's been laid out, that we now have reasonable margin to deliver the full capability of the aircraft within the schedule and within the budget that's been allocated.

Senator MCCAIN. I thank the witnesses and I thank you, Mr. Chairman, for holding this hearing. Obviously we have a lot of monitoring to do and I am very grateful that you held this hearing. I think it's been very helpful and I would like to submit follow- up questions to the witnesses.

Chairman LEVIN. Thank you. We will keep the record open for your questions and questions of other Senators. Let me begin my questioning with looking backward in time.

What caused these huge errors in these estimates? These are 60 to 90 percent increases. These breaches are 50 percent plus and that, of course, triggers Nunn-McCurdy, but there's more than 50 percent increases. They're somewhere between 60 and 90 percent increases.

How do we deter this? Who's accountable for that? Whose mistakes are those and who's paying a price?

Dr. CARTER. If I may, let me do some of the diagnosis first and then the treatment. In the development phase—what's basically been going on for the past couple years is that when it comes time to put the pieces together down in Fort Worth, on occasion they don't quite fit together.

That's because when they were designed, the matchup wasn't done just right and all of this is perfectly normal and that leads to what I refer to in here as the Class 2 change traffic, meaning that the pieces, the design of the pieces has to be changed.

You're not changing the capabilities of the aircraft in any way. You're just trying to make the thing fit together. There has been a lot of change traffic on the line. Every time——

Chairman LEVIN. I don't know what that means, "change traffic on the line."

Dr. CARTER. I'm sorry, it just means——

Chairman LEVIN. You're changing the design, the requirements?

Dr. CARTER. Changing the design of the pieces so that they fit together and then it takes engineers to do those changes. It takes time to do those changes. Everybody else waits around while those changes are made. So it introduces inefficiency on the line. It may seem mundane, but this is the kind of thing that has driven the slow delivery of aircraft to test and——

Chairman LEVIN. I'm not talking about slow delivery. I'm talking about these huge cost overruns here.

Dr. CARTER. I'm sorry. Then I was going to get to the second part.

Chairman LEVIN. Since March 2007, it's gone up from 15 to 35 percent. In other words, in 2007 it was about $70 million a copy in 2002 constant dollars, now it's $80 to $95 million. So it's gone up from $10 to $25 million estimate constant dollars in the last 3 years.

Dr. CARTER. Yes.

Chairman LEVIN. Is that still your——

Dr. CARTER. Yes, yes, that's right.

Chairman LEVIN. Are you satisfied with that?

Dr. CARTER. I'm not satisfied with it, but the—I'm sorry. You were asking then the contributory causes to the unit cost growth in the aircraft and there again, there are several of those.

First, and very significantly was the larger than planned development costs for the STOVL version because of the weight growth in that variant. That occurred several years ago, and the longer than forecasted development schedule which I've already described, increase in labor and overhead rates, and degradation of airframe commonality.

Chairman LEVIN. Increase in labor and overhead rates, now weren't they foreseeable?

Dr. CARTER. They were not foreseen.

Chairman LEVIN. No, I said were they foreseeable?

Was there a buy-in here? Is this a historic, traditional buy-in that someone bids low, gets a huge contract, and then we pay the price down the line? Is that what's going on here?

Dr. CARTER. That has certainly been something that's occurred in the past.

Chairman LEVIN. No, in this one?

Dr. CARTER. It may have been the case with this one.

Chairman LEVIN. On this one, Secretary Carter.

Dr. CARTER. It's a pattern that would match that but I can't speak to that in this instance.

Chairman LEVIN. Who's going to determine whether that's true and what action will we take against people who bought it in?

Dr. CARTER. For this program, we're going to aggressively manage from this point forward. For new programs we're going to follow the instructions you gave us in the WSARA and do independent cost estimating from the very beginning.

So when the program starts out there isn't an opportunity for buy-out, buy-in because Ms. Fox's organization has already done the cost estimate. But we are where we are in the JSF program and from where we are now we need to try to wrestle these costs down.

Chairman LEVIN. Now there was great concurrency that you made reference to in this program and that means that there's great risks. That concurrency, I gather, has been somewhat reduced by the sloping, reduced by the number of—I believe the other way was that what we're going to have more planes that are going to be tested.

Dr. CARTER. Correct.

Chairman LEVIN. But in any event, let me ask you, Dr. Gilmore, is the level of concurrency now have acceptable risk?

Dr. GILMORE. The level of the concurrency, I think, is still unprecedented in these kinds of programs. We'll have bought, even with the reduction and the production ramp, more aircraft here at a given point in time since the beginning of flight testing than we did, for example, in the F–16 program where we bought a couple thousand aircraft. So I would demure on judging whether the amount of concurrency——

Chairman LEVIN. Who's going to give us the judgment if not you?

Dr. GILMORE. I think that's up to the Defense Acquisition Executive and the Secretary. I'm the evaluator of the capability of the aircraft and I know I'm passing the buck but—I think I have to, otherwise I won't be viewed as objective.

Chairman LEVIN. That's okay. All right. Is the level of concurrency acceptable here, Secretary Carter, and why?

Dr. CARTER. The level of concurrency is unprecedented. It is reduced as a result of these actions. We are judging that the schedule that we're giving you is realistic, it's not optimistic. I think Ms. Fox has emphasized this is not the worst case estimate. This is the 50 percent estimate on her part.

I don't want to leave anybody with the wrong impression. The concurrency that remains in the program, though less, is worrying and has to be managed. The theory of the case here, a perfectly reasonable one in general, was that we have gotten to the point now in modeling and simulation that we should be able to confidently enter production before we have completed testing fully.

That's the theory of the case that's been with the JSF program from the very beginning, unprecedented. We have found that in some respects that aspiration, so far in the program has not always been achieved. That's why we're trying to take some of the aggressiveness out of the program at this point, but it's still aggressive. As I said earlier, reality will have a vote here and——

Chairman LEVIN. Yes, but you shorten the development period without—it seems to me that if anything, that increases the concurrency, it doesn't usually decrease it. You knew how much modeling and simulation was going to be going on in this program right from the beginning I assume. Why isn't the shortening of that development period, that 30 months to 13 months, why isn't that an increase in the concurrency level?

Dr. CARTER. The reduction from 30 to 13 months, it just means doing exactly the same testing that we were going to do in 30 months in 13 months. That's good.

Chairman LEVIN. So the number of tests——

Dr. CARTER. The number of test points is the same. One progresses through them more rapidly because you have more tester sources.

Chairman LEVIN. I guess Senator Thune is next according to my list.

Senator THUNE. Thank you, Mr. Chairman. Secretary Carter, I support the F–35 and the program. I believe it's an extremely important program and that we have to do everything that we can to prevent or mitigate the so-called fighter gap that we have coming at us in the not too distant future.

I'm very concerned about these development delays and potential reductions in the number of aircraft that are planned for the program. I'm consistently told by my South Dakota Air National Guard constituents that their F–16s aren't going to last forever. So I want to do everything I can to have the F–35 program reach full-rate production with its fully designed combat capability as soon as is reasonably possible.

The question is, when do you see actually having full strength squadrons of training jets for the various training wings? When do you realistically foresee this program actually reaching full-rate production?

Dr. CARTER. I don't want to speak for the Services who will determine where, how, when, and if they actually field their aircraft. From the program's point of view, for the Air Force we will begin delivering aircraft to the Air Force in 2013. As I mentioned, the Air Force's current intention based upon the revised schedule is to go to IOC in 2016.

Senator THUNE. Okay.

Dr. CARTER. That is with the full capability that they always intended which is now the mission systems capability embodied in

the Block III software. But that capability and after completion of OT&E, that's how they are defining IOC in the Air Force.

Senator THUNE. There's been a lot said and will be said about the effect of the JSF on the Air Force. It's sometimes easier to forget, though, the importance and what it means to the Navy and Marine Corps.

The JSF represents the future of both the Navy and Marine Corps strike fighter force. We know about the significant delays and cost overruns. But there are recent news reports that also indicate an increase in aircraft operating costs once they're finally delivered.

In fact, there was a recent article in Defense News that stated that, "each flight hour flown by Navy and Marine Corps versions of the F–35 will cost about $31,000 in 2029 compared with about $19,000 per flight hour for the Services, the current F/A–18 Hornets and the Harriers."

Admiral Roughead at a recent Navy Association's annual symposium was quoted as saying, "we must ensure that we do not deliver an unaffordable fleet to the next generation of leaders less they burn us in effigy at this dinner 20 years from now." At the same time Lockheed Martin is claiming that support costs for the F–35 will be significantly lower than those for the F–16, F/A–18, and the AV–8B.

Can you set the record straight about what you really expect the operating costs to be compared to current fighters? Will DOD be able to afford those operations and maintenance costs in the future?

Dr. CARTER. I can't as I sit here right now because I—you are pointing to, for the sustainment costs the same kind of discrepancy that I was describing for the development costs that we have. I know Naval Air Systems Command has done an estimate of the total ownership cost of the F–35 and then there is a contractor and JPO estimate and what I—these are for the out years. So it seems in the distant future.

But what we do now will determine how much we pay then and we owe it to the taxpayer then to control those costs. CAPE, and Ms. Fox may wish to speak to this, is having the same ICE done now for the sustainment phase as we've done and are doing for the production phase, the ramp-up to production and then development phase.

So I cannot give you an answer now. I hope to give you a credible answer in the future. That's a lot of money out there to maintain a fleet even as it costs a lot of money to make the fleet in the first place. We owe it to you to control those costs.

Senator THUNE. Ms. Fox, do you have anything to add to that?

Ms. FOX. Yes, sir. I would just like to add that an assessment of operations and support (O&S) will be part of the certification review we'll do for the Nunn-McCurdy. We will have as good an estimate as possible for you as soon as we've finished that.

Senator THUNE. Okay, thanks. Over the past several years the trend I've noticed is that these increasing costs of procurement along with an increased timeline in obtaining a lot of these systems. This isn't a unique phenomenon to the JSF. It inevitably causes an increase in costs and thereby reduces the number of

items we can buy. This year, like any other, we have substantial procurement initiatives including the JSF and a new tanker for example.

My question is, and this is the broader, bigger picture. It obviously pertains to the JSF but other procurement programs as well, and that is, what steps is the DOD taking in order to control costs on these systems and increase numbers of units versus the increasing costs and decreasing numbers of the weapons systems that it procures?

Dr. CARTER. Good question and two answers to it. You are rightly speaking about what we are doing in acquisition reform at the back end of programs. You know we have a lot of good practice and that was the principle intent of the WSARA, to help us start programs better so they don't get into trouble. We have what we have now, our portfolio of programs, what are we doing to make sure that they deliver. JSF is a perfectly good example. We're past the beginning point now in many ways of JSF.

Senator THUNE. Right.

Dr. CARTER. We are looking very carefully now and very aggressively at the cost structure of our programs, the contract structure as between cost-plus and fixed-price. I mentioned earlier our overheads and indirects. All the ways that we can squeeze 2 percent here and 3 percent there and 4 percent there, and pretty soon you're talking about a very serious amount of money. So management acuity and relentlessness in the middle part of the programs is very important.

Finally, there's a form of acquisition reform that Secretary Gates has emphasized also, which is the discipline to stop doing things that we have enough of or that aren't working or that are single purpose capabilities. This year we'll be proposing to end some programs and that's always a difficult thing to do.

Every time we can stop buying something we don't need it frees up money for exactly what you say, more money for the things that we do need. More units of a program that is performing well and that we could buy more of.

So acquisition reform has to go across the whole spectrum, not just at the birthing of programs but right through and into having the discipline to stop doing something when it's time to stop doing something.

Senator THUNE. It just seems like this has become a recurring theme and a recurring story. It's unfortunate that if you have programs that are coming in way over budget and that you don't need, we shouldn't be funding them.

At the same time, you hate to not fund programs because other programs are so far over budget and these increasing costs and over runs and delays, it seems like your acquisition process is in desperate need of a new model.

I wanted to make that observation for the record and raise that question with you. So thank you. Thank you, Mr. Chairman.

Chairman LEVIN. Thank you, Senator.

Senator Lieberman.

Senator LIEBERMAN. Thanks, Mr. Chairman. Thanks to the witnesses. I apologize that I had a couple of other meetings that I've

been running back and forth from. But I think I have the drift of the testimony.

Secretary Carter, I wanted to ask you first a question that is probably simple but I think essential which is, what will the $2.8 billion increase in the JSF programs budget bring total SDD costs to? What degree of confidence do you now have in that estimate for total SDD costs by the April 2016 completion date you've set?

Dr. CARTER. Senator, I'm going to ask General Moore, do you have that number?

General MOORE. The total cost in this will be $50 billion, for the total SDD cost.

Senator LIEBERMAN. The total cost will be $50 billion. That's by that April 2016 date that we're talking about?

General MOORE. Yes, sir.

Senator LIEBERMAN. Okay, thank you.

Dr. CARTER. Just to be clear General Moore is talking about the total cost from the beginning of the program all the way to the end of SDD.

Senator LIEBERMAN. Right.

Dr. CARTER. The $2.8 billion is in addition to the program relative to what was projected over the FYDP, sorry about the technicality——

Senator LIEBERMAN. That's okay.

Dr. CARTER.—but just reconciling——

Senator LIEBERMAN. I understand and I thank you for that clarification.

Second, as you all know very well, alongside the consensus of support there has been for the JSF here in Congress, there is a subpart that has been much in conflict and that is the question of whether there's an alternative engine built. It looks like we're going to have that conflict again this time.

I want to make a general statement and ask some questions. Which is, that this conflict and the idea of building an alternate engine and the costs associated with it, it seems to me gets more exacerbated or at least the argument against the alternate engine gets stronger because of the cost increases in the overall program.

Ms. Fox, I'm going to quote from the information memorandum that you did on this question a short while ago: "The Department has not funded an alternate engine for the JSF program since 2007 because in the Department's view a second engine is unnecessary and too costly. This position is most recently reflected in the fiscal year 2011 President's budget submission which once again does not include funding for the JSF F136 alternate engine. The Department's position is based in part on updated analyses which continue to show that the business case for a JSF alternate engine is not compelling and that the alternate engine program would require a significant DOD investment of additional resources within the FYDP."

Later on in the report you say CAPE analysis shows that it would require a DOD investment of $2.9 billion over the next years to get the alternate engine in position for competition. Incidentally, that is set alongside the estimate of your predecessor in 2007 who said that the alternate engine would require another $1.2 billion at that point in development funding before it was ready to compete.

In the 3 years since then we have spent $1.3 billion on the alternate engine and now you're estimating an additional $2.9 billion in the coming FYDP. So have I got that all right?

Ms. FOX. Yes, sir, you do. There's a few changes. First of all, in apples to apples, assuming competition in 2014——

Senator LIEBERMAN. Right.

Ms. FOX.—when you account for the additional funds Congress has given, we now estimate that it's at a break-even point for cost in terms of the long-term procurement of a second engine.

