

Stenographic Transcript
Before the

COMMITTEE ON
ARMED SERVICES

UNITED STATES SENATE

F-35 JOINT STRIKE FIGHTER PROGRAM

Tuesday, April 26, 2016

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F-35 JOINT STRIKE FIGHTER PROGRAM

Tuesday, April 26, 2016

U.S. Senate
Committee on Armed Services
Washington, D.C.

The committee met, pursuant to notice, at 10:04 a.m., in Room SD-G50, Dirksen Senate Office Building, Hon. John McCain, chairman of the committee, Presiding.

Present: Senators McCain [presiding], Inhofe, Sessions, Wicker, Ayotte, Fischer, Cotton, Rounds, Ernst, Tillis, Sullivan, Lee, Reed, McCaskill, Manchin, Shaheen, Gillibrand, Blumenthal, Donnelly, Hirono, Kaine, and King.

1 OPENING STATEMENT OF HON. JOHN McCAIN, U.S. SENATOR
2 FROM ARIZONA

3 Chairman McCain: The committee meets today to consider
4 the status of the F-35 Joint Strike Fighter program as we
5 review the fiscal year 2017 budget request.

6 I welcome our witnesses, Under Secretary of Defense for
7 Acquisition, Technology and Logistics Frank Kendall;
8 director of Operational Tests and Evaluation, Dr. Michael
9 Gilmore; program executive officer for the F-35, Lieutenant
10 General Christopher Bogdan; and director of Acquisition and
11 Sourcing Management for the Government Accountability
12 Office, Michael Sullivan.

13 The F-35 Joint Strike Fighter program is the largest
14 and most expensive acquisition program in Department of
15 Defense history. The full capabilities this aircraft will
16 eventually provide are critical to America's national
17 security, our ability to deter our potential adversaries
18 around the globe, and, if necessary, respond with
19 overwhelming force to any future conflicts that may require
20 military intervention.

21 At the same time, the F-35 program's record of
22 performance has been both a scandal and a tragedy with
23 respect to cost, schedule, and performance. It is a
24 textbook example of why this committee has placed such a
25 high priority on reforming the broken defense acquisition

1 system.

2 The F-35 schedule for development has now stretched to
3 more than 15 years. Costs have more than doubled from
4 original estimates. Aircraft deliveries amount to no more
5 than a mere trickle relative to the original promises of the
6 program.

7 The original F-35 delivery schedule promised 1,013 F-
8 35s of all variants would be delivered by the end of fiscal
9 year 2016. In reality, we will have 179. Because the Air
10 Force, Marines, and Navy were all counting on the F-35s that
11 never appeared, combat aircraft and strike fighter capacity
12 shortfalls in all three services have reached critical
13 levels, severely impacting readiness and ultimately limiting
14 the department's ability to meet the requirements of the
15 defense strategy.

16 In the department's fiscal year 2017 budget request,
17 dozens more aircraft are being deferred from the future
18 years defense plan, resulting in a situation where the last
19 F-35 will be delivered in 2040.

20 I cannot fathom how this strategy makes any sense,
21 purchasing combat aircraft with a 40-year-old design in
22 light of all the testimony this committee has received about
23 how our potential adversaries are rapidly catching up with
24 and, in some cases, matching America's military
25 technological advantages.

1 Those F-35 aircraft being delivered are not being
2 delivered as promised. They have problems with maintenance,
3 diagnostic software, radar instability, sensor fusion
4 shortfalls, fuel system problems, structural cracks from
5 service-life testing, engine reliability deficits,
6 limitations on the crew escape system that caused pilot
7 weight restrictions, and potential cyber vulnerabilities.
8 This list is as troubling as it is long.

9 At long last, we are approaching the end of the long
10 nightmare known as "concurrency," the ill-advised,
11 simultaneous development, testing, and production of a
12 complex and technologically challenging weapons system that
13 the department estimates will end up costing the American
14 taxpayers \$1.8 billion.

15 But many questions remain, such as the total number of
16 these aircraft the Nation should buy or can even afford, the
17 cost of future upgrades to keep these aircraft relevant in
18 the face of an ever-evolving threat, and the management and
19 administration of a so-called joint program that General
20 Bogdan himself has admitted consists of aircraft that have
21 only 20 percent to 25 percent commonality across the three
22 variants as compared to the original goal of 70 percent to
23 90 percent.

24 The F-35A, F-35B, and F-35C are essentially three
25 distinct aircraft with significantly different missions and

1 capability requirements. The illusion of jointness
2 perpetuated by the structure of the F-35 joint program
3 stifles the proper alignment of responsibility and
4 accountability this program so desperately needs.

5 There are also questions as to when the system
6 development and demonstration phase, or SDD, will actually
7 be completed so that initial operational tests and
8 evaluation can begin. Originally scheduled to conclude in
9 2017, we have every indication that schedule pressures will
10 likely extend SDD well into fiscal year 2018.

11 I am very concerned the department may attempt to take
12 shortcuts by deferring mission capability content into later
13 block upgrades and, by doing so, shortchange the warfighter
14 once again by delaying necessary capabilities.

15 The F-35 was designed to replace multiple aircraft of
16 all three services, the A-10, the F-16, the F-18, and the
17 Harrier. That is why the operational testing and evaluation
18 must be of such high fidelity.

19 There can be no question in the minds of the American
20 people that their gigantic investment in this program will
21 pay off with greatly improved capabilities that far surpass
22 the mission capabilities of all these individual combat
23 aircraft. The Congress will not likely allow any more of
24 these legacy aircraft to be retired from service until there
25 is no doubt the F-35 can adequately replace them. Nor is

1 the Congress likely to entertain a "block buy" or other
2 multiyear procurement scheme until the initial operational
3 test and evaluation is completed and a positive milestone
4 decision is made to commence full-rate production, both of
5 which I understand are scheduled to occur in fiscal year
6 2019.

7 The department appears to be considering managing the
8 F-35 follow-on modernization, which is estimated to cost
9 over \$8 billion for the first block upgrade within the
10 overall F-35 program. This is incredible given the
11 department's dismal track record on these upgrade programs
12 as the F-22A modernization and upgrade debacle showed.

13 I have seen no evidence that DOD's processes have
14 improved to a level that would remove the need for a
15 separate major defense acquisition program that would enable
16 close scrutiny by Congress. Moreover, I expect the
17 department to use fixed-price contracts for the F-35
18 modernization effort in order to protect taxpayers.

19 Despite this programs many stumbles, there are some
20 positive signs for the F-35. The Marines declared initial
21 operational capability, or IOC, last July in Yuma, Arizona,
22 and are preparing for their first F-35B overseas deployment
23 next year.