But the initial investment that would be required, and now we project with the restructured program, that competition would move to 2017. So I'm sorry for the difference in dates. But to account for that, that additional investment is necessary not only to complete the development program for the alternate engine but also to fund the component improvement program you would need to maintain the engine's currency.

You would need to perform directed buys from the engine's primary and second sources to prepare for a competition. You'd have to procure tooling, support equipment, and spares. That's all in the $2.9 billion.

Senator LIEBERMAN. That's all in the $2.9 billion?

Ms. FOX. Yes, sir.

Senator LIEBERMAN. When Admiral Roughead was before the committee a couple of weeks ago, he said he had real space concerns; what would be necessary to employ the back-up and support for the alternate engine for the Navy and Marine Corps.

Okay, I want to end with a broader question to you Secretary Carter, and maybe it's been touched on. But just to give you a chance to talk more generally.

Obviously you served in the DOD before you were in this position. We have continued to be troubled, hounded, frustrated, and infuriated by the fact that these systems that we need so much are costing so much more than we expect, hoped, estimated, let alone arrive late.

Forgive this question, but to the best of your ability what the heck is going on? In other words, is this happening because, as some of us think, probably conventionally, simplistically speaking that we ought to be moving along the spectrum much more toward fixed-price contracts from cost-plus?

Is it happening because DOD and we are accepting estimates, initial estimates of a cost of programs that are simply not realistic? At this point, in this round of your service, what's your explanation of what's happening? Because I know you want very much to stop it from happening.

Dr. CARTER. It is pervasive. Secretary Gates says about acquisition reform, there's no silver bullet, I wish there were. It is pervasive. We've always had problems with the acquisition reform system as long as I've been associated with it.

I think there are two things that are critically important to attend to now. One is, that it seems to me that the last decade of double digit year-on-year growth in the Defense budget, which has been terrific in lots of ways for DOD in terms of being able to buy more capability and enhance our military capabilities, has also engendered, and this is human nature, an erosion of discipline.

It's been easy to solve problems with money. You see that in programs where they slip a little bit, throw a little bit more money, a technological problem, throw a little bit more money in. We need to be much more vigilant about how we use money to solve our problems.

You know Einstein said his work was 90 percent perspiration and 10 percent inspiration as opposed to an acquisition executive's is 99 percent perspiration and 1 percent inspiration. You just have to keep hammering away at these things and be disciplined and be willing to say as Ms. Fox's organization does, "hey, wait a minute, this doesn't look right."

I don't mean to sound too abstract about it but we have to have good people. In the last 10 or 15 years, and this has been widely reported and documented, the acquisition cadre in both the civilian side and uniformed side has been allowed to dwindle away and our workforce is older than it ought to be.

Nothing wrong with that, they're experienced but older people at some point leave the DOD and then what do we have. So I'm trying to pay a lot of attention to drawing into service the people we need, the program managers, the cost estimators, the engineers, the systems engineers, and so forth that will make the system better. Then there are all the changes to the system itself, including those that were included in the WSARA legislation.

I guess what I was going to say is, you can have the best system in the world and if it's not populated by the right people and you don't have the discipline to recognize and surface problems when they arise and try to address them, you can have milestones, landmarks, this kind of independent estimate, that kind of independent estimate, and you're not going to get anywhere. We're trying to just do the blocking and tackling that delivers value to the taxpayer.

Senator LIEBERMAN. I appreciate that answer. I think it was important and candid and the obvious reality in terms of the mentality that you solve every real problem with more money is that with the enormous deficits and long-term debt the country is running, we're just coming to a point where the broad consensus in support of defense spending is going to begin to break or at least be under real pressure that's going to deny the kind of funding that's been available.

I'm fearful up until now and so the work that you're doing is really critically important. Of course every dollar you save is a dollar that might be spent for instance on additional personnel which I think we still need.

So anyway, my time's up. I thank you very much.

Chairman LEVIN. Thank you, Senator Lieberman. Since we claim Thomas Edison as a son of Michigan, the perspiration/inspiration comment we claim and believe it was Edison's not Einstein's.

Dr. CARTER. I'm sorry, I'm sure you're right.

Chairman LEVIN. Senator Chambliss.

Senator CHAMBLISS. Thank you, Mr. Chairman. Secretary Carter, as I hear you talk about the average age of the workforce in the acquisition department, and I think about the average age of the U.S. Senate, we're both headed in that direction, I guess.

Chairman LEVIN. That's off the record by the way. [Laughter.]

Senator CHAMBLISS. We're all dealing with experience, Mr. Chairman.

Chairman LEVIN. That's on the record. [Laughter.]

Senator CHAMBLISS. Mr. Sullivan, your statement relative to the cost of this airplane being unknown is not new. You've testified to that effect over and over particularly last year as we were going through the defense authorization process as well as the appropriation process, and with the ongoing debate over the F–22.

You noted in your written statement that DOD does not have a full comprehensive cost estimate for completing the program. You validated that statement again today and in fact, in April of last year you made a statement on National Public Radio (aka NPR) that when all is said and done that the price of the nearly 2,500 F–35s could approach $140 million for each plane. Do you still stand by that statement?

Mr. SULLIVAN. Frankly, right now, I don't remember having said that. I'm not sure what you're referring to.

Senator CHAMBLISS. Okay.

Mr. SULLIVAN. But at any rate, no, I don't think that sounds right.

Senator CHAMBLISS. Okay, would you concur with the JET's estimate that Ms. Fox alluded to, relative to the plane in 2001 dollars, I believe, Ms. Fox, you said.

Ms. FOX. 2002, sir.

Senator CHAMBLISS. 2002 dollars would be in the range of $80 million. Is that a fair statement in your opinion?

Mr. SULLIVAN. Right now, I have numbers here that are then-years. So I don't—it would be apples to oranges. But the average procurement unit cost that we've calculated is about $112 million.

Senator CHAMBLISS. Okay, well that——

Mr. SULLIVAN. So that would be——

Senator CHAMBLISS. You've answered my question because that was going to be my point. When we talk about today's dollar——

Mr. SULLIVAN. Right.

Senator CHAMBLISS.—we're looking at somewhere $112 million, and that's an average cost?

Mr. SULLIVAN. Yes.

Senator CHAMBLISS. That's assuming that the perfect storm occurs and that every timeline is met and the test phase is conducted within the times that we've talked about here.

Finally then, Mr. Sullivan, let me ask you about this timeline of reducing 30 months of testing down to 13 months. This is a very sophisticated airplane, we know that. You've had experience with other weapons systems at the DOD. Do you know of any other weapons system that has been able to reduce its testing time from 30 months down to 13 months?

Mr. SULLIVAN. Just to qualify that a little bit, it's an increase to an existing plan. The way that they came about that—the pull back was by adding new assets.

Senator CHAMBLISS. So actually it's an increase——

Mr. SULLIVAN. —not increase——

Senator CHAMBLISS. —it seems relatively optimistic to me though.

I think it will be a challenge for them especially given this aircraft is laden with software. I think that's going to be one of the long poles in the tent.

Dr. GILMORE. Senator, could I just observe in that regard?

Senator CHAMBLISS. Sure.

Dr. GILMORE. The total testing program is not going to span in excess of 60 months. The question was, whether we would extend from 53 months, which had been planned as of about a year ago to 80 months versus expand from 50 months to over 60 months. 60 months is in line with past experience in these kinds of complex programs. I hope that clarifies what the duration of the testing program is going to be.

Senator CHAMBLISS. Right, I understand that. Dr. Carter, in your written statement you state that the current IOC dates for the Marine Corps and the F–35 is 2012. The Navy is 2016, the Air Force 2016, is that correct? Dr. Carter, that's a 2-year delay for the Navy and a 3-year delay for the Air Force over what was advertised only a month ago, isn't that right?

Dr. CARTER. If you're referring to testimony given, I'm not quite sure what the baseline is. It certainly is an increase over what you—what I'm saying today is an increase over what you've heard in the past because the Services have taken the revised JET II estimate as the most realistic plan we can give them for when we'll deliver them jets.

Then they have done their separate things with respect to defining IOC. So they have adjusted their IOC dates in accordance with the change in the program. So I'm sure it's different from what has been said before.

Senator CHAMBLISS. Why did it take OSD over a year to validate the JET report of October 2008?

Dr. CARTER. There were actually two separate JET reports, both of them valid now, I think.

Senator CHAMBLISS. Both of them were basically the same, they reached the same conclusion.

Dr. CARTER. Exactly, what made the second one, although it had the similar content, more serious, Senator, was that it was a year later. So the problems noted in the fall of 2008 had continued into the fall of 2009. It was reporting essentially the same dynamic going on on the assembly line but since it came a year later it was saying that this has been going on not just for 1 year, which is what DOD knew in October 2008, but 2 years.

Two years is much more serious than 1 year. Same content but a year later you're still getting the same news, you really need to be more worried than you were earlier.

Senator CHAMBLISS. When did you become aware of the 2008 JET report?

Dr. CARTER. Shortly after I got into office which was a few months before—it was around the same time that the Deputy Secretary of Defense ordered up a new JET estimate recognizing that the 2008 estimate was serious. Bill Lynn, the Deputy Secretary of Defense, said we'd better do it again.

It was done again in October by Ms. Fox's, or under her leadership, and it showed what it showed. Which is, whoops, this wasn't

just something that—you know it was true in October 2008, it's October 2009, it's still true. That's why it was more serious this year.

Senator CHAMBLISS. Was that 2008 report pretty widely known throughout the DOD?

Dr. CARTER. It certainly was known to my office. I believe it was, my understanding is it was also briefed to Congress last year as well. I think it was pretty widely circulated.

Senator CHAMBLISS. My concern is, that during the debate over the F–22 last year two issues were front and center. One being, that the cost of the F–22 got way out of line. The last contract on the F–22, the last lot was $140 million per copy. Certainly that's $28 million difference in what Mr. Sullivan estimates that today's dollars is going to be for the purchase of the F–35.

But it's not materially different when you consider that the F–22 has significantly more capability particularly from an air superiority standpoint. I'm curious as to why that wasn't talked about during the debate last year on the F–22. Do you have any recollection of that?

Dr. CARTER. I can't speak to that because I wasn't in office at the time. I do know from the records what transpired after the first JET estimate, which was that Secretary Gates added, recognizing that there had been this poor performance in the program, added $476 million to the fiscal year 2010. Said oops, we'd better adjust our budget in fiscal year 2010 to take account of the CAPE estimate.

He did not adjust the entire out-year budget as we are doing this year because he only had the first JET estimate which showed that there was trouble going on for a year. This year, knowing that trouble's gone on for 2 years, he directed that we adjust the budget to reflect the CAPE estimate not only in fiscal year 2011 but throughout the out-years.

It's a more serious action taken in response to more serious news which is a second JET estimate that says the same thing that the first one did a year earlier. So he took actions in both years, they were different actions but proportional to the information he had at the time.

Senator CHAMBLISS. I have some additional questions, Mr. Chairman, I want to submit for the record. But I think it's pretty obvious to all of the panel members how serious this issue is to us. We're committed to this program, it's a great airplane and we have to have it. We, Ms. Fox, don't want to go down that trail that Senator McCain talked to you about of reducing the buy. We can't afford to reduce the buy.

We just had testimony that the reduction in TACAIR for Northern Command has already caused us to have to call on the Canadians. If we don't get these costs under control then who knows where we're going to go. But we can't do without this airplane. The assets of this airplane are so superior to any other asset that we have outside the F–22.

With the Russians now coming out with an airplane that they say is comparable to the F–22, and it didn't even mention the F–35. They assume it's superior to the F–35.

It's imperative that we continue down the track of trying to get these costs under control. I appreciate all of you working as hard

as you have and being as frank as you have with respect to this program. So thank you, Mr. Chairman.

Chairman LEVIN. Thank you, Senator Chambliss.

Senator McCaskill.

Senator MCCASKILL. I know that there's been talk about unit cost and I was here for the previous testimony about unit cost, Ms. Fox, but I've not heard an estimate for the entire program including military construction (MILCON). Can somebody give me that number?

Ms. FOX. Yes, ma'am, I'm sorry I don't have that number. We will get back to you, I don't believe we have that number with us today.

[The information referred to follows:]

In base year 2002, the current estimate for military construction (MILCON) costs is $0.5 billion. These are system-specific MILCON costs and would not include broader costs such as establishing new bases. This is less than a quarter of 1 percent of the total of development, production, and MILCON cost which is currently estimated to range from $239 billion to $278 billion. MILCON costs will be evaluated as part of the Nunn-McCurdy cost recertification.

Senator MCCASKILL. I think we need to know that number. I'm a little worried that you would come to this hearing without that number, to be honest with you. Knowing that this was going to be all about the costs and the problems associated with this program.

I think everybody having a handle on what the overall costs are compared to what they were predicted to be. We're stuck. I'm sure this is going to be a great jet but we better learn from this. We don't want to do this again.

You know we have the potential if we don't have competition, which you know I'm a big fan of the product that Boeing puts in the air. But we have the tanker coming up and just for accountability purposes I think whenever this group of people assembles you ought to have a number of what the overall program's going to be.

Let me talk about two things briefly. First is the shortfall. As you might imagine, the home of the F/A–18s in St. Louis, I know what that tactical aircraft means to our Services now. I know that as you talked about more and cheaper, Secretary Carter, there is a shortfall.

It has been difficult to get a handle on the shortfall but now learning today that the initial operational planes are not going to be until 2016 for the Navy, and knowing we have 11 carriers to fill, it's just hard for me to believe that you all are still maintaining that there's only 100 shortfall. Do you have a number that you all are comfortable with having a shortfall?

Dr. CARTER. Let me ask Ms. Fox specifically to address the shortfall issue because she's done a lot of analysis on that. Let me just back up to the point you made. You're absolute right except the point about total ownership cost.

We have to take into account and manage the fielding, your point about MILCON and the other associated total ownership costs of the JSF, not just the cost to build it. We've been addressing the cost to build it mostly in this hearing.

To be quite honest and your question reveals this, internally we are going to turn to the total ownership cost. We have a couple es-

timates of that that differ among themselves and we need to try to reconcile them. Not just so that we have a number, but so that we have a plan for reducing that number because somebody is going to end up owning these things and they ought to have a reasonable cost of ownership.

With respect to the F/A–18 and the JSF issue, we've done a lot of analysis on that question. Let me ask Ms. Fox if she would address that.

Senator MCCASKILL. You know I'm headed towards the ultimate question here, with multi-year we'll save money. We have a big enough shortfall—I know you all have asked for an extension. We need to get to the multi-year. You know you will end up buying that many jets, you know you are.

I mean this thing has gotten moved and it would be great if I could go to lunch today with you all saying, yes, we think multi-year is the right way to go.

Dr. CARTER. Why don't you speak to that—and then I'm happy to speak to the multi-year issue.

Senator MCCASKILL. Thank you.

Ms. FOX. Yes ma'am, we are concerned about the JSF shortfall for all the Services as a result of the restructuring. We're in the process of doing an analysis there. The number you quote of 100 is an old number, it doesn't reflect the restructuring. We're looking at that right now. Again, I apologize, but I don't have a final analysis for you.