24 Air Force personnel at Hill Air Force Base in Utah who
25 fly and maintain the aircraft are preparing for Air Force

1 IOC this fall. They report that the latest lots of F-35As
2 are flying very well with a significant jump in reliability
3 in warfighting capability as compared to earlier aircraft.

4 General Bogdan has steadily pushed down aircraft
5 procurement unit costs; reliability metrics are on the rise;
6 and each lot of aircraft deliveries possess increasingly
7 effective warfighting capabilities.

8 All of this is a testament to hard work of military and
9 civilian personnel inside this program today. They are
10 doing their best to overcome misguided decisions taken long
11 ago, and they are having success in important areas.

12 However, there is a lot of development left to complete
13 in this program, and with it comes the potential for more
14 problems, schedule delays, and increased costs. This
15 committee will remain steadfast in its oversight
16 responsibilities to ensure our warfighters get the
17 capabilities they need on time and at reasonable cost.

18 Since a quorum is now present, I ask the committee to
19 consider a list of 920 pending military nominations.
20 Included in this list are the nominations of General Vincent
21 K. Brooks, USA, to be commander of United Nations Command,
22 Combined Forces Command, U.S. Forces Korea; General Curtis
23 M. Scaparrotti, USA, to be Commander of U.S. European
24 Command and Supreme Allied Commander Europe; and General
25 Lori J. Robinson, USAF, to be Commander, U.S. Northern

1 Command, Commander North America Aerospace Defense Command.

2 All these nominations have been before the committee
3 the required length of time.

4 Is there a motion to favorably report these 920?

5 Senator Reed: So moved.

6 Chairman McCain: Is there a second?

7 Senator Ayotte: Second.

8 Chairman McCain: All in favor, say aye.

9 The motion carries.

10 Senator Reed?

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1 STATEMENT OF HON. JACK REED, U.S. SENATOR FROM RHODE
2 ISLAND

3 Senator Reed: Thank you very much, Mr. Chairman.

4 Let me join you in welcoming the witnesses today. We
5 are grateful for your service. So thank you very much,
6 gentlemen.

7 Today, we will seek a better understanding of the
8 progress the department is making in fielding the Joint
9 Strike Fighter; what actions the department has taken to
10 ameliorate problems with the program; what is the best
11 judgment available of how effective these actions will be in
12 preventing problems with the program, including additional
13 cost overruns and delays.

14 Overall, the production program has been delivering on
15 expected cost reductions on aircraft lots. However, we
16 still have to complete the system development and
17 demonstration, SDD, program that is expected to deliver
18 complete warfighting capability of each of three variants of
19 the F-35. We may not have seen all the potential schedule
20 changes in SDD, since not all the program difficulties are
21 behind us.

22 Quoting from Dr. Gilmore's prepared testimony,
23 "Although the Marine Corps has declared initial operational
24 capability, IOC, and the Air Force plans to do so later this
25 calendar year, the F-35 system remains immature and provides

1 limited combat capability, with the officially planned start
2 of initial operational test and evaluation, IOT&E, just over
3 1 year away."

4 Dr. Gilmore also says assesses that the F-35 program
5 will not be ready for IOT&E until calendar year 2018 at the
6 soonest, and these assessments are of concern.

7 Several years ago, we required the department to
8 estimate the dates for initial operating capability, IOC, of
9 the three variants to the F-35. The Marine Corps declared
10 IOC last year in July. The Air Force is scheduled to
11 declare IOC later this year. And the Navy is scheduled to
12 clear IOC in 2018.

13 The Marine Corps IOC was based on a version of the
14 program software called the Block 2B. The Air Force's
15 declaration of IOC will be based on the Block 3i software.
16 The Navy's declaration of IOC will be based on the Block 3F
17 software version.

18 Until recently, in order to support the IOC dates, the
19 program office has been working on versions of both Blocks
20 3i and 3F of the software simultaneously. The Block 3F
21 software depends on having a stable baseline for the Block
22 3i software.

23 With the contractor team working on multiple releases
24 of software, correcting deficiencies and achieving software
25 stability has proved elusive. Working on the two software

1 packages simultaneously was intended to save time, but that
2 time was lost when the project had to be redone because of
3 mistakes stemming from concurrency.

4 Within the past year, the program executive officer
5 halted work on the Block 3F software until the problems with
6 the Block 3i software could be sorted out. We need to
7 understand what effect this altered approach may have on the
8 overall program schedule.

9 Beyond that, we are planning for sizable upgrades in F-
10 35 capability through spiral development efforts to the
11 Block 4 program. The Block 4 program will likely be a
12 multibillion-dollar effort. We want to make sure that we do
13 not repeat past mistakes.

14 Beyond the SDD program, there is an even larger issue
15 of the cost to sustain the F-35 once we have bought it.
16 These estimates were at one point as large as \$1 trillion.
17 We need to understand what the department is doing to reduce
18 these potential costs. If we do nothing, we run the risk of
19 allowing increased costs to sustain and support the F-35 to
20 reduce the funds available for investment in the future
21 force.

22 This committee has been a strong supporter of the JSF
23 program from the beginning. However, we must continue our
24 vigilance on cost so there is a proper balance between F-35
25 and other important DOD acquisitions.

1 Thank you very much for calling the hearing, Mr.
2 Chairman.

3 Chairman McCain: Thank you.

4 I welcome the witnesses.

5 Secretary Kendall?

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1 STATEMENT OF HON. FRANK KENDALL III, UNDER SECRETARY
2 OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS

3 Mr. Kendall: Thank you, Chairman McCain. Chairman
4 McCain, Ranking Member Reed, members of the committee, I am
5 happy to be here today with Lieutenant General Bogdan, the
6 program executive officer for the F-35 program, as well as
7 with Dr. Gilmore and Mr. Sullivan, to discuss the status of
8 the program and the President's budget request for fiscal
9 year 2017.

10 In my opening comments, I would like to discuss my own
11 involvement with the F-35. Lieutenant General Bogdan will
12 provide more detail on the current state of the program.

13 My first exposure to the F-35 was in the fall of 2009,
14 as I was awaiting confirmation to be the Principal Deputy
15 Under Secretary for AT&L. I was briefed by a member of Dr.
16 Gilmore's staff, and my reaction at the time was one of
17 surprise at the extremely long period of low-rate initial
18 production, approximately 10 years, and at the very high
19 amount of concurrency in the program, as you mentioned, Mr.
20 Chairman, concurrency being the overlap in this case between
21 development and production. It was one of the highest and,
22 therefore, most risky that I had ever seen.

23 Production was started in 2007, well before the
24 stability of the design could be confirmed through testing.
25 I later called the decision to start production so early

1 acquisition malpractice, a phrase which seems to have stuck.