Back to the overall costs, we will have an assessment of O&S costs of the JSF program in the Nunn-McCurdy certification. You added MILCON, I think that's a very good thing to add, but I just wanted to alert you that these are challenging things to estimate this early in the program, but we owe everyone an O&S estimate for sure. We owe everyone an estimate working with the Services on the implications of the restructuring on their JSF inventory.

Senator MCCASKILL. Since we don't know, we know it's not 100 now, but we don't have a number. Secretary Carter, multi-year?

Dr. CARTER. If I may address the question of multi-year procurement for the F/A–18 arises anew and appropriately because we have made the decisions in the program review to procure more F/A–18E/F versions and also the Growler electronic attack version in order to recapitalize the expeditionary electronic attack fleet now represented by the Prowlers.

Since we're buying more, we have asked the question of the manufacturer, give us a price. We've indicated that the threshold of interest is 10 percent, that's just the threshold of interest. We would look for savings in the teens in order for that to be an interesting proposition to the DOD and for the taxpayer. Given that it's a multi-year commitment, there would have to be savings there. The Department of the Navy is in discussions with Boeing over that very point.

Senator MCCASKILL. I'm glad you're in discussions and you know, I know that 10 is the threshold but with all due respect, I hate to say I told you so. But you know, I kind of knew that 100 wasn't real. If you just look, if you step back with common sense and look at the JSF program, and looking at my friend from the GAO here because I know he wants to nod right now. It wasn't going to be

on time and it was going to keep getting pushed back. We have those 11 carriers.

Frankly, if we save money with a multi-year we ought to save the money if we're going to buy the jets. This notion that we have to get into the teens of savings for multi-year, I don't know what we accomplish if we end up buying them anyway. If it's going to save money to do multi-year and we know we're going to buy them, by all means let's do it.

My final question is hard. I need somebody to do an estimate on the problems associated with this program. We're going to have a Nunn-McCurdy breach. I need to know whose fault it is.

You know this is too big to fail, this program. We're going to push money across the table, we're going to push back timelines, we're going to push money across the table.

I need to figure out, I think we all need to figure out whose fault is it? Is it the contractor's fault? How much of the fault is the military's? Were they changing things during the process, were there delays that the military is responsible for? Is anybody in charge of figuring out whose fault this was?

Second, if it's the contractor's fault, I know we've withheld one payment. Are there other penalties that you're envisioning that the contractor pays for these mistakes? You know this isn't no harm, no foul.

Somebody needs to be held accountable. What worries me, is we all sit around and shrug: "well we can't do anything about it, well, we got to spend more." No one ever is held accountable. I want to know who is going to be held accountable and whose fault it was.

Dr. CARTER. I will address that. First of all, whose fault it was, who's accountable for it? I actually think that there is responsibility on both the government's side and the contractor's side.

It's our job to get the best business deal. It's our job to surface problems. It's our job to tell the truth and not an optimistic story. That has not always been done in the course of this program. Then it's the contractor's job to perform. So there have been failures on both sides.

I will say that as soon as I got the JET II estimate I went to the contractor and the leadership of that contractor, who recognized immediately as I did the seriousness of the analysis represented by CAPE, rolled up his sleeves in the same spirit I was. I have to commend him for that.

It would have been better if we didn't have to find this out in October 2009. But there was immediate recognition of the importance of the problem and a willingness to acknowledge it and get on with solving it. I wanted to say that because I'm grateful that was the response of the contractor to the JET report.

Senator MCCASKILL. If would indulge one more question and I know Mr. LeMieux you're waiting, and it's lunchtime.

Is it unreasonable for us to ask for someone to give us names? Is somebody being demoted? Has someone lost their job? Is there something happening on the contractor side in terms of accountability?

These are multi-million dollar mistakes. We need every penny of that money right now in terms of the economic strength of this Nation. While our economic strength is sapped, our strength is not

just military. I'm very proud of our military and the work all of you do. But this really—I mean, can't we get some names and whose fault it is?

Dr. CARTER. On the government side, Secretary Gates has taken some steps to strengthen the program management and specifically to upgrade the program manager on the JSF to a three-star position. We'll be continuing to try to strengthen——

Senator MCCASKILL. I don't want to know about who's getting promoted. I want to know about who's getting demoted. That's what I want to know about. I want to know if anybody has been held accountable. If you all would get back to me with that I would appreciate it. Thank you, Secretary Carter. Thank you, Mr. Chairman.

[The information referred to follows:]

The major personnel action relative to the Joint Strike Fighter (JSF) program was the Secretary elevating the JSF Program Executive Officer (PEO) to a three-star billet. The two-star PEO was removed and now a three-star Admiral is in charge. Having a three-star flag officer as the PEO affords the billet the appropriate level of experience and responsibility for this large, important, and very challenging program. The Department concluded the JSF Nunn-McCurdy review and certified to Congress on June 1, 2010. The thorough review included a comprehensive root cause analysis of the causes of the Nunn-McCurdy cost breach. The root cause analysis identified the major factors which led to the increase over the baseline cost estimates from 2001. These factors occurred and accumulated over many years and involved programmatic, technical, and executive decisions made on the government and contractor side. No individuals from the government were demoted as a result of the Nunn-McCurdy review. The review resulted in numerous management and programmatic recommendations that we are currently executing.

Chairman LEVIN. Thank you. Is it not true that General Heinz was relieved of duty as the——

Dr. CARTER. The program manager, Senator, was removed and that is why a three-star program manager will be appointed in his place.

Chairman LEVIN. If I could just take from Senator LeMieux 10 seconds further on this because I was pressing them for the same question before. I interrupted Secretary Carter when he gave me the first two reasons for these huge cost overruns.

He listed two and I would, following what you're pressing for ask you, Secretary Carter, for the record, to give us all of the causes that you began to identify, you said there were engineering changes. You then said there were labor costs that went up. Give us all of the reasons, if you would, for the record as to this 60 to 90 percent increase in the unit cost.

[The information referred to follows:]

The reasons for the Unit Cost Growth included larger-than-planned development costs driven by weight growth and a longer forecasted development schedule, increases in engineering and manufacturing labor hours, increase in labor and overhead rates, degradation of airframe commonality, lower production quantities, increases in commodity prices (particularly titanium), major subcontractor cost growth, and the impact of revised inflation indices all contributed to the unit cost increases. In addition, factors that were driven by substantially higher contractor change traffic (i.e., changes in design not resulting from changes in requirements or capability), which led to increased engineering and software staffing, extended manufacturing span times, and delayed delivery of aircraft to flight test, led to a further slip of the development and flight test program.

If additional causes of cost growth are discovered in the anticipated Nunn-McCurdy review they will be detailed as a result of that review process, and those results will be provided to Congress.

Chairman LEVIN. Senator LeMieux.

Senator LEMIEUX. Thank you, Mr. Chairman. I want to commend Senator McCaskill on always being vigilant on these cost issues. We need more of that in this chamber. I'm new to the Senate so you will forgive me for not being an expert on these topics.

My understanding of this project and, Mr. Secretary, perhaps you can make sure that I have my numbers straight, is that this project started in 1995? We're 38 percent over budget, $18 billion?

Dr. CARTER. We're more than that on the SDD program if you're talking about—more than that on the SDD program.

Senator LEMIEUX. Do you know what it is?

Dr. CARTER. I'm going to ask Ms. Fox.

Ms. FOX. I'm sorry sir, I don't have the data back to 1995. The SDD program is at $50 billion in the current estimate. We added $3 billion, $2.8 billion to it for this review, but I believe it had gone up before. So I'd have to get you a total.

[The information referred to follows:]

Pre-System Development and Demonstration (SDD) activities did begin in the mid-1990s; however, the program was baselined in October 2001 at the time of the SDD contract award. At that time, the development costs were estimated to be $32 billion (FY$02). The current estimate is $45 billion (FY$02), an increase of about 40 percent.

Senator LEMIEUX. So it's more. If you could submit that for the record. You know we're very excited in Florida about getting this JSF, getting it to Eglin. You know we're very proud of our military bases in Florida with the world's largest Air Force base, we look forward to getting them there.

But I think the American people, if they knew about this, would be shocked about how long it's taken to build this plane and get it in the air. We don't yet have one ready to operate as I understand, we just have test planes, is that correct?

Dr. CARTER. There are aircraft flying, they are all test aircraft.

Senator LEMIEUX. Right. We're hoping to get a plane to the Marines by 2012?

Dr. CARTER. That is correct.

Senator LEMIEUX. That's still a good target date?

Dr. CARTER. For the Marines, yes, sir.

Senator LEMIEUX. So we started this program in 1995 and we're going to get a plane delivered in 2012. It occurs to me that we went to the moon faster then developing this plane. To be this far over budget, more than $18 billion, more than 38 percent, I appreciate the comments of my colleagues about accountability.

Mr. Chairman, it bespeaks to a larger problem with procurement. I appreciate your comments about using business models but this would not happen in the business world. If it did, a company would fail if they did this.

I commend the chairman and you may have done this before so if you have, I apologize for not knowing about it, but for us to have a hearing on procurement, to bring in large companies who buy billions of dollars of goods and services and bring our friends from the DOD in to have them hear what's being done in the private sector.

I can just tell you from my private sector experience, I've had the opportunity and the honor to run a large law firm, nothing comparable, we talked in millions not billions. But when you do pro-

curement there's carrots and there's sticks. In these processes the vendor should be held accountable.

I understand there's mission creep problems, too, which caused these overruns but defining a goal and setting a specification that stays static and not creeping with that specification. Then when the vendor comes in over, they bear the responsibility unless it's our responsibility, which we have to work on that side of it also.

This is a needed plane. We need to get them as quickly as we can and I'm supportive of the plane. But these types of numbers in this environment, when this country is going broke with $12.4 trillion in debt and we we are going to add another $10 trillion to the debt this decade, is not sustainable.

You have a very difficult job and I'm appreciative of your service. It seems like we have to do better. So I'm sorry, that's not a question, that's more of a comment. But I'm becoming increasingly concerned about this as I watch it.

Give me some hope, Secretary Carter, about where we are with this program and where we'll be with procurement going forward.

Dr. CARTER. I can give you realism and I think that's what we're trying to do with the revised JET II estimate, to be realistic about what we can project to you and about the progress of this program.

I have the aspiration, we all ought to have the aspiration to do better than the projection if we possibly can. That will be a matter of discipline. It'll be a matter of negotiation and performance.

I agree with you, the picture that we painted at the beginning of our testimony today is unacceptable. We're paying more than we said and asking you to pay more then we said you were going to have to pay. That's unacceptable and we need to wrestle this back into some sort of realistic box. I think the best I can offer you, or what we're trying to offer is realism, not optimism but realism.

Senator LEMIEUX. In going forward, learning the lessons of this plane as well as the F–22 and other procurement, are we going to change the way that we do procurement in the DOD?

Dr. CARTER. I think we have to, in fact, we are making a number of changes that were written into law. The WSARA last year that prescribed a number of changes to improve the acquisition system, all of those are in process now. Some of them are in my office, some of them are in Ms. Fox's office.

In a sense what you see today is a reflection of what was written in the legislation that came out of this committee last year. Namely, that we should start doing ICEs and taking them seriously. That's what we're trying to do, perhaps belatedly, but that's what we're trying to do here in the JSF program.

Senator LEMIEUX. Now, Secretary Carter and Ms. Fox, is there something that you have not yet implemented that you need to implement when we get to the next procurement? I'm sure you don't and I'm know that the chairman doesn't ever want to be here in the future with another program that's over budget and not on time.

Do you have all the tools you need? Are all the mechanisms in place? Have we learned enough to know that that's not going to happen again?

Dr. CARTER. I think that the sort of bureaucratic structure is there to do better. All the structure, all the boxes don't matter unless you have two other things.

One is the discipline to surface problems and solve them in a candid manner. Again, we're trying to do that here on the JSF program, maybe belatedly, but surface them and solve them.

The other thing, as I mentioned earlier, is good people. That is something that we're still working on that will take years to rebuild the acquisition cadre in the DOD so that they have all the engineering skills, systems engineering skills, contracting officers, pricers, and all the things that it takes to replicate what you rightly suggest in the private sector would be a matter of course.

Senator LEMIEUX. Do we need to pay these folks more? We'd be a lot more efficient to put together a squad of the best and brightest people in the world working for us. If it cost us some millions of dollars and we saved billions, it'd be good for the taxpayer. When you say rebuild, do we not have the talent we need?

Dr. CARTER. We don't either on the civilian side or on the uniformed side, I think it's widely recognized. On the civilian side, we reduced the numbers about a decade ago without adequate care to preserving key skills and quality. We're trying to rebuild. Something similar happened in the armed services.

What's important there is that a major or colonel who has acquisition expertise as something they think they're pretty good at and an aspiration to become a general officer can see a pyramid that they can go up in the acquisition field.

We're having a lot of experience now with seeing what the market is like for people wanting to come into government work and acquisitions because of some initiatives that came out of this committee; we are hiring or in-sourcing 20,000 people into the acquisition workforce.

We can't pay them what they can get outside. We take too long to hire them and it's a cumbersome system to join the government. But what we have going for us, what you see again and again and again is the mission, the mission.

They come in and say, "boy, now I'm doing something that really matters, contributing to national security." That's our hook, that's all we have. We can't pay them a lot. It's frustrating to work in the government and all the rest of it. But the mission, that's our hook.

Senator LEMIEUX. Thank you, Mr. Chairman.

Chairman LEVIN. Thank you very much, Senator LeMieux. We as a committee, as Secretary Carter said, adopted, led the way to get the major acquisition reform into law last year. It's hopefully just about fully implemented now.

Ms. Fox is here because her office was created for exactly this reason, to do the same kind of work in the area of cost as Dr. Gilmore's office does in terms of OT&E. So these were major changes that took place.

You're absolutely right, we were not doing business the way businesses would do it. We're trying through that law and hopefully through full implementation of that law as you point out is so essential, to change not just the words on a page that will hopefully make a big difference but the culture in the building.

That 20,000 figure comes as a startling number to a lot of people. When we talk about adding 20,000 government employees, that has a very negative effect in the minds of some folks. But we know how badly this acquisition corps was damaged and was reduced during the previous decade.

We're going to reverse that. The President's determined to reverse it. Our law reverses it. We put some provisions in that law that will strongly promote the rebuidling of that acquisition capability.

One of the things that is critically important here in terms of keeping costs down is competition. The whole argument now on the second engine for that JSF is, are we going to have competition or not and the value of the competition is critically important.

Those of us that favor the second engine do it not because we have any back-home interest. I don't. It's because we believe that without competition we're going to see that same kind of upward curve on that engine if it's going to be sole-sourced, which it is, as we see now with the JSF.

We're basically at the mercy of a contractor. We all want the plane for the reasons you give. We want that plane but the number hasn't changed in the last 2 years. Once you tell a contractor we're buying 2,417 planes, okay, now what? Where's the leverage?