2 In early 2010, also before I was confirmed, the program
3 manager was replaced. The new program manager was Admiral
4 David Venlet, a very seasoned and competent professional.
5 At that time, the F-35 went through a Nunn-McCurdy review,
6 as a result of the cost increases. As a result of the
7 review, the program was rebaselined under Admiral Venlet to
8 the baseline that it is operating against now and has ever
9 since.

10 In 2010, my predecessor, Dr. Carter, ended the use of
11 cost-plus contracts for production, starting with Lot 4.

12 In the fall of 2011, I became the Acting Under
13 Secretary. One of my early decisions was to bring
14 Lieutenant General Bogdan in to replace Vice Admiral Venlet.

15 Lieutenant General Bogdan has proven to be highly
16 competent and professional program executive officer.

17 In the fall 2011, based on an early operational
18 assessment report from Dr. Gilmore's office, I commissioned
19 an independent review of the technical status of the program
20 focused on the design stability of the program. At that
21 time, the extent of the open design issues and the risk of
22 high concurrency costs for retrofitting aircraft that had
23 already been produced with fixes that were found later led
24 me to seriously consider halting production. Based on
25 several considerations, I made the decision to hold

1 production constant at 30 aircraft per year for the next 2
2 years, and to assess progress before increasing production
3 at that point.

4 Under Lieutenant General Bogdan's leadership, the
5 program has made steady progress for the past 4 years. Cost
6 and development have remained within the baseline.
7 Production costs have steadily decreased, beating the
8 independent cost estimate each year. The cost of
9 sustainment has also been reduced by approximately 10
10 percent since the program was rebaselined.

11 There have been a few months of schedule slip primarily
12 due to software complexity.

13 While I do continue to monitor progress monthly and
14 conduct annual program deep-dive reviews, the F-35 is no
15 longer a program that keeps me up at night. There are some
16 design issues that still need to be resolved. The test
17 program is about 90 percent complete, and I do expect
18 additional discovery, but I will be surprised if a major
19 design problem surfaces at this point.

20 Our task now is to complete the test program, achieve
21 IOC for the Air Force later this year and the Navy in 2018,
22 complete OT&E, and support our many partners and foreign
23 sales customers as they become operational over the next few
24 years.

25 We also need to move forward with the follow-on

1 development. I appreciate this committee's support for
2 authorizing and funding that important work.

3 The F-35 is a game-changing, state-of-the-art weapons
4 system. But our potential adversaries are not standing
5 still. Threat advances in areas like integrated air defense
6 systems, air-to-air weapons, and electronic warfare must be
7 continuously countered. We must continuously improve the
8 weapons system to keep pace with emerging threats.

9 I thank the committee for its support and look forward
10 to your questions.

11 [The prepared statement of Mr. Kendall follows:]

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1 Chairman McCain: Thank you.

2 General Bogdan?

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1 STATEMENT OF LIEUTENANT GENERAL CHRISTOPHER C. BOGDAN,
2 USAF, PROGRAM EXECUTIVE OFFICER FOR THE F-35 LIGHTNING II
3 JOINT PROGRAM

4 General Bogdan: Thank you, sir. Chairman McCain,
5 Ranking Member Reed, distinguished members of the committee,
6 thank you for the opportunity here today to discuss the F-35
7 Lightning II program.

8 My purpose here today is to provide you an honest,
9 balanced assessment of where the program stands today. That
10 means I will tell you the good, the bad, and the ugly about
11 the program, and tell you what my team is doing to reduce
12 costs, improve F-35 performance, and meet our scheduled
13 commitments.

14 The F-35 Lightning II is of vital importance to the
15 security of the United States. And as the program executive
16 officer and program director, I am committed to delivering
17 an affordable, reliable, and sustainable fifth-generation
18 weapons system to our warfighters and those of our
19 international partners and foreign military sales customers.

20 Overall, the F-35 program is executing well across the
21 entire spectrum of acquisition to include development and
22 design, flight test, production fielding, base standup,
23 maintenance and support, and building a global sustainment
24 enterprise.

25 The program is at a pivot point. It is now rapidly

1 changing, growing, and accelerating. We will be finishing
2 our development program in late 2017 and begin a transition
3 to a leaner, more efficient follow-on modernization program.
4 We will see production grow from delivering 45 aircraft in
5 2015 to delivering over 100 airplanes in 2018, and up to 145
6 by 2020.

7 Additionally, in the next 4 years, we will continue the
8 standup of 17 new operating F-35 bases all over the world.
9 We are also accelerating the creation of our heavy
10 maintenance and repair capability and supply chain in the
11 Pacific, European, and North American regions, creating a
12 truly global sustainment capability.

13 However, the program is not without risks and
14 challenges, as these come with any program of this size and
15 complexity. But I am confident the current risks and issues
16 we face can be resolved, and we will be able to overcome
17 future problems and deliver the F-35's full combat
18 capability.

19 I have often said that the mark of a good program is
20 not that it has no problems but rather that it discovers
21 problems, implements solutions, improves the weapons
22 systems, and at the same time keeps the program on track. I
23 believe we have been doing that for a number of years now.

24 Let me highlight a few of our recent accomplishments.

25 Last year, we began U.S. Air Force and partner pilot

1 training at Luke Air Force Base in Arizona where a blend of
2 U.S. and partner F-35 instructor pilots are helping to train
3 U.S. Air Force and other partner pilots. The Air Force is
4 now receiving F-35As at Hill Air Force Base in Utah, and
5 training is underway to ready its first combat-coded F-35
6 squadron to be operational later this year.

7 Also, the United States Marine Corps is successfully
8 flying and deploying to austere sites for training, and
9 dropping and shooting live weapons with the F-35B today.

10 In addition, industry committed to and then
11 successfully delivered 45 airplanes last year, including the
12 first aircraft produced in the Italian assembly facility in
13 Cameri, Italy. From a production perspective, we have
14 delivered a total of 176 of our test, operational, and
15 training aircraft to date.

16 On the cost front, the price of purchasing F-35s
17 continues to decline lot after lot, a trend I believe will
18 continue for many years. I expect the cost of an F-35A with
19 an engine and fee in then-year dollars to be less than \$85
20 million in fiscal year 2019.

21 As I said before, the program is changing, growing, and
22 accelerating, but it is not without its issues, risks, and
23 challenges. Let me highlight some of these areas and what
24 we are doing about them.

25 On the technical front, we have a number of risks I

1 would like to mention. At the top of my list are both
2 aircraft software and our maintenance system known as the
3 Autonomic Logistics Information System, or ALIS. We have
4 seen stability issues with our Block 3 software. However,
5 we believe we have identified the root cause of these
6 problems and have tested solutions in the lab and in flight
7 test, and are now completing our flight tests with these
8 solutions.

9 Our initial indications of this flight testing was
10 positive, and we see software stability improved to two to
11 three times better than what we have seen in the past. By
12 the end of this month, I am encouraged that we will have an
13 enough data to consider this problem an issue closed.

14 We have also experienced schedule issues with the
15 development of our next version of ALIS, version 2.0.2. I
16 am prepared to discuss this issue as well as topics such as
17 our egress system, U.S. Air Force IOC, initial operational
18 test, and recent U.S. Air Force and U.S. Marine Corps
19 deployments, and the status of our partners and FMS
20 customers during the questions and answers.

21 In summary, the F-35 program is moving forward,
22 sometimes slower than I would like, but moving forward and
23 making progress nonetheless. We are nearing the completion
24 of development and flight test in 2017. We are ramping up
25 production, standing up new bases, and growing a global

1 sustainment enterprise. We have also stabilized and reduced
2 the major costs on this program.

3 As with any big, complex program, new discoveries,
4 challenges, and obstacles will occur. The F-35 is still in
5 development, and this is a time when challenges and
6 discoveries are expected. However, we believe the combined
7 government and industry team has the ability to resolve our
8 current issues and any future discoveries.

9 I intend to continue leading this program with
10 integrity, discipline, transparency, and accountability. It
11 is my intention to complete this program within the
12 resources and time I have been given, and I intend on
13 holding my team and myself accountable for the outcomes on
14 this program.

15 We never forget that someday your sons and daughters,
16 your grandsons or granddaughters, will take an F-35 into
17 harm's way to defend our freedom. Delivering them the best
18 possible weapons system is a responsibility I and my team
19 take very seriously.

20 Thank you again for the opportunity to discuss the
21 program. I look forward to your questions.

22 [The prepared statement of General Bogdan follows:]

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1 Chairman McCain: Thank you.

2 Dr. Gilmore?

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1 STATEMENT OF HON. J. MICHAEL GILMORE, PH.D., DIRECTOR
2 OF OPERATIONAL TEST AND EVALUATION, DEPARTMENT OF DEFENSE

3 Dr. Gilmore: Mr. Chairman, Senator Reed, members of
4 the committee, I will focus my remarks on readiness for
5 initial operational test and evaluation, and achievement of
6 full combat capability.

7 My estimate is the program will not be ready to begin
8 operational test and evaluation until mid-calendar year 2018
9 at the earliest. That is about a 1-year delay relative to
10 the program's objective date and 6 months relative to the
11 threshold date.

12 There are a number of reasons that that is my
13 assessment. The most complex mission system testing
14 remains, as does verification of fixes to a number of
15 significant problems. In-flight stability of mission
16 systems with the new Technical Refresh 2 processor has been
17 poor, but there is recent indication of significant progress
18 in achieving stability, although those stability issues
19 while they were being fixed led to delays in Block 3F
20 development, which provides full combat capability.
21 Nonetheless, there is good news on the stability front.

22 Significant ground startup instabilities persist,
23 however. Inadequate fusion of sensor information from
24 sensors on a single aircraft, as well as among a four-ship
25 of aircraft, resulted in cluttered and confusing displays

1 and are still a problem. Four-ships will be frequently used
2 in combat to enable key multi-ship sensor applications that
3 are necessary to deal with the increasingly complex and
4 stressing integrated air defense systems potential
5 adversaries began fielding in the middle of the last decade.

6 Shortfalls in electronic warfare and electronic attack,
7 geolocation, electronic countermeasures persist. There are
8 shortfalls in the performance of the distributed aperture
9 system, including missile warning and situational awareness;
10 long aerial refueling times up to two to three times those
11 of legacy aircraft; lack of viable moving target capability,
12 which is crucial for successful conduct of close-air support
13 and other missions; lack of display to pilots of failures in
14 critical mission systems components, which is unacceptable
15 in combat; and there are other issues that are classified.

16 Regarding mission systems, the program has now changed
17 its approach, as has been discussed, from executing parallel
18 schedule-driven software releases to a serial capability-
19 based approach, which does take longer. But that approach
20 has been validated in the recent achievement of improved
21 stability with the TR2 processor. That approach, the new
22 approach, allows the extra time needed to actually fix
23 problems and, as I mentioned, has been validated by the
24 progress recently seen.

25 Stealth aircraft are not invisible. Mission systems

1 infusion must work in some reasonable sense of that word.
2 They do not have to be perfect, but they have to, in some
3 sense of the word, work to prevail in combat against the
4 modern, very capable, and mobile integrated air defense
5 systems potential adversaries have been fielding since the
6 middle of the last decade. The ability to prevail against
7 these threats is a key rationale for this \$400 billion
8 program.

9 To continue with other reasons that there may be a
10 delay in operational testing, time is needed to complete and
11 certify full weapons usage throughout the full flight
12 envelope. The most recent test community estimates are
13 October 2017 for F-35A, February 2018 for F-35C, and May
14 2018 for F-35B. These estimates assume an increase in the
15 rate at which weapons tests are accomplished that may be a
16 challenge to achieve.

17 As has been mentioned, there are problems that continue
18 with the Autonomic Logistics Information System, or ALIS,
19 which remains immature, requiring problematic and resource-
20 intensive workarounds not acceptable in combat. Under the
21 program's current schedule, the final version of ALIS 3.0,
22 the full capability production version required for IOT&E
23 and full combat capability, will not be released until the
24 first quarter of calendar year 2018. But this schedule
25 could be delayed by the ongoing problems with ALIS version

1 2.0.2, which attempts to integrate the engine data and
2 incorporate other functionality and fixes.

3 Concurrency-driven extensive modifications would be
4 required. The early lot aircraft that originally had been
5 bought for IOT&E when IOT&E was planned to begin in 2013.
6 The current unmitigated schedule for accomplishing those
7 modifications, including those for the gun, which is turning
8 out to be very problematic on all variants, extends into the
9 third quarter of 2019. The program is working on a
10 multipronged approach to pull those modifications to the
11 left. That includes taking production aircraft slated for
12 operational use and taking hardware from recently fielded
13 aircraft, and a definitive decision on that approach is
14 needed now.

15 There are inadequacies that remain in U.S.
16 reprogramming laboratory that are precluding the ability to
17 generate combat-effective mission data files, enabling
18 aircraft to deal with the air defense threats I mentioned.
19 And they are only going to worsen in the future.

20 The current schedule shows USRL hardware upgrades
21 required to handle current threats extend into calendar year
22 2020. The program can and has delivered mission data files,
23 but they are not optimized or fully tested to handle the
24 current threat because of the hardware and software
25 deficiencies in the USRL.

1 The program's optimistic schedule for delivery of a
2 validated but probably inadequate MDF to support IOT&E is
3 the first quarter 2018. But this assumes USRL receives the
4 functional lab version of Block 3 this month, which may be
5 problematic.