I don't know what the leverage is on this contractor myself, I don't see the leverage. You know you testified, Dr. Carter, that—and by the way, one other thing about competition, we wrote that right into our law that we passed here last year.

The Secretary of Defense shall ensure the acquisition strategy for each major defense acquisition program includes measures to ensure competition or the option of competition at both the prime contract level and the subcontract level throughout the life cycle of such a program.

Now one of the questions I was going to ask is to what extent we're going to do that at least at the subcontract level. In this case we've done that with some shipbuilding now where the Secretary has decided he's going to sole source two ships.

The problem with that is, where's the competition going to be with those two ships, with those shipyards? If you don't have two shipyards, but you only have one, you're at their mercy again. That's what my fear is here.

Dr. Carter in his testimony said that we're going to ask Lockheed Martin to share in some of the cost increases. We're going to ask them. Where's the leverage, Secretary Carter?

Dr. CARTER. We don't have to ask about award fees. That was a specific reference to an award fee that is at the will of the government. That was a polite way of saying that the award fee was being withheld.

In general, I'll be very candid for this program. It's in the interests of the performers to have a successful program. Because otherwise, the international customers and the Services are going to buy fewer jets.

The danger of poor performance is that you sell less. It's obviously in the interests of the performers of the program to sell more jets sooner and therefore to move that ramp over, that I spoke of earlier, and get up that ramp as soon as possible. That is the prin-

ciple reason why performance of a kind that we seek is also, if we set the circumstances right, in the interests of the performers as well.

Chairman LEVIN. That has not historically stopped buy-ins in the past and I'm afraid it continues that way. I just worry greatly about where we're going with this program. I'm appreciative of the effort that you are making now to be realistic on these numbers.

We might as well know the facts of this program. You've given them to us the best you can. The facts are painful because you have a 60 to 90 percent increase in the projected cost each plane at the 2,400 number in constant dollars.

That is, as Senator LeMieux says, a painful bit of news that the taxpayers are not going to be particularly happy to hear. It's better that we not sugar-coat it, however. It's better that we let them know, let the country know, and that's what this hearing is all about, exactly what kinds of problems that we foresee in an honest way and we think you've done that now.

I understand your answer earlier, Ms. Fox, you were attempting when you made reference to the earlier planes and the fact that their numbers were reduced, you were not holding that up as a role model here.

What you're saying was, that we have produced planes that cost us more than planned, took us longer than planned, but were able to carry out their mission in an effective way. That's what I gather you were pointing to.

But my question is in relation to that. This $200 million figure for these developmental planes, if you estimate in constant dollars a plane will be costing $80 to $95 million, and your first planes are costing two to three times that much, is that about normal for these kinds of programs?

Are your first planes generally that much more than when you get to full-rate production? Do you have any way of measuring that for us?

Ms. FOX. We do have a way of measuring that. I don't have the measurements with me, but we will get back to you. My short answer would be yes. There are 2,443 aircraft overall, but we've reduced the ramp very sharply in restructuring, so the initial buy is actually much, much smaller.

[The information referred to follows:]

It is typical in a unique military aircraft production line that early production units will cost more than latter production units. This reflects the effects of learning curves—as a production line matures, production processes become increasingly efficient. In addition, fixed costs are increasingly spread over larger aircraft quantities. These collective effects create downward pressure on unit prices. As an illustration, the current average procurement unit cost is estimated to fall within a range of $79 million to $95 million (FY$02) for the total production buy. In contrast, the unit cost of early production aircraft procured in fiscal year 2015 and prior years is $141 million (FY$02).

Ms. FOX. One of the leverage points we actually have on the contractor is that ramp. They want to push the ramp up, get the unit cost down, and push jets out. We are holding them back based on the analysis we've done, the review of the IMRT, and the desire to keep pressure on this unprecedented concurrency. So it is about right.

Sir, if I could add, in my short time in this position, one of the most important things I think about the WSARA legislation is the——

Chairman LEVIN. That's the Acquisition Reform Bill you're referring to?

Ms. FOX. Yes sir, I'm sorry.

Chairman LEVIN. It's all right.

Ms. FOX. The ICE at the beginning of a program, I think, is going to prove in the future to be a very critical thing for us all to look at. Because based on historical performance, the JSF program is actually not inconsistent with what's been achieved in the past. An ICE at the very beginning would have allowed us to look at this and understand what we were going toward.

Chairman LEVIN. Now is in place?

Ms. FOX. Yes, sir.

Chairman LEVIN. I made reference in my opening statement to the IMRT that late last summer said that on the JSF program, "affordability is no longer embraced as a core pillar". That is a completely unacceptable premise for us to proceed on.

Secretary Carter, you today said that you're going to be relentlessly pursuing affordability. Which means, I think, that you've rejected that quote from the IMRT's presentation. Is that correct? Were you familiar with that comment?

Dr. CARTER. Absolutely, and that review was charted by my office. What they were reporting was that the program had lost sight of affordability as a key ingredient and I couldn't agree more. Their report and that statement in their report was important input to us as we restructured the program.

Chairman LEVIN. The IMRT identified a series of milestones called Production Integrated Transition Implementation Plan. I will not try to even pronounce that acronym.

That plan was intended to get the program back on a reasonable schedule. Among the action items were completing a program risk management plan, completing a business systems modernization plan, a Pratt & Whitney milestone action plan, and a Pratt & Whitney risk management plan.

Those were, I think, to be completed or were scheduled to be completed, General, I think, this question goes to you, by the end of last month. Where are those?

General MOORE. Senator, there are actually 20 action items associated with the IMRT. Some are process related, some are product related, some are government, some are contractor. As far as the risk management activities, those did occur on schedule. We have a comprehensive risk management program tracking over 300 technical risks on the program to include engines and aircraft. That has occurred.

Chairman LEVIN. What I made reference to, those plans were filed on schedule?

General MOORE. Yes, sir, we understand all the risks on the program and we are tracking those to closure as well as the other 19 actions on the IMRT.

Chairman LEVIN. Okay, but more specifically, were those plans completed on schedule?

General MOORE. Yes, sir, they were completed last month.

Chairman LEVIN. Thank you, Senator LeMieux.

Senator LEMIEUX. Thank you, Mr. Chairman, and I appreciate the law that was passed and thank you for providing that information to me. I just want to make a couple quick points.

When I talk to people who are on the vendor side and they talk to me off the record, the view that they have is that the DOD gets gamed on these bids. That they bid low knowing that there's going to be mission creep. This is not unfamiliar to other parts of the world. Then they know there's going to be, for lack of a better term, change orders. That's where they can make up the difference.

When I was speaking with you earlier about how we can control costs, making sure that the mission doesn't creep, certainly seems to be a big part of this. When something goes on for 15, 17 years, you're going to have change because the technology's going to change, the demands of the current time are going to change. The longer the project goes the more it seems like it's going to be cost overruns.

I want you to address that in a moment if you would about how you keep these project static if you can and without sacrificing safety, make sure that we try to end these projects in the future quicker.

The second thing I wanted to mention is putting pressure on the vendor. What will be done in the future to make sure that these contracts we negotiate give you the opportunity to put pressure on the vendor?

In the business world, like manufacturing and suppliers for manufacturers, in the automobile industry, the prime vendors are constantly going back to them and saying you have to make it for less; to the point where they don't think they can make any money.

Constantly beating them up over price. Constantly saying I'm going to go to another company. Constantly putting pressure on them which spurs innovation for that company to find a way, to wring out inefficiencies and get something done as quickly as possible.

Are there people working for you who have that experience, who are going to the vendor over time and pressuring the heck out of the vendor to wring out inefficiencies and do things cheaper?

Do you have the flexibility in your contract to make them do things cheaper? Will your contracts going forward give you all of the tools that you need to put you more in a setting as if you were a large company so that we can get the most cost effective product possible?

Dr. CARTER. Senator, you put your finger on just about every major issue of acquisition policy and practice. I'll try to address the three major ones that you pointed to.

The first was the practice, which does occur, of bidding low. Then you have yourself a program which the country depends upon and then the cost goes up, but we still have the program.

That dynamic is one that the WSARA was intended to interdict by having us—requiring us—to do a realistic cost estimate up front so that we wouldn't be just buying the, so to speak, cost estimate of the vendor. We need to keep at that, and we now have a mechanism for doing that.

About changing requirements, that's something we also have to be vigilant about so that you don't come in and decide later that that wasn't really what you wanted, you want more and it'll cost you more. That's connected to your point about pressure on the vendor.

In one way at least it's worth noting which is in contract structure. That is the dynamic between the government and the contractor in a cost-plus contract versus a fixed-price contract. Both contract types are appropriate in different circumstances.

But if you're in a circumstance where you know pretty much on the government side on what you want and you're not going to change that and it's a fairly well-defined article, then it's reasonable to ask the vendor to give a fixed price. Then the burden is on them to control their costs.

Senator LEMIEUX. Which is great.

Dr. CARTER. Correct, and we want to do more and more of that. That is unreasonable when we don't know what we want. Sometimes we don't know what we want for a good reason because we're doing a development and an exploratory development of a new military capability. It's fine to have that be a cost plus environment.

But elsewhere we're trying to do more of our transactions in a fixed price way for just the reason you say because that requires everybody to get real. We have to get real about what we want and not change it. The contractor needs to get real about what it costs to deliver it.

Senator LEMIEUX. Can I interrupt you for 1 second?

Dr. CARTER. Absolutely.

Senator LEMIEUX. When we don't know what we want but we're in the developmental stage, are we making the vendor bear some of that cost? Because you know if I'm a big defense contractor and I know that I have an opportunity to get the F–35 for 20 or 30 years, this becomes the signature program of this contractor if they win this award. I would think that they, just like any company that's doing research and development (R&D), they have to bear some of that expense. You have a big prize out there that should give them some incentive to bear some of those costs on their own.

Dr. CARTER. The traditional practice for a development that really requires some invention and therefore whose future unfolding is legitimately uncertain, is to audit and reimburse the contractor's costs and add to that a fee. As I said, that's appropriate in a circumstance when it's not reasonable to expect the vendor to give you a price because you don't know exactly what you want or whether you can even get it.

As where we are coming in the JSF program, to the ramp-up to production, it is now reasonable to say to the contractor, give me a price for the next lot of jets. You figure it out and then we'll hold you to that price. Because the line is now mature enough that it should be possible to price its performance in advance.

Senator LEMIEUX. There are two points. One is, and then I'll conclude, Mr. Chairman, is that the traditional practice of paying them for their development of a product that they're going to then sell to us doesn't seem to make a lot of sense to me looking at it from a private sector perspective.

I understand that sometimes that might have to be the way it is because it's just too big an expense for them to bear. But I would encourage you in the future, these contractors want this work, to use your power as the purchaser to extract concessions out of them on the front side too to see if they'll help finance some of this R&D.

On the question of creep and making sure that we don't have scope creep. Are we at a disadvantage on our side in that the vendor stays constant but folks like you and others similar to you rotate out and there will be a new Secretary so-and-so, and a new Ms. so-and-so, and a new General so-and-so, and we don't have the constancy on our side? Do we need to think and maybe it has already been done creatively to make sure there's something on our side that gives us continuity as well?

Dr. CARTER. Excellent point, people do change jobs rapidly, more rapidly in government than in industry. Programs take a long time and the commitments need to remain solid over that time. So it's important that as people come into these jobs, respect the commitments that were made by predecessors in the interests of stability in a program unless there's really something wrong or the circumstances have changed.

It gets back to another point you made though that's important which is how long these programs take. I think that time is the variable that we do not manage enough, in general, in our programs.

The dynamic is this: if you have a program that runs into trouble, the first thing to do is come and get more money for it. But there's only so much money every year, that only goes so far. Then your next step, if you can't get more money, is to slip the program to the right. So these things stretch out to the right. An 11-year program is 10 percent more expensive than a 10-year program. In general they run at a kind of level of effort.

That's concerning to me. So not only by the time you get the thing, it might not be what you want or we've forgotten why we bought it in the first place, or it's more expensive than it should be. So managing to the variable of time is an important idea. I appreciate your raising it.

Senator LEMIEUX. I thank you all and I thank you for your service and your focus on these important issues. Thank you, Mr. Chairman.

Chairman LEVIN. Thank you very much, Senator LeMieux. On that important point that Senator LeMieux raised about the creep of requirements—those increases, what we did in this bill was to put—we created a board, a Configuration Board it's called, to make sure that if there is a proposed change in a mission or in a requirement, it goes to the board for approval, so it doesn't creep the way Senator LeMieux pointed out.

We understand it's pretty slow getting those boards going. I just wanted to remind you that my staff has looked into this and it's not moving as quickly as we would like. If you want to comment you can but I want to just let you know that's been our concern.

Dr. CARTER. My only comment is that it's an incredibly important idea and I will look into it and get back to you.

[The information referred to follows:]

Consistent with section 814 of the Duncan Hunter National Defense Authorization Act for Fiscal Year 2009, the Department of Defense (DOD) acquisition policy requires the Acquisition Executive of each DOD component to establish and chair a Configuration Steering Board (CSB) with broad executive membership from the office of the Under Secretary of Defense (Acquisition, Technology, and Logistics and the Joint Staff. CSBs are required to meet at least annually to review all requirements changes for ACAT 1 and 1A programs in development that have the potential to result in cost and schedule impacts on the program. Such changes will generally be rejected, deferring them to future blocks or increments. On a roughly annual basis, program managers (PMs) and program executive officers (PEOs) are also required to identify and propose descoping options to the CSB that reduce program cost or moderate requirements. This policy has been actively implemented at the component level. Examples follow:

- Army acquisition policy directs a CSB to be conducted whenever an event is anticipated that could cause significant deviation from parameters in a program's approved Acquisition Program Baseline (APB). In the absence of a triggering event, programs undergo a yearly "descoping" CSB where PEOs and PMs present options for reducing cost or moderating requirements for the Milestone Decision Authority's consideration. In calendar year 2009, the Army conducted 13 CSBs.
- The Air Force applies a similarly aggressive CSB policy in a two-tier approach based on monthly program analysis to conduct either "event driven" or yearly CSBs. The CSB requirement for all Air Force Aircraft Major Defense Acquisition Program (MDAP) and MAIS programs was met for calendar year 2009.
- The Navy requires a CSB for each MDAP annually. In calendar year 2009, the Navy conducted 33 CSBs out of 45 possible for ACAT I programs. So far in calendar year 2010, the Navy has conducted 14 CSBs out of 44 possible ACAT I programs. The Navy has another 30 CSBs scheduled to be conducted in the next 3 months.

Chairman LEVIN. All right, thank you. Then also, Ms. Fox, you said that now an engine competition under your business case will achieve a break even point which is important news. It's also important that we know the assumption that you made relative to the savings of competition. What percent savings did you assume?

Ms. FOX. Sir, let me ask my colleague if we have that number. Perhaps I could invite Mr. Janicki to answer your question since he did the analysis.

Chairman LEVIN. Sure. Can you just tell us who you are?

Mr. JANICKI. I'm Fred Janicki. I led the JET team and I work for Ms. Fox.

Chairman LEVIN. Okay.

Mr. JANICKI. The 2007 study, we evaluated that we would need 21 percent to break even. Now for the updated study, we did not go in and determine what savings would be needed. For the new study, the 2010 study we have not determined that.

Chairman LEVIN. Have not, okay.

Mr. JANICKI. No, sir.

Ms. FOX. But in the past study, we assume the 21 percent, sir.

Chairman LEVIN. From what? 21 percent——

Ms. FOX. Percent of savings from competition.

Chairman LEVIN. Over the——

Ms. FOX. For a competition that would start in 2014.

Chairman LEVIN. Over the life of the contract?

Ms. FOX. That's right.

Chairman LEVIN. Are you all set, George? We're set, okay.

Thank you all. It's been a long hearing, we want to particularly thank our reporter. We don't often do that but it's a little longer

than planned so once in a while we remember to say thanks to people who keep us going here.

We appreciate your coming to visit us today and there will be questions for the record and we'll stand adjourned.

[Questions for the record with answers supplied follow:]

QUESTIONS SUBMITTED BY SENATOR CARL LEVIN

COST SHARING

1. Senator LEVIN. Secretary Carter, Secretary Gates announced that you have asked Lockheed Martin to share in some of the cost increases that the independent reviews are predicting for the F–35 program. Where do you stand in these negotiations?

Dr. CARTER. Relative to the System Development and Demonstration (SDD) Program, the Department of Defense (DOD) is challenging Lockheed Martin to meet program needs through application of the remaining fee to reward accomplishment of key schedule and cost objectives. The previous SDD incentive structure is being restructured and the remaining $614 million is being converted to event-based fee that will reward measurable progress against significant schedule events and ensure event-based fees, to include completion at or under the estimate at completion, are paid only if the events are accomplished in order to support the restructured contract performance. $379 million of the fee has been allocated to meeting objective contract performance milestones. The balance of the potential fee may be earned only if the contractor's cost at completion is at or below the restructured contract cost.

The Low Rate Initial Production (LRIP) Lot 4 fiscal year 2010 procurement contract is being negotiated as a fixed-price-type contract. The transition to a fixed-price contract is earlier than previously planned and shifts the burden of contract performance risk to the contractor.

2. Senator LEVIN. Secretary Carter, what, if any, commitment has Lockheed Martin made to sharing in any increased costs?

Dr. CARTER. Relative to the SDD Program, DOD is challenging Lockheed Martin to meet program needs through application of the remaining fee ($614 million) to reward accomplishment of key schedule and cost objectives. The previous SDD incentive structure is being restructured and the remaining $614 million is being converted to event-based fee that will reward only key schedule and cost goals/events that support successfully finishing the development program within the current estimate. If the contractor fails to meet the criteria established by the Government, it will forfeit fee.

The LRIP Lot 4 fiscal year 2010 procurement contracts are being negotiated as fixed-price incentive-fee-type contracts. The transition to a fixed-price contract is earlier than previously planned and shifts the burden of contract performance risk to the contractor.

3. Senator LEVIN. Secretary Carter, will you award the fiscal year 2010 production contract without such an agreement?

Dr. CARTER. The Acquisition Decision Memorandum authorizing full funding for Lot 4 is currently being reviewed for my signature, and I anticipate that the contract will be awarded this summer. Intensive negotiations are underway to strike a deal in the best interest of the Government. With the LRIP 4 contract, the program will transition to fixed-price incentive fee contracts reflecting the maturity of the airframe and engine, as well as signifying a commitment on the part of the contractors to control costs and maintain a focus on affordability.

INDEPENDENT MANUFACTURING REVIEW TEAM-AFFORDABILITY

4. Senator LEVIN. Secretary Carter, in my opening statement, I mentioned that the Independent Manufacturing Review Team (IMRT) had observed that, on the Joint Strike Fighter (JSF) program, "Affordability is no longer embraced as a core pillar." Why should Congress, or DOD for that matter, continue to support a program that has lost the affordability upon which the program was sold as the solution to modernizing all three components of our tactical fighter force structure?

Dr. CARTER. The IMRT review was helpful in identifying areas that the contractor and the government needed to refocus on to ensure the success of the JSF program.

Affordability was a core pillar of the JSF program at inception and the Department is taking the necessary actions to ensure that the government and contractor team restore affordability as a core pillar as the program moves forward. Additionally, the program is undergoing a significant restructure as a result of the findings and recommendations from the Nunn McCurdy review. Paramount among those recommendations is a renewed focus on restoring program affordability. In the Nunn McCurdy Acquisition Decision Memorandum, dated June 3, 2010, Dr. Carter directed the IMRT to update their 2009 assessment with particular emphasis on a fully integrated comprehensive affordability plan, maximum achievable and optimal ramp rate goals and restrictions, and the contractor organization and skill sets required in key enterprise activities to achieve those ramp rates. He also directed the Services and JSF Program Executive Officer to more closely manage affordability with a focus on successful management of cost and manufacturing risks identified by the IMRT as well as the F135 Joint Assessment Team (JAT). Additionally, it was directed that the LRIP Lot 4 contract for air systems and engines transition to a Fixed Price Incentive Firm Target contract. Dr. Carter has taken an active and aggressive role in making sure that this contract meets our affordability goals and provides a best value for the government. The costs have gradually been built into the program over time, partly as a result of a loss of focus on affordability.

5. Senator LEVIN. Secretary Carter, what specific actions have you taken, or do you intend to take, to restore affordability to the center of the program?

Dr. CARTER. DOD is restructuring the remaining $614 million in award fee and revising the SDD contract structure to reward measurable progress against significant schedule events and ensure event-based fees, to include completion at or under the estimate at completion, are paid only if the events are accomplished in order to support the restructured contract performance. DOD is also focused on transitioning to a fixed price structure for procurement contracts sooner than originally planned, specifically the LRIP Lot 4 contract. Finally, the program restructure was premised on introducing more realistic cost estimates for development and production. Having a better understanding of what the various elements of the program should cost is a critical step in managing affordability.

6. Senator LEVIN. Secretary Carter, is this lack of focus a major reason for the potential Nunn-McCurdy breach on this program?

Dr. CARTER. Subsequent to this hearing, I directed a review of the JSF program using the Nunn-McCurdy criteria. As called for in the Weapon Systems Acquisition Reform Act (WSARA), the Department conducted a root cause analysis and assessment. The JSF program's estimated average procurement unit cost has increased significantly over the past 8 years, and this is the reason the program is in Nunn-McCurdy breach. The increase in estimated unit cost is driven by a combination of flawed programmatic and technological assumptions at program inception that led to artificially low initial cost and schedule estimates, higher material costs, a decrease in the quantity of aircraft planned for purchase, and changes in inflation assumptions. Production planning, contractor commitments, production process improvement, quantity changes, material cost, international partner commitments, foreign military sales, overhead rates, and interest rates will ultimately affect unit cost more than the development and test challenges the program is currently addressing. The cost estimates in this Nunn-McCurdy review are being conducted at a time when the program is just beginning to produce aircraft and before development and testing are complete. These estimates are therefore forecasts of a future production process that will unfold over the next 25 years. They therefore carry with them the uncertainty inherent in such a long-term forecasting process, but I believe they provide the most realistic foundation available for our planning and management. At the same time, the JSF program under its new management structure should strive to reduce the program costs forecast in these estimates. I believe that costs have gradually been built into the program over time, and that with disciplined management they can be removed.

GOVERNMENT ACCOUNTABILITY OFFICE ACCESS TO INDEPENDENT REVIEWS

7. Senator LEVIN. Mr. Sullivan, to what extent have you and your team had visibility into the efforts of the various reviews that DOD conducted on the JSF independent of the program office in the past year?

Mr. SULLIVAN. The team generally had poor visibility into the independent reviews conducted by the Joint Estimating Team (JET), IMRT, and the F135 Engine JAT until very late. We made repeated requests for this information starting in No-

vember 2009, but were not briefed and provided supporting documentation by DOD until February 25, 2010. This occurred while our draft report was in processing and we ended up delaying issuance by 1 week, in part, so we could provide more current and accurate information about these important reviews. We did not, however, have sufficient time to do the necessary follow-up work and analysis to fully evaluate the reviews and their significance to the JSF program.

8. Senator LEVIN. Mr. Sullivan, are there particular conclusions from the independent reviews with which you and your team particularly agree or disagree?

Mr. SULLIVAN. While we have not yet fully evaluated the independent reviews, we largely agree with each review's overall conclusions, major findings, and recommended improvements. Each review helped confirm our own assessments of issues related to cost and schedule, manufacturing, and the primary engine. Our next annual review to begin soon will look in more detail at the results and improvement plans from these three reviews.

- We agree with the JET's conclusion that the program assessments of cost, schedule, manufacturing span times, and flight test plans were over-optimistic. We have reported increasing costs and delayed schedules for a number of years and a need for a comprehensive, independent assessment of total program costs, one that the Department is now doing. We've also reported increases in time and labor hours needed to manufacture test aircraft that have delayed deliveries and the development flight test program. We agree with the JET's assertion that development will take more time than the program was estimating and its findings on the program's overly optimistic assumptions. As we reported in March 2010, the program had completed only 10 percent of its planned flight test for fiscal year 2009 and only 3 percent of the program overall. We had noted in our March 2008 report that the program's decision to cancel two test aircraft as a result of the Mid-Course Risk Reduction Plan would add significant risk to the program. The recent addition of another test aircraft back into the development program and the allocation of up to three LRIP aircraft effectively confirmed our own earlier concerns about the risk reduction plan. The JET also noted the program's overly optimistic plan for reducing engineering staffing levels and projections for software productivity. We support the JET's assumptions which are based more on actual program performance and legacy aircraft experience. Furthermore, we have previously reported on the risks of concurrency and that the procurement rate should be slowed and were pleased to note the JET's recommendation—and DOD's subsequent action—to reduce near-term production quantities.
- The IMRT analysis also effectively confirmed many of our previous concerns regarding the JSF manufacturing program. The IMRT reported that the program's planned increase in production was unachievable based on the program's past performance and current manufacturing processes. Further, the IMRT concluded that the prime contractor would need to address a large number of conditions in order to achieve its planned full-rate production ramp-up. The manufacturing effort has been plagued by parts shortages caused largely by design changes and an immature supplier base. Given all of the challenges facing the program, we said that moving forward with the current plan for ramping up production does not seem prudent.
- While we have not reviewed the JAT findings in detail nor talked to the principals involved in the study, our work identified escalating engine costs, reduced management reserves, and slowed technical progress and would agree with the JAT that substantial cost reduction initiatives are needed.

9. Senator LEVIN. Mr. Sullivan, have you had sufficient time to assess the restructured program, and if so, what are your conclusions?

Mr. SULLIVAN. Given that we did not obtain the information on the restructuring and the related independent reviews until recently and only a short time before our report was issued, we have not had sufficient time to fully assess the restructured program. Nonetheless, we are encouraged by the positive steps taken by DOD and testified that these actions, if effectively implemented, should significantly improve program outcomes and provide more realistic cost and schedule projections. In particular, reducing near-term procurement quantities, extending development, and adding four aircraft to support the development test program (one new test jet and use of three production jets) increases the chance of successful outcomes. However, the production ramp-up remains overly optimistic considering program problems. Also, the program is still highly concurrent. Due to the program's recent critical Nunn-McCurdy breach, the program is processing a complete Independent Cost Es-

timate. We plan to more fully assess the restructuring as it unfolds over the next year and provide more details in our March 2011 report.

INDEPENDENT MANUFACTURING REVIEW TEAM-SHORT TAKEOFF/VERTICAL LANDING IMMATURITY

10. Senator LEVIN. Dr. Gilmore, the IMRT highlighted a concern about maturity of the short takeoff/vertical landing (STOVL), variant of the aircraft, the F–35B. This is the aircraft slated for the Marine Corps, and is scheduled to achieve initial operational capability (IOC) before the Air Force variant F–35A, which was the next variant scheduled to achieve IOC. The IMRT expressed a concern about the immaturity of the F–35B flight testing capability. I presume this to mean that the IMRT considers the F–35B variant to be closer in the development process than the conventional takeoff and landing (CTOL) variant for the Air Force F–35A. This might lead one to the conclusion that we could reduce concurrency and risk by fielding the F–35A before we field the F–35B. From your perspective as the Director of Operational Testing and Evaluation, is this a concern for you?

Dr. GILMORE. The test program is designed for concurrent flight sciences testing of the F–35B and F–35A in order to take advantage of common flight sciences test points. F–35B flight test is intended to lead CTOL flight testing in these common test point regimes. It is not clear at this point that reversing this relationship would necessarily reduce risk in the program. However, the F–35B, due to the STOVL system, is inherently more complex than the F–35A CTOL variant. F–35B flight test has achieved the first vertical landing and short takeoff within a limited, developmental flight test envelope with a significant amount of envelope expansion yet to be accomplished. The first production representative F–35A SDD flight test aircraft (AF–1), has not yet ferried to the Edwards AFB, California test center; that is planned to occur by early May 2010. It would be prudent to evaluate the progress made in flight testing of the two variants near the end of this year, and determine on the basis of that evaluation which variant can make better progress as the lead system.

11. Senator LEVIN. Dr. Gilmore, do you believe that shifting the program to field the Air Force F–35A variant first would reduce concerns about the testing program?

Dr. GILMORE. Referring to the answer to question 10, it is not clear at this time that shifting the program to field the F–35A first would reduce concerns about the ability to execute the test program. The test strategy depends on commonality between the two variants in certain (but not all) disciplines of flight sciences testing, with the F–35B leading the F–35A. The F–35B is, however, more complex than the F–35A CTOL variant. It would be prudent to reevaluate the test strategy towards the end of this year to determine whether the current leader-follower relationship remains the best approach.

12. Senator LEVIN. Secretary Carter, did you consider delaying the F–35B and proceeding with the F–35A as a means of simplifying the program and increasing its chances of staying on some overall schedule?

Dr. CARTER. All aspects of the program were reviewed and considered during the Department's recent review that resulted in the current restructure. At this point in the development program, delaying the F–35B, or any of the variants, would not necessarily improve schedule performance. In fact, the design of the F–35B is more mature than the F–35 A and C. Delays in the manufacture of the test aircraft is primarily due to the later than planned delivery of parts from suppliers. Those late parts are consistent across the three variants and delaying the build of one of the variants would not help regain schedule, in and of itself. As with any acquisition program, there is also the question of requirements. In the case of the F–35B, the Marine Corps is counting on the 5th generation capability that will be provided by JSF to replace legacy AV–8B and F/A–18 aircraft.

13. Senator LEVIN. General Moore, what would be the implications from the program's perspective of streamlining the program to bring the F–35A along faster than the F–35B?

General MOORE. At this point in the program, there are very limited options to accelerate development of the F–35A. The primary remaining effort is developmental flight testing and our flight test capacity at Edwards Air Force Base and Naval Air Station Patuxent River is sufficient to enable testing of all three variants concurrently. There would be little or no benefit to optimizing or prioritizing test of one variant at the expense of the others.