6 For all these reasons, delays to IOT&E and full combat
7 capability are likely. I want to remind everyone that IOT&E
8 will constitute the most realistic and stressing test of JSF
9 that will be performed. Therefore, discovery of new,
10 significant deficiencies during IOT&E, as was the case with
11 F-22, is pretty much assured.

12 Thank you.

13 [The prepared statement of Dr. Gilmore follows:]

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Chairman McCain: Mr. Sullivan, welcome.

1 STATEMENT OF MICHAEL J. SULLIVAN, DIRECTOR OF
2 ACQUISITION AND SOURCING MANAGEMENT, GOVERNMENT
3 ACCOUNTABILITY OFFICE

4 Mr. Sullivan: Thank you, Chairman McCain, Senator
5 Reed, members of the committee. I have a written statement
6 for the record, but I would like to just take this time to
7 briefly highlight what we consider to be the most important
8 challenges facing the program moving forward.

9 In addition to my written statement, my report to this
10 committee and others, which was issued on April 14, contains
11 more details on the program's progress to date.

12 First, although the program has managed costs very well
13 since it is Nunn-McCurdy breach and subsequent rebaselining
14 in 2012, it still poses significant future affordability
15 challenges for the department and Congress. As the program
16 begins procuring more aircraft, the department is expected
17 to spend on average about \$13 billion per year over the next
18 22 years, until all planned purchases are complete in 2040.

19 These annual funding levels will present challenges as
20 the program stacks its funding priorities against other
21 large acquisitions, including the B-21 bomber, KC-46 tanker,
22 the Ohio class submarine replacement, the new carrier, and
23 many more.

24 Second, the department now plans to add new capability
25 known as Block 4 to the F-35 that is beyond its original

1 baseline capability, and it is planning to manage that
2 effort as part of the existing program, rather than
3 establishing a separate business case and baseline for that
4 effort. This has significant implications as far as
5 Congress' ability to provide oversight and holding the
6 program accountable.

7 The new work has a projected cost of about \$3 billion
8 over just the next 6 years, and that price tag alone would
9 qualify it as a major defense acquisition program in its own
10 right. We believe it should be managed as such, with its
11 own separate business case to allow for transparency and
12 accountability.

13 Third, the F-35 software development is nearing
14 completion, but the program faces challenges in getting all
15 of its development activity completed on time for
16 operational testing, as we just heard Dr. Gilmore talk
17 about. It has completed over 80 percent of its
18 developmental flight tests and is now working to close out
19 flight testing of its final block of software, Block 3F.
20 This final block is critical as it will provide the full
21 warfighting capability to the aircraft.

22 Program officials have estimated as much as a 3-month
23 delay right now to completing Block 3F testing, and our own
24 analysis indicates that it could be closer to 6 months. I
25 think Dr. Gilmore's analysis, as he just stated, has it more

1 than that. Getting that developmental testing done is
2 critical, of course, to getting operational testing done and
3 IOCing the aircraft.

4 With regard to technical risk, the program has found
5 fixes for earlier problems, problems such as the helmet
6 display and the engine, and it is working now to find
7 solutions for two other challenges, the ejection seat
8 problem and the carrier variants wing structure. There are
9 cracks in the wing structure.

10 Perhaps the biggest outstanding technical risk for the
11 program today, though, as has been discussed already, is the
12 Autonomic Logistics Information System known as ALIS. As
13 you know, ALIS is a complex system that supports operations,
14 mission planning, supply chain management, maintenance, and
15 many other processes.

16 In our companion report also issued on April 14, we
17 documented several issues with ALIS, most importantly
18 concerning its inability to deploy right now and the lack of
19 needed redundancy at this point that could result in
20 operational and schedule risks in the future.

21 Finally, manufacturing and production data continue to
22 show a positive trend toward more efficient production, and
23 that is good. The amount of labor hours to build each
24 aircraft continues to go down. The engineering changes that
25 are coming out of the test program have been reduced

1 significantly. And the contractor is now delivering
2 aircraft on time or, in some cases, ahead of schedule.

3 We continue to monitor the measures for aircraft and
4 engine reliability and maintainability. While they still
5 fall short of expectations, they continue to improve, and
6 there is still time to achieve the program's required goals
7 in that area.

8 I will close with that, Mr. Chairman. I look forward
9 to your questions.

10 [The prepared statement of Mr. Sullivan follows:]

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1 Chairman McCain: Thank you very much. I thank the
2 witnesses.

3 General Bogdan, how many military, government
4 civilians, and full-time equivalent contractor positions are
5 assigned to the Joint Program Office? And what is the
6 annual cost to operate the office?

7 General Bogdan: Sir, today, if you include the test
8 force at Pax River and the test force at Edwards Air Force
9 Base, which are not necessarily part of my program office
10 but I pay for them, just like I do support contractors, the
11 number is about 2,590. The annual cost to operate the JPO
12 is on the order of about \$70 million a year. That includes
13 pay for salaries. That includes leasing facilities and
14 space, computers, IT, everything wrapped up.

15 Chairman McCain: The information that I have is that
16 it is nearly 3,000 and the cost is \$300 million a year, but
17 \$70 million a year to run an office of a program is pretty
18 disturbing.

19 Secretary Kendall, last year's NDAA included report
20 language that directed the Secretary of Defense to either
21 revalidate the F-35 total by a quantity of 2,443 for all
22 variants or submit a new number by May 25, 2016. Does the
23 department intend on meeting this requirement on time?

24 Mr. Kendall: Mr. Chairman, as far as I know, yes, we
25 are.

1 Chairman McCain: I was interested, Dr. Gilmore, you
2 said that the IOC is likely to be delayed. Have you any
3 idea how long that delay would be in the IOC?

4 Dr. Gilmore: Are you speaking, Mr. Chairman, about the
5 IOC for the Air Force with Block 3i?

6 Chairman McCain: Yes.

7 Dr. Gilmore: I think it is unlikely the Air Force will
8 meet its objective date, which is mid-2016, but it could
9 meet its threshold date, which is later in the fall.

10 Chairman McCain: In this issue, Mr. Sullivan, of
11 pursuing a block buy, can you provide any examples of a
12 program pursuing a block buy or multiyear procurement
13 strategy prior to a full-rate production decision?

14 Mr. Sullivan: You are referring to the proposal right
15 now to buy aircraft on a 3-year buy?

16 Chairman McCain: Yes.

17 Mr. Sullivan: I do not have any examples of that. The
18 only example I know of a block buy situation is our usual
19 multiyear procurements, which require a lot of criteria to
20 show that the industrial base is stable, the design is
21 stable, they are ready to produce. Usually, it comes much
22 later in a production line.

23 I do not think there is even any criteria for that kind
24 of block buy.

25 Chairman McCain: Dr. Gilmore, in your statement, you

1 said the limited and incomplete F-35 cybersecurity testing
2 accomplished to date has nonetheless revealed deficiencies
3 that cannot be ignored. Can you elaborate on that?

4 Dr. Gilmore: I would be happy to do so in the
5 appropriate forum. It would require the discussion of
6 classified information. We treat cyber vulnerabilities, the
7 details of them, as classified. But they are significant,
8 in my judgment.

9 Chairman McCain: General Bogdan, Dr. Gilmore believes
10 that there will be a delay in the IOC of the Air Force
11 version. What is your response?

12 General Bogdan: Sir, there are many things that the
13 Air Force needs me to deliver to them before they can
14 declare IOC. All of the things that are necessary for them
15 to make that decision are on track for a 1 August 2016
16 declaration, with the exception of ALIS. I believe ALIS is
17 approximately 60 days behind. And, therefore, I would put
18 ALIS delivery, which is a criteria for them, at about 1
19 October 2016, as opposed to 1 August.

20 They have until December, which is their threshold
21 date, so I think they will meet their IOC criteria within
22 that period, but not exactly on 1 August.

23 Chairman McCain: The fiscal year 2016, General,
24 limited funds for the procurement of F-35As until Secretary
25 James certified that the F-35A aircraft delivered in 2018

1 will have the full combat capability with Block 3F hardware,
2 software, and weapons carriage.

3 Have you recommended or do you intend to recommend to
4 Secretary James that she make the certification?

5 General Bogdan: Yes, Senator. I am preparing the
6 package now to forward to the Secretary of the Air Force
7 with my recommendation that she make that certification. I
8 needed a few pieces of information before I could feel
9 confident asking her to certify. One of those pieces was
10 that the software stability issues that were spoken about
11 before were behind us. I believe they are now. Therefore,
12 I believe that 3F will be delivered in fiscal year 2018,
13 with the full capability, so I will forward the package to
14 her now.

15 Chairman McCain: Finally, Dr. Gilmore, given the size
16 and cost of Block 4, would you believe it should be treated
17 as a separate program for Nunn-McCurdy purposes or just as
18 part of the F-35 program?

19 Dr. Gilmore: Senator, I remind you that is not my
20 decision. However, in taking a look at what I have seen in
21 the current plans for Block 4, as I mentioned in my written
22 statement, they need to be scrubbed, rigorously, in my view.

23 So anything that will help in that rigorous scrub and bring
24 clarity to desired performance and cost would be useful. So
25 I think that would be a good idea, but again, I hasten to

1 say it is not my decision.

2 Chairman McCain: Senator Reed?

3 I thank the witnesses.

4 Senator Reed: Mr. Chairman, with your permission, I
5 would like to yield to Senator Donnelly. He has a pressing
6 engagement elsewhere.

7 Senator Donnelly: Thank you, Mr. Chairman.

8 I want to thank the witnesses.

9 Secretary Kendall, from 1996 to 2007, as the F-35 was
10 under development, DOD supported an alternate engine
11 program. The push for the F136 engine was controversial in
12 later years, but I am interested to hear from you, and
13 others who have thoughts on this, do you believe the
14 alternate engine program was a smart strategy in those early
15 R&D years?

16 Mr. Kendall: The question of the alternate engine, and
17 I was in my position for the last couple years of that
18 debate, was really a question of the economics associated
19 with it. Basically, a decision was made that the economic
20 case was not there to carry a second engine. That entailed
21 taking some risk, of course, when you only rely on one.
22 That has proven out.

23 The engine of the F135 is performing. We are getting
24 cost out of that, not as quickly nor as much as we would
25 like, but we think that the strategy that we have embarked

1 on is working.

2 We are also funding some advanced development for
3 follow-on engines. It is competitive development at this
4 point. They could be cut into the production several years
5 from now, if we can fund the EMD program for that. But
6 affordability has been a major constraint on the program
7 overall, including on the engines.

8 Senator Donnelly: General Bogdan, I am particularly
9 concerned about the performance of the F135, given that
10 Pratt & Whitney was recently selected to build the engine
11 for the B-21. I am concerned that looking back on the
12 history of the F-35, the F-16, and others, there are
13 performance issues, and I quote from the Department of
14 Defense annual report, "recurring manufacturing and quality
15 issues" that have been an issue with Pratt & Whitney for the
16 F-35. Could you comment on that, please?

17 General Bogdan: Yes, sir. The quality issues that you
18 are talking about are primarily not at the Pratt & Whitney
19 level. They are at their suppliers' level. Nonetheless,
20 Pratt & Whitney is responsible for those suppliers.

21 Over the last few years, we have improved our on-time
22 delivery of engines significantly. But early on in the
23 program, you are correct, sir, that we were seeing quality
24 escapes and manufacturing issues with the lower tier
25 suppliers. I think at this point in time, the manufacturing

1 of the engine is much more mature than it was a few years
2 ago.

3 Relative to the performance of the engine, today, the
4 F135 engine has about 52,000 fleet hours on it, and it is
5 maintaining about a 94 percent full mission capable rate.
6 That is a very, very good number. In the endgame of the
7 program, we were shooting for 95 percent, so here we are
8 less than a quarter of a way through the full maturity of
9 the airplane, and we are just about achieving that
10 reliability we are looking for.

11 However, that is not to say that there are not issues.
12 We are dealing with the engine right now and changes we are
13 making to make it more affordable, more producible, and
14 increase the reliability.

15 But from that perspective, I have been fairly happy
16 with the performance of the F135.

17 Senator Donnelly: Mr. Sullivan, they have said that
18 their engines are well ahead of the 2020 requirements, but
19 in your report last month, GAO wrote that the F-35A and F-
20 35B engines are at about 55 percent and 63 percent of where
21 the program expected them to be. Can you explain the
22 difference in that assessment, sir?

23 Mr. Sullivan: I do not know that I can explain the
24 cause of that, but we have found that the engine reliability
25 and the measurements that we look at in terms of coming up a

1 reliability growth curve for an engine during development,
2 Pratt & Whitney has been pretty consistently below where
3 they were expected to be, but I would say they have been
4 improving in the last 2 or 3 years, in that respect. It
5 seems like they are beginning to retire some of that risk.

6 Senator Donnelly: This is to all the panelists. What
7 is the top lesson you have learned through the F-35
8 acquisition process that can inform future major
9 acquisitions across the services?

10 Mr. Sullivan, I would like to start with you.

11 Mr. Sullivan: I think, obviously, the first thing that
12 we have learned with this is that you should not
13 concurrently develop technology with a product, and you
14 should not concurrently buy aircraft while you are still
15 developing them. That is the number one thing.

16 Senator Donnelly: Dr. Gilmore?

17 Dr. Gilmore: The F-35 was an extreme example of
18 optimistic if not ridiculous assumptions about how a program
19 would play out.