SUPPLY CHAIN MANAGEMENT

14. Senator LEVIN. Secretary Carter, one of the challenges the private sector has faced and continues to face is dealing with a new business model incorporating a much greater contribution of the global supply chain to build weapons systems. The much publicized delays of Boeing on the B–787 have been attributed to the growing pains of managing this global supply chain, particularly as you are designing the aircraft. The IMRT concluded that managing the global supply chain process is a huge challenge for the JSF contractor team. It also concluded that the current funding process within DOD does not support a complex, large-scale international partner, global supplier program. What steps should the contractor team take to become better at global supply chain management?

Dr. CARTER. First, the contractor's Global Supplier Executive should develop and provide a plan for including long-lead advance procurement funding requirements in each year's budget to properly fund those globally manufactured parts that take a considerable time to manufacture and ensure their availability to the production line. The contractor should also develop a transition plan for the global supply chain with associated metrics for each critical capacity issue. In addition, the contractor needs to ensure the global supplier team has adequate resources as the program transitions to higher production rates. The entire global supply chain must be advised immediately of any engineering changes in order to take appropriate and timely action to support the production line. Finally, the contractor should develop international and domestic transportation plans (after an appropriate level of study) for their suppliers, factoring into their production schedule an appropriate amount of "slack" material/parts reserve to account for issues that arise from international transportation.

15. Senator LEVIN. Secretary Carter, what steps should DOD take to be a better manager of such a program?

Dr. CARTER. DOD should develop the necessary expertise to recognize whether the prime contractor has the appropriate processes and resources in place to succeed with their global supply chain. We have already done that to some extent with the IMRT we chartered. DOD will continue to examine this particular issue with the appropriate expertise to make this part of the F–35 program a success.

NEW F–35 PROGRAM RISKS

16. Senator LEVIN. Secretary Carter, we understand that there may be some new risks that were first identified this year by the latest JET II. One of these was that expected delays in the schedule are apparently raising concerns about the maturity of the aircraft to support training of new pilots. Are there other new risks this year that have been identified by the JET and if so, is maturity of the aircraft to support training one of these?

Dr. CARTER. The JET II did not introduce any new risks. In general, they validated the risks previously identified. The JET II (and JET I) estimate did highlight development schedule risk, driven primarily by aircraft deliveries to the lest program and the ability of the test program to validate aircraft performance within that schedule. Delays in flight test do impact the maturity of the aircraft when training begins. The ongoing re-plan is feeding the pilot training syllabus to ensure the pilots going through F–35 training receive the safest, most robust training possible while the aircraft capabilities are expanded and validated through flight test.

17. Senator LEVIN. Secretary Carter, what have you proposed in this restructured program to mitigate this risk?

Dr. CARTER. We have reduced the number of aircraft across the Future Years Defense Program (FYDP), thereby reducing the concurrency of the F–35 program. In addition, we added test aircraft and properly resourced the development program in funds and schedule to account for the various risks identified by JET I and II. We have delayed the Milestone C decision to April 2016, and the Navy and Air Force are moving their IOCs commensurate with this schedule extension. This will provide the program with an appropriate amount of time to recover from aircraft delivery delays and fully develop the F–35's maturity to appropriate levels.

WEAPON SYSTEMS ACQUISITION REFORM ACT OF 2009

18. Senator LEVIN. Secretary Carter, leaving aside for the moment the issue of competition of the JSF alternate engine, the WSARA of 2009 says the following

about competition: "The Secretary of Defense shall ensure that the acquisition strategy for each major defense acquisition program includes measures to ensure competition, or the option of competition, at both the prime contract level and the subcontract level (at such tier or tiers as are appropriate) of such program throughout the life-cycle of such program as a means to improve contractor performance . . ."

I understand that you have taken a position on the alternate engine issue. However, there are a whole multitude of other prime contractor systems and subcontractor systems that would fit the mandate of the WSARA competition provision.

What is the Department's plan for complying with this competition language in WSARA for all of the rest of the JSF program, including such items as logistics, training systems, ejections seats, avionics, or other major subsystems of the JSF?

Dr. CARTER. Suppliers throughout the world are competing to be part of the JSF program. We expect the competition to expand as JSF moves into full-rate production under fixed price contracts. The F–35 program will be continuing for many years, giving us ample opportunity to address this area, though there are many areas where competition, for a variety of reasons, wouldn't make sense for the Department or taxpayers.

SOFTWARE MATURITY

19. Senator LEVIN. General Moore, one of the typical things that is done on complex software programs that run into performance or schedule troubles is for the software developers to delay functional capability to later releases of the software. From the outside, the software developers have maintained the schedule for software release X, but they have not maintained the content of software release X that they promised. This tends to paint too rosy a picture to the outside world of how well the development is going. Is this the case on the F–35?

General MOORE. While there has been some minor functionality shifted between software block releases, we are maintaining our planned capability releases while taking additional time to deliver and test those capabilities. This was a major consideration in the program restructure. Rather than deferring or deleting capabilities, the Department added resources (i.e., software personnel and an additional software test line) to our software development effort. The restructured SDD program provides the necessary resources and schedule margin to deliver full block capabilities to meet the warfighters' objectives.

20. Senator LEVIN. General Moore, have the program and the contractor been delaying any functional capability to later software releases?

General MOORE. The basic block capabilities have remained stable during SDD. While there have been some minor functionality shifts between software block releases, we are maintaining our planned capability releases while taking additional time to deliver and test those capabilities. This was a major consideration in the program restructure. Rather than deferring or deleting capabilities, the Department added resources (i.e., software personnel and an additional software test line) to our software development effort.

21. Senator LEVIN. Mr. Sullivan, does your review find that there have been delays in functional capability to later software releases?

Mr. SULLIVAN. Yes, our review has found that there have been delays in delivering functional capability, including deferral of work to later software releases. Software is developed, integrated, tested, and released in five block increments. While approximately three-fourths of total expected software has been developed, only about 40 percent has completed the more challenging phase of integration and testing. During this overall development, software capabilities have been deferred or deleted due to software growth and integration challenges. The JSF program has experienced 40 percent software growth since the preliminary design review and 13 percent since critical design review. The JET reported that some growth has been offset by software deferral or deletion—up to 10 percent of program of record software content—in order to address schedule pressures. The program has also deferred capabilities to future blocks due to significant technical and integration challenges. Mission systems software, in particular, is behind schedule and has moved the communications, navigation, and identification subsystem from block 0.5 to block 1.0 due to integration challenges. In addition, Defense Contract Management Agency officials stated that voice recognition capabilities planned for block 0.5 BF–4 first mission system aircraft would be deferred. JSF program officials also reported that 38 software severity 1 and 2 defects were moved from Block 0.5 to 1.0. This deferment strategy to meet schedule is doubtful given the consequences and

probability of software risk being realized later in flight test. It also extends the overall schedule for completing and maturing related capabilities while adding costs to future efforts.

22. Senator LEVIN. General Moore, General Fraser, head of the Air Force's Air Combat Command (ACC), has been quoted as saying that he could be forced to delay the Air Force's IOC date by 2 years or more, based not on delayed aircraft deliveries, but based on a lack of sufficient capability in the software delivered with those early aircraft. When will the JSF program be able to deliver the software to ACC that General Fraser believes is needed to achieve IOC?

General MOORE. Block 3 is planned to deliver to operational testing in late 2014. We expect Block 3 operational testing to complete in early 2016. I defer to the Services on their respective IOC plans.

DEFENSE CONTRACT MANAGEMENT AGENCY PROBLEMS

23. Senator LEVIN. Secretary Carter, the IMRT highlighted a concern about a lack of consistent Defense Contract Management Agency (DCMA) engagement across the contractor sites. This would have been bad enough when we were building aircraft the old-fashioned way, but when we are trying to take advantage of a global supply chain to build an aircraft, such a situation is intolerable. What steps are you taking to correct this problem with DCMA?

Dr. CARTER. The DCMA has developed a new strategic plan for fiscal years 2009–2013 to address the lack of consistent engagement across contractor sites. This plan defines the key focus areas and specific steps being taken to improve the Agency's support to the DOD Acquisition Enterprise. To address increased customer demand for specialized skills, the DCMA is expanding their analytical capabilities in the areas of pricing, earned value management, and supply chain management. The Agency is continuing to improve management controls and consistency of operations and contractor engagement through deployment of a new organization alignment which establishes an Operations Directorate replacing the divisional structure and functionally realigning its core business activities into three functional Directorates: Contracting, Quality Assurance, and Engineering and Analysis. The Agency concept of operations implementing this realignment incorporates well-defined roles, responsibilities, and infrastructure to promote standardization, ensure proper alignment, and enhance mission performance. To provide focused and integrated acquisition insight to the Agency's customers, a Portfolio Integration and Analysis Directorate has also been established under the new organizational design. This new Directorate includes an Integration Support Division whose duties include integration and analysis of functional data to provide predictive strategic products and corporate technical and business system profiles to the Agency's customers. This overarching strategic approach is designed to ensure the Agency executes standard business processes and drives consistent supplier engagement activities.

FIGHTER FORCE STRUCTURE

24. Senator LEVIN. Ms. Fox, in my opening statement, I mentioned the possible impact that the delays in the F–35 program could have on the Air Force, Navy, and Marine Corps. Even under the last announced F–35 schedule, the Services were already anticipating sizeable force structure gaps. What effect will the F–35 program delays have on the fighter force structure of the Services?

Ms. FOX. The PB11 JSF restructure deferred the procurement of 122 of the 483 aircraft planned for fiscal years 2011 through 2015 in PB10. 55 of the 122 were Navy aircraft and 67 were Air Force aircraft. CAPE and the Services are assessing a potential capacity gap in the years prior to full delivery of the JSF. This effort will also examine the feasibility of mitigating a shortfall. These measures include achieving depot efficiencies to increase aircraft availability and service life extensions of existing aircraft.

25. Senator LEVIN. Ms. Fox, why didn't the Quadrennial Defense Review (QDR) reach any conclusion about requirements for fighter force structure?

Ms. FOX. The 2010 QDR identified 6 air superiority wing equivalents and 10–11 theater strike wing equivalents for the Air Force and 10 Navy carrier air wings and 6 Marine Corps fixed-wing Marine Air Groups (5 Active Duty and 1 Reserve) for the Navy.

JOINT ASSESSMENT TEAM REVIEW OF THE PRATT & WHITNEY ENGINE PROGRAM

26. Senator LEVIN. Secretary Carter, earlier this year, you announced that you were commissioning a JAT to review cost and schedule issues with the Pratt & Whitney F135 engine program. What were the conclusions or recommendations of the JAT?

Dr. CARTER. The JAT determined that the cost growth projections are to a significant degree reversible. The JAT also determined that with investment in affordability and a commitment by the contractor, Pratt & Whitney (P&W) could realistically achieve their cost goals. The JAT recommendations focused on affordability investment, contracting actions, the Component Improvement Program, and risk management and readiness for production of the prime and subs, as well as other more detailed areas. The results of the JAT were briefed to professional staff members of the four congressional defense committees on February 22, 2010. The backup information was provided to the congressional defense committees on March 5, 2010.

27. Senator LEVIN. Secretary Carter, what part, if any, is the F135 program playing in the cost, schedule, or performance issues with the F–35 program?

Dr. CARTER. The F135 program, from program baseline in 2001, is approximately 7.5 percent of the Average Unit Procurement Cost. From SAR 07 to SAR 09, the F135 program accounts for approximately 4.4 percent of the increase in Average Unit Procurement Cost and 3.5 percent of the Program Acquisition Unit Cost. While the F135 program has experienced delays, to date none of those delays have created a delay in the overall F–35 program. Initial Service Release was accomplished earlier this year and the engine has accumulated 13,400 ground test hours and 219 flight test hours.

28. Senator LEVIN. Secretary Carter, what, if any, commitment do you have from Pratt & Whitney leadership to correct the problems, or share in the additional costs of the F135 program?

Dr. CARTER. Pratt & Whitney leadership has committed to assist the Department in correcting the cost growth concerns on the F135 engine. In addition, they have agreed, from corporate funds, to fund a number of affordability initiatives that require investment in order to further reduce the cost of the F135 engine. The JAT proposed that with commitment and funding, the cost growth trends can be reversed, and I have challenged Pratt & Whitney to do so.

QUESTION SUBMITTED BY SENATOR BILL NELSON

F–35 PROGRAM DELAYS

29. Senator BILL NELSON. Secretary Carter and General Moore, both of your written statements to the committee state that you expect F–35 training operations to begin at Eglin Air Force Base in late 2010 with LRIP 1 aircraft. Have the F–35 program delays impacted the number of aircraft that will arrive and train at Eglin over time? Please provide a revised estimate of the total number of aircraft that will be based there and the arrival timeframe for each.

Dr. CARTER. The total number of aircraft to be based at Eglin Air Force Base (AFB) has not changed; however, program delays have impacted the delivery dates of the aircraft. The initial Record of Decision for Eglin AFB is for the beddown and limited operations of 59 aircraft (24 CTOLs, 20 STOVLs, and 15 CVs). The first aircraft, Air Force CTOLs, are scheduled to arrive at Eglin before the end of calendar year 2010. Marine Corps STOVLs begin to arrive in early 2011 and Navy CVs will start arriving in mid-2012. Aircraft will continue arriving through 2014.

General MOORE. Delays in production have had a direct impact on the timing of aircraft arrival at Eglin so that training will start later. However, the total number of planned aircraft remains the same and is restricted by the current Environmental Impact Statement. Approximate projections for cumulative aircraft at Eglin Air Force Base by year are as follows: 4 (2010); 30 (2011); 37 (2012); 51 (2013); and 46 (2014).

QUESTION SUBMITTED BY SENATOR MARK UDALL

SERVICE LIFE EXTENSION PROGRAM

30. Senator UDALL. Secretary Carter, based on recent testimony before the House of Representatives, it appears the Air Force plans to modernize and renovate fourth

generation aircraft using a Service Life Extension Program (SLEP) in order to bridge the capability gap until the F–35 becomes available. What does this year's budget request do to meet that goal and what would a SLEP include for the Nation's F–16s?

Dr. CARTER. The Air Force is closely monitoring fighter capability and capacity shortfalls. The Air Force is currently conducting full scale fatigue tests (FSFT) on the A–10 and F–15C, and starting a FSFT on the F–16 Block 50 in fiscal year 2011. These tests will increase the accuracy of determining the remaining service life of aircraft and continue to inform SLEP. SLEP combined with sustainment upgrades and a capability enhancement package for the F–16 Block 40–52 aircraft provides essentially the same capability as all-new "4.5 Generation" fighters at 10 to 15 percent of the cost.

QUESTIONS SUBMITTED BY SENATOR ROLAND W. BURRIS

F–35 DELAY TO MARINE CORPS

31. Senator BURRIS. Secretary Carter and General Moore, the Air Force reports that the introduction of the F–35 to their operating forces is going to be delayed up to 24 months. Is the IOC of the F–35 for the Marine Corps going to have to be delayed as well?