20 The decision to begin production before much of
21 development had really been accomplished was a very bad one,
22 as Mr. Kendall has discussed. But although an extreme
23 example, it is not unprecedented because the department is
24 typically very optimistic about schedules and costs, which
25 then sets up the program managers who are put in charge of

1 these programs to look like failures from the outset, which
2 is a terrible thing to do to them.

3 Senator Donnelly: Thank you. I would love to hear the
4 other two, but I am out of time.

5 Thank you, Mr. Chairman.

6 Chairman McCain: Senator Inhofe?

7 Senator Inhofe: Thank you, Mr. Chairman.

8 I think the question that I was going to ask may have
9 been answered in the second sentence in your opening
10 statement when you said the F-35 will form the backbone of
11 the U.S. air combat superiority for decades to come.

12 We keep hearing things to the contrary. You might
13 remember when Secretary Hagel, just in February 2014, he
14 said, "American dominance in the seas, in the skies, and in
15 space can no longer be taken for granted." General Frank
16 Gorenc, the USAFE commander, said, just in September last
17 year, this is his quote, "The advantage that we had from the
18 air I can honestly say is shrinking. This is not just a
19 Pacific problem. It is as significant in Europe as it is
20 anywhere else on the planet. I do not think it is
21 controversial to say they have closed the gap in
22 capability."

23 General Bogdan, do you agree with that?

24 General Bogdan: Sir, I would agree with that. Our
25 adversaries today are full speed ahead and accelerating the

1 development of significant military capabilities to thwart
2 ours, both in air-to-air and air-to-ground.

3 I believe that F-35 is absolutely necessary now and in
4 the future to give you and the Nation options to take an
5 airplane and go anywhere on the face of the Earth at a time
6 of our choosing and be survivable and hit a target. I do
7 not believe there is any other airplane in the world that
8 can do that today. However, the F-35 can do it and will do
9 it for many years.

10 Senator Inhofe: You are talking about some fifth
11 generation aircraft from both Russia and China. You have
12 the T-50 and then the Chinese have the J-20. I think they
13 also have the J-31 or something like that, maybe lagging
14 behind a little bit.

15 Now, when you compare those, normally they talk about
16 we are going to be stealthier; we are going to have better
17 radar. Why don't you give us an idea of what the opposition
18 is doing right now, and specifically in what areas that we
19 are better?

20 General Bogdan: Senator, I will try to do that without
21 walking across the line of sensitive information or
22 classified.

23 One of the things that folks like to think about when
24 they look at those adversary airplanes is that they look a
25 lot like ours. That is a true statement. Much of the

1 design of those airplanes came on the outer mold line from
2 what we developed in our F-22s and F-35s.

3 Senator Inhofe: I understand that. Yes.

4 General Bogdan: What makes us better and special is
5 what is on the inside of these airplanes. Our radar, our
6 multi-sensor fusion, our ability to take information in the
7 battlespace and provide it to the pilot in such a way that
8 he knows everything that is going on 360 degrees around him
9 --

10 Senator Inhofe: Okay, that is good.

11 General Bogdan: -- and the weapons to employ that
12 knowledge are what makes it different.

13 Senator Inhofe: That is good.

14 Recently, some pretty high individuals are talking
15 about the fact on the F-22s, they are really using those a
16 lot more than we anticipated. This is for anybody here.
17 Yet in your presentation, you talk pretty specifically about
18 the numbers of copies we are going to have, the As, the Bs,
19 and the Cs.

20 Most of us here on this side of the table remember we
21 went through this thing with F-22s. Originally, it was
22 going to be 750, then it was going to be 380-some, then 187
23 ultimately. Now that is quite a deterioration from the
24 original numbers.

25 Is there a reason that you do not believe we are going

1 to experience the same thing with the F-35?

2 General Bogdan: Sir, I cannot assume in the future
3 what the U.S. services will do. But what I will tell you is
4 that the major difference between an F-22-type program and
5 the F-35 program are significant in that we have many FMS
6 and foreign partners who are also buying the airplane. And
7 if they continue to buy the airplane, the price will
8 continue to come down. So that stabilizes --

9 Senator Inhofe: And that is where you come up with the
10 \$85 million ultimately, taking that into consideration.

11 General Bogdan: Yes, sir.

12 Senator Inhofe: One last thing, we were all a little
13 disturbed 2 years ago when we thought we were going to have
14 a B model at Farnborough and at the last minute we had to
15 bag it. Of course, we did not have anything at France, in
16 Paris. Are you pretty confident it is going to make the
17 Farnborough this year?

18 General Bogdan: Yes, sir. We are planning a
19 deployment of five F-35s to Farnborough and RIAT, two A
20 models and three B models, one of those being a U.K.
21 airplane.

22 Senator Inhofe: How many of those will be flying?

23 General Bogdan: We will fly all of those airplanes at
24 Farnborough and RIAT.

25 Senator Inhofe: I look forward to it.

1 Thank you, Mr. Chairman.

2 Chairman McCain: Senator Reed?

3 Senator Reed: Thank you very much, Mr. Chairman.

4 Dr. Gilmore, I just want to clarify one your comments.
5 You were talking about, I think, the difficulty of operating
6 with four aircraft and, essentially, the multi-sensor fusion
7 of the four aircraft operating together. That seems to be
8 the preferred form of operation. Is that an accurate
9 recollection?

10 Dr. Gilmore: Yes. Four-ship will often be used
11 because that will provide information from four aircraft
12 that must be fused in order to provide the situational
13 awareness that General Bogdan just mentioned is so critical
14 to dealing with future threats and current threats.

15 Senator Reed: And there is a current difficulty in
16 making those systems, even if they operate in a single
17 aircraft, operate effectively together?

18 Dr. Gilmore: Fusion has been a challenge to make work
19 well. It will, based on what I have seen, continue to be a
20 challenge. It is a very hard problem. It does not surprise
21 me that it is turning out to be a hard problem, to make the
22 fusion work well, because you get information from different
23 sensors on the same aircraft as well as from different
24 aircraft. You have to have software that then sorts through
25 all that and says, "Oh, this signal that I got from this

1 sensor is from the same target as this sensor on another
2 aircraft." That is a very hard physics problem. It is not
3 a matter of just simply writing code for graphical user
4 interface. It involves detailed understanding of physics,
5 of the propagation of the signals, and so forth, and the
6 errors in the signals.

7 So that is going to continue to be a challenge, and it
8 will require a lot of iterative test-fix-test where you
9 guess at solutions and then use subject-matter experts to
10 guess at solutions, try to implement them, test them to see
11 how they work. That is a time-consuming process.

12 Senator Reed: Just a clarification, in the IOC status,
13 do you really get into that multi-aircraft fusion issue? Or
14 is that just simply the aircraft being able to fly?