Dr. CARTER. The Marine Corps plans to IOC with a multi-mission support capable Block 2B aircraft as defined in the JSF operational requirements document (ORD) change 3. The aircraft, support, and ancillary equipment for training, test, and the first operational squadron were procured in fiscal years 2008, 2009, and 2010. With the recent program restructuring, IOC is now projected for December 2012 for the Marine Corps. This is based on operational requirements and the associated metrics that encompass capabilities, equipment, training, and support. We will track and measure the progress of the program to meet Marine Corps requirements between now and December 2012 and ensure the Marine Corps has all the elements required for operational use of the F–35B. An IOC declaration will be dependent upon meeting these requirements.

The F–35B Block 2B is far superior to any aircraft in the Marine Corps inventory. With VLO survivability, a powerful integrated sensor suite, fused information displays, interoperable joint connectivity, a precision weapon capability, and self protect anti-air weapons, it is a total package of capabilities. It will revolutionize our expeditionary Marine Corps air-ground combat power in all threat environments while enabling joint interoperability and reducing the reliance on supporting aircraft, tankers, and electronic warfare jammers.

General MOORE. I defer to the Services on their respective IOC plans.

32. Senator BURRIS. Secretary Carter and General Moore, if the delay is 24 months, what is the plan to recapitalize the current F–18 and AV–8B aircraft fleet for the Marine Corps?

Dr. CARTER. We are closely managing the flight hours and fatigue life of our tactical aircraft. Since 2004, we have provided guidance and actions to optimize aircraft utilization rates while maximizing training and operational opportunities. The F–18 A–D Inventory Management Forecasting Tool is used to project the combined effects of TACAIR transition plans, retirements, attrition, and pipeline requirements on the total F–18 A–D aircraft inventory. The model is updated with the most recent data and forecasts the strike fighter inventory compared to the existing requirements. Critical model variables include JSF deliveries, force structure, usage rates, life limits, depot turnaround time, fatigue life expended, catapult launches and arrested landings, and field landings.

Faced with an increased shortfall, the Navy has continued to identify further opportunities to reduce its impact. The Marine Corps has modified its F–35 transition plan by transitioning some Hornet squadrons earlier and leveraging the service life remaining in the AV–8B fleet. Management "levers" have been identified: accelerating the transition of five legacy F–18C squadrons to F–18 E/F; transitioning two additional F–18 C squadrons to F–18E/F using the remaining attrition F–18 E/F Reserve aircraft; and reducing the Navy Unit Deployment Program and Marine Corps Expeditionary F–18 A+/C/D squadrons from 12 to 10 aircraft per squadron. Some of these measures are dependent on reduced demand in Global Force Management requirements.

We do not anticipate procuring fewer than 680 JSF aircraft for the Navy. Recapitalizing the Navy TACAIR inventory with the F–35B and F–35C aircraft provides a survivable "Day One" strike capability in a denied access environment that cannot

be accomplished by current legacy aircraft. The Navy's desire is to acquire the JSF program of record at the programmed ramp to standup squadrons in the most efficient manner possible.

General MOORE. I defer to the Services on their respective IOC plans.

F–35 DELAY COSTS TO NATIONAL SECURITY

33. Senator BURRIS. Secretary Carter and General Moore, as the gap for fighter aircraft grows, when will our national security position be seriously degraded?

Dr. CARTER. The Department has the necessary fighter aircraft capacity in the near-term to support our Nation's security needs. However, ongoing assessments forecast a potential decrease in our strike fighter capacity during JSF transition, unless further mitigation measures are implemented. Management initiatives being implemented by the Department prudently balance operational risks and requirements today, while seeking to fulfill future projected capacity and capability requirements. They also allow the Department to closely monitor progress toward reducing the shortfall and enable adjustments to the plan before making unnecessary and premature investments or force structure decisions. Additionally, the Department continues to assess the projected threats, capabilities, and geo-political (actors that combine to constitute our strike fighter requirements. On balance, I believe the force structure represented by our 30-year aviation plan maintains our national security position across the spectrum of challenges we are likely to face throughout the time period of the report, albeit with prudent risk where appropriate.

General MOORE. The Air Force is taking numerous steps to mitigate the fighter shortfall. These steps include options to maximize the service life of our legacy fighters while we aggressively manage the procurement of the F–35. We are confident these steps will ensure our national security risk never reaches the point where it is seriously degraded.

CONTRACTOR COSTS

34. Senator BURRIS. Ms. Fox, part of the JSF program overhaul includes adding $2.8 billion, while withholding $614 million in performance award fees. If we are injecting another $2.8 billion, what is really being withheld?

Ms. FOX. JSF award fees are contractual incentives available to the Joint Program Office to reward desired contractor performance, according to the terms of the contract. These fees are normally awarded when the contractor meets or surpasses key performance goals.

The Department decided to withhold the $614 million in award fees that were available for distribution for recent contract performance. This withhold applies to past performance.

The $2.8 billion added to the JSF program will be budgeted to address critical developmental requirements going forward, beginning in fiscal year 2011. The Joint Program Office will review contract performance at appropriate times in the future in order to determine whether the contractor qualifies for and receives award fees.

QUESTIONS SUBMITTED BY SENATOR JOHN MCCAIN

RESTRUCTURE PLAN

35. Senator MCCAIN. Secretary Carter, in 2008, the JET I estimated that the JSF program was 2 years behind the latest schedule; the 2009 JET II revised that estimate and predicted a 30-month delay. Now, the DOD predicts that its plan to restructure the program, by reducing production numbers and providing additional funds for development, will extend the official timeline by only 13 months, not the 30 months the JET II team predicted the slip would be. Exactly where does that 17-month savings come from? In other words, exactly how does adding the additional test aircraft and funding shorten the flight test schedule by 17 months?

Dr. CARTER. The Department has stated they want more realism in program estimates, but will refuse to accept the cost and operational consequences of a longer development program without doing everything possible to minimize them. The JET II projected an additional 30 months would be required to complete SDD because of F–35 schedule delays that resulted in an increasingly pressurized flight test schedule and other program execution assessments (e.g., engineering and software staffing, manufacturing span times, etc.). To mitigate that potential outcome, the Department is adding another SDD carrier variant flight test aircraft, adding a soft-

ware integration line, and borrowing up to four LRIP aircraft for development flight test. Taking these factors into consideration, JET II revised its estimate.

The Department believes these steps will help reduce the 30 months of additional JET-projected schedule requirements while providing adequate schedule margin. Under the restructured program, development test (DT) is planned to complete in March 2015, with Milestone C (full-rate production) planned in April 2016 commensurate with the completion of initial operational test and evaluation (IOT&E). In PB11, the Department also added $2.8 billion RDT&E through the FYDP to fully fund to the JET II development estimate for the restructured program. The Department plans to incentivize the contractor to further improve on the revised cost and schedule position.

CAPABILITY

36. Senator MCCAIN. General Moore, since 2006, have there been any changes in the planned block capabilities or overall planned capabilities for any variant of the JSF? In answering this question, please provide a comparison of planned capabilities circa 2006 with capabilities associated with each planned block today. Please also highlight which of those planned capabilities circa 2006 are either no longer planned or have been moved to later blocks.

General MOORE. The basic approach to the overall functionality of the block plan has not changed markedly since 2006. Block 0.5 provides mission system functionality for basic flight; Block 1 supports initial training; Block 2 supports the Marine Corps IOC with basic close air support, interdiction, and initial air-to-air capability; and Block 3 provides ORD mission coverage, which includes full suppression/destruction of enemy air defenses, and offensive and defensive counter air.

While there have been some minor functionality adjustments within blocks in the basic block plan, none have had a significant impact on the overall operational objectives of Blocks 1, 2, or 3. For example, the functionality moved from Block 2 to Block 3 was primarily advanced functionality to support the destruction of enemy air defense missions, and other functions that required the core processing technology refresh associated with LRIP 5 (Block 3 configuration).

INITIAL OPERATING CAPABILITY

37. Senator MCCAIN. Secretary Carter, the Marine Corps expects to take delivery of its version of the JSF with IOC on 2012. You testified that the Navy and the Air Force are projecting IOC dates of 2016. Given the likelihood that development will probably not be completed until 2017, exactly what kind of capabilities will those aircraft have?

Dr. CARTER. Block 0.5 provides mission system functionality for basic flight; Block 1 supports initial training; Block 2 supports Marine Corps IOC with basic close air support, interdiction, and initial air-to-air capability; and Block 3 provides ORD mission coverage, which includes full suppression/destruction of enemy air defenses, and offensive and defensive counter air. Navy and Air Force IOC dates are based on completion of IOT&E of Block 3 capability.

38. Senator MCCAIN. Secretary Carter, how meaningful will those capabilities be, given the fighter gaps the Departments of the Navy and the Air Force are forecasting?

Dr. CARTER. The capabilities of the F–35 will be very meaningful to the Department. The F–35 will provide fifth generation strike fighter capability and will be the backbone of the tactical aviation fleet not just for the Services but also for our international partners and allies.

The Marine Corps will declare IOC with Block 2 software and basic close air support, interdiction, and initial air-to-air capability. These capabilities will exceed the capabilities of Their current AV–8B aircraft and will be upgradable to full Block 3 capability.

When the Air Force and Navy declare IOC with Block 3, the F–35A and F–35C will have full air-to-air, interdiction, CAS, suppression of enemy air defenses, and tactical and strategic destruction of enemy air defenses capability. Further weapons capability will be limited by test asset capacity, and the Services are prioritizing new weapons and external weapon certifications to be completed within the schedule and budget constraints.

39. Senator MCCAIN. Secretary Carter, exactly when does the JSF exceed weapons-carrying capabilities of the fourth-generation aircraft they are replacing?

Dr. CARTER. The Marine Corps will declare IOC with Block 2 software and basic close air support, interdiction, and initial air-to-air capability, These capabilities will exceed the capabilities of their current AV–8B aircraft and will be upgradable to full Block 3 capability. When the Air Force and Navy declare IOC with Block 3, the F–35A and F–35C will have full air-to-air, interdiction, CAS, suppression of enemy air defenses, and tactical and strategic destruction of enemy air defenses capability. Further weapons capability will be limited by test asset capacity, and the Services are prioritizing new weapons and external weapon certifications to be completed within the schedule and budget constraints.

LOW-RATE INITIAL PRODUCTION

40. Senator MCCAIN. Dr. Gilmore, you noted recently that the concurrency structured into the JSF program's test, production, and training plans has obscured the mission capability of LRIP aircraft and support systems. Do you believe that the revised plan improves the process by which the mission capability of LRIP systems will be accurately and credibly predicted well before delivery? Please explain your answer.

Dr. GILMORE. By adding time and somewhat reducing the planned buys of production aircraft, the restructure provides the opportunity to better tie deliveries of aircraft to demonstrated progress in the flight test program. An Integrated Test Review (ITR) begins this week to analyze the new schedule and determine the critical paths to complete development goals and enter two mission-level tests, including IOT&E. The review process will yield insight into and provide a basis for how LRIP capabilities will be verified prior to delivery. During the ITR process, DOT&E will work to improve the users' understanding of the mission capability of each LRIP lot as well as assure that the test plans in place will verify what capability exists before delivery.

FIXED-PRICE CONTRACTING

41. Senator MCCAIN. Secretary Carter, exactly by when do you expect that the program will transition into using fixed-price-type production contracts?

Dr. CARTER. The program is attempting to transition to fixed-price production contracts for the LRIP Lot 4 contracts.

42. Senator MCCAIN. Secretary Carter, in 2008, the DOD concurred with a Government Accountability Office (GAO) recommendation that the Under Secretary of Defense for Acquisition, Technology, and Logistics (AT&L) report on a strategy to transition to a fixed-price-type contract. As GAO pointed out, without such a report, Congress will be unable to assess the extent to which the taxpayer could be exposed to production cost increases. Mindful of the substantial amount of concurrency that will remain in the test plan even after your Risk Mitigation Strategy is executed, what is your strategy to transition the program into fixed-price-type production contracting?

Dr. CARTER. The program is transitioning to fixed-price production contracts for the LRIP Lot 4 contracts. Negotiations are ongoing and are expected to be completed this summer.

AWARD FEES

43. Senator MCCAIN. Secretary Carter, on the JSF program, what is the history of award fees paid to the program's prime contractor since the beginning of SDD? Please express that as both a dollar amount and a percentage of the total fee available.

Dr. CARTER. For the Lockheed Martin development contract, the total fee available through the end of the October 2009 award fee period was $1.862.4 million and the total fee awarded is $1,528.3 million, so the contractor was awarded approximately 82 percent of the available award fee.

44. Senator MCCAIN. Secretary Carter, how much of the available fee, if any, remains to be earned on the prime contractor's efforts to develop the aircraft?

Dr. CARTER. The remaining fee for the contractor's development effort is $614 million. We are restructuring that $614 million and revising the SDD contract structure to reward measurable progress against significant schedule events and ensure event-based fees, to include completion at or under the estimate at completion, are

paid only if the events are accomplished in order to support the restructured contract performance.

OPERATIONAL TEST AND EVALUATION

45. Senator MCCAIN. Dr. Gilmore, what concerns, if any, do you have about the potential impact that the new plan to restructure the JSF, essentially comprised of reducing production numbers and adding funds for developmental testing, have on the proper conduct of operational testing?

Dr. GILMORE. The restructure provides the opportunity to conduct the robust developmental test program that is a prerequisite for successful operational testing. As the restructured program proceeds, DOT&E will work to address the following concerns:

- Since the LRIP aircraft being added to the SDD flight test fleets were originally intended for training and operational test functions, we need to assure that they are returned to the operational test team in time to meet the operational test entry criteria.
- The training center will also have fewer aircraft to accomplish the planned training of operational test crews; therefore, the impact of this change needs to be clearly understood and mitigated.
- An additional test line for software integration must be procured to enable timely delivery of the remaining software blocks. The contractor is acquiring equipment for the U.S. Reprogramming Lab (USRL) that will be used to develop the operational mission data load. The contractor intends to use the USRL equipment for some software integration testing in parallel with preparation of the equipment for delivery to the USRL. We need to assure that use of the USRL to develop the operational mission data load is not disrupted by this approach.
- The plans for the Block 2 operational test and the Block 3 IOT&E are not adequate without full accreditation of the verification simulation for operational scenarios. The opportunity exists during the restructure to correct resource shortfalls associated with this important man-in-the-loop simulation.

EARNED VALUE MANAGEMENT

46. Senator MCCAIN. Secretary Carter, what is your assessment of the prime contractor's earned value management system (EVMS) and how close the DOD is to formally allowing the DCMA to decertify the system or take other remedial action, pending a demonstration of progress in fixing documented deficiencies?

Dr. CARTER. Lockheed Martin Fort Worth is currently non-compliant with 19 of 32 EVMS guidelines. The Department considers this unacceptable. Lockheed Martin had developed a Corrective Action Plan that fell short of the Department's expectations. I have directed the DCMA to supplement the F–35 Joint Program Office's team with EVMS experts in working with Lockheed Martin to make sure we get this right. We are proactively working to obtain an improved, executable plan by June 30, 2010. If this date is not met, I will consult with the JPO and DCMA on what contractual or other remedies can be employed to achieve results we seek.

RISK SOFTWARE DEVELOPMENT AND TESTING

47. Senator MCCAIN. Dr. Gilmore, while the test plans associated with the initial software blocks, which provide relatively modest capability, are sufficiently defined, those associated with the later software Blocks 2 and 3 appear to lack fidelity. With their delivery delayed by more than a year, your observation that "[t]he late delivery of test aircraft has, so far, masked the effect of delays in software development" is salient. How significant is the possibility of a hidden software risk, that is, software and integration risks that no one can really see right now because flight testing has barely begun?

Dr. GILMORE. The risk in developing, integrating, and flight testing software in the time allotted remains high. While recent developments such as accomplishing first flight of the first mission systems test aircraft, BF–4, are positive, all missions systems flight test remains to be accomplished. Recognition of the need for an additional software systems integration and test line and including it in the program restructure is an acknowledgement of that risk. Flight test of Block 1, which is planned to begin by the fourth quarter of this year, will provide the next key indica-

tion of the ability of the program to perform to schedule and meet requirements for delivered capability.

INTERNATIONAL PARTNERS AND COST, SCHEDULE, AND PERFORMANCE

48. Senator MCCAIN. Secretary Carter, please describe what price effect any change in the procurement quantity of JSF aircraft sought by each of the program's international partners will have on the unit cost of the JSF under the overall program. In other words, please explain as specifically as possible, how elastic the unit cost of buying JSF aircraft under the overall program is to any change in the number of JSF aircraft that each of the program's international partners ultimately decide to buy.

Dr. CARTER. The elasticity of JSF prices to changes in international buy assumptions depends on how these changes are modeled. As a general approximation, we considered 25 percent, 50 percent, 75 percent, and 100 percent reductions in international quantities and computed how the Program Acquisition Unit Cost (PAUC) and Average Procurement Unit Cost (APUC) would change in response to these reductions. We found that PAUC and APUC increased on average 1 percent for each 25 percent reduction in total partner procurement quantities. Smaller total production quantities imply less opportunity for cost improvement from worker learning and consequently, higher unit costs. In addition, program fixed costs are increasingly spread over a smaller base which increases average unit costs.

A table showing the results of this analysis is attached.

Item	100% International Participation - 700 Partner JSFs	75% International Participation - 525 Partner JSFs	% Change from 100% Case	50% International Participation - 350 Partner JSFs	% Change from 100% Case	25% International Participation - 175 Partner JSFs	% Change from 100% Case	0% International Participation - 0 Partner JSFs	% Change from 100% Case
PAUC (BY$02)	$108	$109	0.7%	$110	1.6%	$111	2.6%	$113	3.9%
APUC (BY$02)	$90	$91	0.9%	$92	1.9%	$93	3.2%	$94	4.7%
PAUC (TY$)	$152	$154	0.8%	$155	1.6%	$156	2.7%	$158	3.9%
APUC (TY$)	$132	$133	0.9%	$135	1.9%	$136	3.1%	$138	4.6%

49. Senator MCCAIN. Secretary Carter, what impact, if any, will the new plan to restructure the JSF program have on the dates by which each of the program's international partners can expect to take delivery of the aircraft and the cost at which each will ultimately buy them?

Dr. CARTER. The JSF restructure will not impact the dates by which each of the program's international partners can expect to take delivery of their planned aircraft procurements. The Department's restructure did revise the procurement profile, which does impact procurement costs. However, the partner's costs for aircraft will ultimately be determined by when each partner decides to actually execute their planned procurements.

50. Senator MCCAIN. Secretary Carter, does the new restructure plan have any impact on the capabilities of any JSF aircraft that any of the program's international partners intend to buy?

Dr. CARTER. The restructuring of the JSF program will not have any impact on the capabilities of the (JSF) aircraft the program's international partners intend to buy. The revised JSF program schedule may affect some countries' original plans regarding introduction of JSF capability into their force structure.

QUESTIONS SUBMITTED BY SENATOR SAXBY CHAMBLISS

INITIAL OPERATIONAL CAPABILITY FOR THE JOINT STRIKE FIGHTER

51. Senator CHAMBLISS. Ms. Fox and Mr. Sullivan, in Secretary Carter's written testimony for this hearing, he announced that projected IOC dates for the three F–35 variants are as follows: the Marine Corps in 2012 and the Navy and the Air Force in 2016. Do you think these dates will be met and, if not, what do you expect the actual IOC dates for the three variants will be?

Ms. FOX. Yes, in light of the changes to the program, the Services have reassessed their IOC dates. Each Service defines IOC depending on what capabilities it intends to have at IOC, operational test and training requirements, and the number of air-

craft required. Specifically, the Marine Corps will reach IOC in 2012 and the Navy and the Air Force will reach IOC in 2016.

Mr. SULLIVAN. Our March 2010 report states that JSF cost increases and schedule delays increase the risk that the program will not be able to meet warfighter capability and quantity requirements on time. At that time, the Marine Corps IOC date was March 2012, the Air Force's March 2013, and the Navy's March 2015. We recommended, and DOD concurred, that the military services conduct a detailed review of IOC requirements and reasonable, realistic timeframes for achieving them. Shortly after the Department announced it was restructuring the JSF program to add more time for development and to reduce near-term procurement, the Air Force and Navy indicated their intent to extend IOC dates, while the Marine Corps did not. We seriously question the Marine Corps ability to meet the 2012 IOC date, as it was previously defined as requiring 30 operational STOVL aircraft with interim warfighting capability.

The likelihood of the Air Force and Navy meeting their extended IOC dates will depend on several factors. First, the program must continue to mature its manufacturing processes and speed up the production of aircraft. Development test aircraft are taking longer than planned to manufacture and the prime contractor has not come down the manufacturing learning curve as projected. As of January 2010, the program has only delivered four development flight test aircraft and has a backlog of production aircraft on order. The Air Force requires 51 operational aircraft and the Navy 28 aircraft at IOC, all with full warfighting capability. Given that the program is still struggling to mature its production processes we believe it optimistic that it will be able to produce sufficient assets and fully test these quantities in time to meet even the extended service IOC dates.

Another key factor is the progress of the development and initial operational flight test programs. Specifically, real progress must be made in the development flight test program demonstrated by the burning down of test flights, flight test hours, and test points. The flight test program has experienced significant delays because of late aircraft deliveries, technical problems, and low productivity. Only 3 percent of its planned flight tests were completed as of the end of 2009. The program does not expect to complete development flight testing of Block 2 capabilities-required for Marine Corps IOC—until mid-2012. The program does not expect to complete development flight testing of Block 3 full warfighting capabilities—required for the Air Force and Navy IOCs—until March 2015. Restructuring also extended operational testing. The Director of Operational Test and Evaluation (DOT&E) is now projecting completion of initial operational testing of the full warfighting capability by mid-2016, but only if additional test aircraft are added, software is delivered on time, and a strenuous pace of testing is maintained, something that both DOT&E and the JET question. DOT&E also reported that the mission capability of the initial production aircraft is unclear, creating planning problems for the Services that depend on these aircraft to meet IOC. Our report concluded that these actions, coupled with plans to reduce procurement in the near-term and utilize some production aircraft in development testing, could impinge on concurrent efforts to begin training pilots and maintainers, and could significantly overlap operational testing—all efforts important to stand up the first operating units and meet warfighter capability and quantity requirements.

An unknown factor is the number of problems to be discovered in testing and the program's "success" in fixing deficiencies. Past programs have shown that many problems are not discovered until flight testing. As such, the program is likely to experience setbacks as it discovers and completes the necessary technical or design fixes to address the problem. This could, in turn, delay the start or completion of operational testing. In this way, the likelihood of meeting IOC dates will depend to a large degree on the number and severity of problems discovered in development testing. While the restructuring adds new test assets and extends testing, the test schedule is still aggressive with little schedule margin for error. In addition, while the program's simulation labs may reduce the risk of discovering major issues in flight testing, the labs are unproven as a substitute for flight testing and most have yet to be accredited. Furthermore, while approximately three-fourths of software has been developed, only about 40 percent has completed the more challenging phase of integration and testing.

52. Senator CHAMBLISS. Ms. Fox and Mr. Sullivan, do you expect it will be necessary to eliminate or defer certain capabilities on the different variants in order for those variants to meet the now advertised IOC dates?

Ms. FOX. No. The Services define the deliveries and capability required to declare IOC. The Navy and Air Force have decided to declare IOC in 2016 after the conclu-

sion of operational test, which is consistent with the restructured schedule. The Marine Corps remains committed to an interim capability in 2012.

Mr. SULLIVAN. As discussed above, the Air Force and Navy are projecting an extension of their respective IOCs to 2016, while the Marine Corps' IOC date remains the same. The determination of IOC is primarily a Service responsibility. The progress of the schedule will largely determine what capabilities are available when each Service ultimately declares IOC. While the deferred Air Force and Navy IOC dates will provide more time for testing and fixing problems, we are not in a position to determine whether or not it will be necessary to eliminate or defer certain capabilities on the different variants. Based on prior test performance to date, with significantly less progress accomplished than planned, the program will have to improve to provide sufficient capabilities for IOC dates. In our March 2010 report, we recommended that DOD reassess warfighter requirements and if necessary, defer some capabilities to future increments.

QUESTIONS SUBMITTED BY SENATOR DAVID VITTER

ALTERNATE ENGINE FOR THE F135

53. Senator VITTER. Secretary Carter and Ms. Fox, I understand that the current projected cost of the F135 is in significant excess of its target value and has had continued cost growth. It seems to me that the competition would hold down the cost growth that you are experiencing now, and would hold down cost growth in future years. Why then is the DOD so adamant about abandoning competition by proposing to eliminate the alternate engine?

Dr. CARTER. The Department is firm in our view that the interests of the taxpayers, our military, our partner nations, and the integrity of the JSF program are best served by not pursuing a second engine. There is no guarantee that having two engines will create significant long-term savings to outweigh the significant near-term investment. The additional costs and the burden of maintaining two logistical systems are not necessarily offset by the potential savings generated through competition.

Ms. FOX. While it is true that competition can be effective in managing major acquisition programs, it is not the only tool that the Department has available to manage key supplier relationships, as well as costs, in acquiring major systems. As part of the restructuring of the JSF program proposed in the fiscal year 2011 President's budget, we plan to improve the implementation of proven contract management principles and incentives related to costs, as well as insight into actual contractor cost performance, in the management of the entire JSF program, including the propulsion system.

ACQUISITION SHORTFALLS

54. Senator VITTER. Secretary Carter, according to a McKinsey study released this month analyzing 33 major militaries in the world, the United States scored last in combat gear output per dollar spent. Do you agree with the study's assertions that the United States is one of the lowest performing countries in output per dollar spent?

Dr. CARTER. I do not agree with the study's assertion that the United States is one of the lowest performing countries in output per dollar spent. We do not agree with the methodology that was used to derive this conclusion.

For instance, the "Military Equipment Output" metric used to calculate "output" per dollar spent does not adequately reflect the superior capabilities of the equipment used by the U.S. Armed Forces. For example, the study states that an F–22 or F–35 is equivalent to 3.6 MiG–19s, first flown in 1953. We believe our newest fighters are much more capable than this comparison would suggest.

Furthermore, the study's methodology uses France and the United Kingdom as having the "ideal" equipment mix, and then judges other countries' mixes against this benchmark. This does not take into account the very different types of global missions the United States prepares for that other countries do not.

Due to inadequate consideration of U.S. capability advantages and the different mix of capabilities needed by the United States, the study incorrectly finds that the U.S. output per dollar spent ratio is lower than other countries'.

These factors prevent the study from forming a reliable qualitative or quantitative judgment about the U.S. output per dollar spent.

55. Senator VITTER. Secretary Carter, how do you plan on getting better value for the money DOD spends while still maintaining high quality weapon systems?

Dr. CARTER. First let me say that many programs do well in terms of cost, schedule, and performance, providing value to the warfighter and the taxpayer. But for those programs that do have cost and schedule growth or performance issues, one of the biggest drivers is unstable requirements.

We are addressing requirements instability through increased partnering with the Joint Staff on requirements and through Configuration Steering Boards (CSBs). CSBs review all proposed requirements changes and any proposed significant technical configuration changes that could potentially impact cost and schedule for an MDAP. Such changes will generally be rejected, deferring them to future blocks or increments. Changes may not be approved unless funds are identified and schedule impacts mitigated. CSBs also create a collaborative forum for program managers to propose and describe reductions in requirements that can significantly lower cost without substantially reducing capability.

The Department maintains high quality weapon systems by rigorously testing the capabilities that have been developed to assure that the system performs as advertised, and that we are adequately equipping the warfighter. Testing and evaluation is a critical process that must be thoroughly executed before entering into the more costly production phases. DOD acquisition policy requires the Director of Operational Test and Evaluation to conduct independent testing of all MDAPs to determine the operational effectiveness and suitability of a system under realistic operational conditions. The demonstration of critical technologies on which the system design is based is embedded in the overarching evaluation of operational effectiveness. Operational testing must be completed and the results assessed before a program may proceed to a full-rate production decision.

Fostering greater use of CSBs and implementing robust testing and evaluation are just two areas among many where the Department is demonstrating its commitment to getting better value in its acquisition programs while still delivering high quality capabilities to the warfighter.

56. Senator VITTER. Secretary Carter, what immediate reforms can you implement to get better value for acquisitions?

Dr. CARTER. There is no "silver bullet" strategy for reforming the acquisition system. The QDR identified several broad areas where the Department is focusing its reform efforts, including: setting reasonable requirements for new systems that do not stretch to the far limit of current technological boundaries; and maintaining budget stability through demanding cost, schedule, and performance realism while holding industry and ourselves accountable. Consistent with the Weapon Systems Acquisition Reform Act of 2009, the Department is implementing changes in the early, middle, and end phases of a program's lifecycle.

In the early phases, the Department is addressing requirement overreach by subjecting each major program to a Materiel Development Decision before Milestone A, which will ensure early on that programs are based on approved requirements and a rigorous assessment of alternatives. Furthermore, through competitive prototyping and preliminary design reviews before Milestone B, technical risks will be reduced before progressing to the more costly phases.

To foster budget stability through cost, schedule, and performance realism, the Department is implementing a number of tools to focus on the middle and end phases of a program's lifecycle. These include greater use of fixed-price, competitively awarded contracts where technological requirements are mature and well defined; forming Configuration Steering Boards to prevent requirements creep; initiating independent peer review processes to ensure consistency of approach, quality of contracting, and information sharing; and improving life cycle management and sustainment policy procedures with attention toward accurately estimating long-term ownership costs.

These reforms will improve outcomes for our customer—the warfighter—and provide better value to the taxpayer.

[Whereupon, at 1:35 p.m., the committee adjourned.]