15 Dr. Gilmore: The Air Force is the one, just as the
16 Marines did for their own initial operational capability,
17 the Air Force sets the standards for determining what
18 constitutes sufficient performance for IOC.

19 I cannot remember the details of what the Air Force has
20 said about fusion, but obviously the more fusion capability
21 they have, the better. It will be limited because Block 3i
22 provides the same basic capability that Block 2B did with
23 the new processor, and there were fusion shortfalls in Block
24 2B that Block 3F is meant to surmount.

25 Senator Reed: Thank you very much.

1 Mr. Secretary, from your perspective, what do you think
2 the most significant challenges are? I know General Bogdan
3 talked about ALIS as a key issue in terms of resolution.
4 Any others that you would identify, that you are focused on,
5 and your approach to deal with them?

6 Mr. Kendall: I think ALIS is the leading problem in
7 terms of achieving IOC for the Air Force on time. The issue
8 that was mentioned earlier on stability I think was a
9 concern, but that seems to be getting under control.

10 There are a number of concerns with just the pace of
11 testing and how much has to be done. I know some steps
12 General Bogdan is taking to alleviate some of that schedule
13 pressure that he has.

14 So I think it is a suite of a lot of things that have
15 to happen. At the end of the day, the Air Force will make
16 the decision as to when they think it is ready to clear IOC.

17 My experience with the Marine Corps, I think the Air
18 Force will be exactly the same. They are not going to do
19 that until they are comfortable with the product that they
20 have.

21 Senator Reed: One of the major issues, long term, is
22 the sustainment cost of the aircraft, which seemed to be
23 quite significant. Can you describe steps that you and
24 General Bogdan are taking to lower those costs? We want to
25 lower the cost of the platform, but we certainly would like

1 to lower the cost long term of maintenance and operation.

2 Mr. Kendall: So far, we have been able to take about
3 10 percent out of the cost estimate at the time of the
4 rebaselining in a variety of things to do that. We are
5 looking at various ways to structure the business case, if
6 you will, for the sustainment. That is a work that is still
7 in progress. We do not want to remain in a sole-source
8 environment for any more of that than we possibly have to.
9 So introducing competition is a big part of it.

10 We are looking for creative ways to work with our
11 partners so that we do things together as opposed to
12 separately, because there are cost efficiencies associated
13 with that.

14 General Bogdan I think probably has a very long list he
15 could give you in addition to that.

16 Senator Reed: Can you give me your top two or three,
17 General, in my time?

18 General Bogdan: Yes, sir. We started a fully funded
19 reliability and maintainability program about 2 years ago,
20 where we looked at each and every component on the F-35 to
21 determine if it was maintaining its performance on the
22 airplane at the pace at which we needed it. That has proven
23 to be very cost-effective for us, so we are going after
24 those pieces and parts on the airplane that are not
25 performing well.

1 We also have a cost war room, where we look at every
2 idea that comes from the field on how to better maintain the
3 airplane. A perfect example of that is the original concept
4 for tires, wheels, and brakes on this airplane was to ship
5 all that off to a contractor somewhere. The U.S. Air Force,
6 the U.S. Navy, the U.S. Marine Corps have that capability
7 today with their legacy systems at their bases, so we are
8 moving all of that work to them. That reduces about 40
9 percent or 50 percent of the cost and the turn time of
10 fixing things like that. So we are going about
11 systematically trying to get every piece of cost out of the
12 program.

13 Senator Reed: Thank you.

14 Thank you, Mr. Chairman.

15 Chairman McCain: Senator Ayotte?

16 Senator Ayotte: Thank you, Chairman.

17 General Bogdan, I wanted to ask you, recently, General
18 Welsh came before our committee and said that the mission
19 capability of the A-10 will not be replaced by the F-35, yet
20 the Web site for the Joint Strike Fighter program says that
21 the F-35 will replace the A-10. So can you answer this
22 question for us? There is an inconsistency there, and I
23 would like to know, is General Welsh right or is your Web
24 site right?

25 General Bogdan: Thank you for that question, ma'am.

1 First, the force structure of the U.S. Air Force and
2 its fighter inventory is well beyond my purview. So I will
3 not try to explain what General Welsh said or what the
4 decision-making processes for the Air Force on replacing
5 their fighter inventory.

6 Senator Ayotte: But, General, I think this is an
7 important question. If General Welsh comes before our
8 committee and says the F-35A is not going to replace the A-
9 10, and yet the Joint Strike Fighter Web site says that the
10 F-35A will replace the A-10, it is pretty important as we
11 think about the capabilities of the A-10.

12 Secretary Kendall?

13 Mr. Kendall: I cannot speak for certain for General
14 Welsh, but I think what he was trying to say was that we
15 will in fact -- first of all, I think both statements are
16 correct. We will, in fact, replace the --

17 Senator Ayotte: Both statements cannot be correct.

18 Mr. Kendall: Well, we will, in fact, replace the A-10s
19 with F-35s. That is the plan. But the F-35 will not do
20 close-air support mission the same way the A-10 does. It
21 will do it very differently.

22 The A-10 was designed to be low and slow and close to
23 the targets that it was engaging, relatively speaking. We
24 will not use the F-35 in the same way as the A-10. So it
25 will perform the mission very differently.

1 Senator Ayotte: So let me ask, Dr. Gilmore, it is
2 going to perform the mission very differently. Is it not
3 important that we understand how the two compare? So I
4 would ask you, will there be comparison testing, not just
5 with the A-10 but with other comparative airframes that the
6 F-35 is going to replace? And how will the operational
7 testing, comparing the close-air support capabilities of the
8 F-35A and A-10, be conducted?

9 Dr. Gilmore: Senator, if I could just point out, I
10 have here the operational requirements document for the F-
11 35. On page 2, it says the F-35A will rely primarily upon
12 the F-22 for air superiority and will assume the current F-
13 16 role as the low end of the USAF high-low fighter mix
14 strategy and the A-10 role.

15 So that is in the operational requirements document.

16 Senator Ayotte: Okay. So if it is going to perform
17 the A-10 role, it is a pretty darn important role to our men
18 and women on the ground. So what about the fly-off? How
19 will that go down?

20 Dr. Gilmore: We are going to do a comparative test of
21 the ability of the F-35 to perform close-air support, combat
22 search and rescue, and related missions, with the A-10. We
23 are also going to do a comparison test as integral part of
24 operational test and evaluation of the ability of F-35 to
25 perform suppression and destruction of enemy air defenses

1 with the F-16 and F-18. This operational requirements
2 document has numerous citations to the performance expected
3 in F-35 in relationship to the aircraft it is going to
4 replace, so that operational testing is entirely consistent
5 with the operational requirements document.

6 The comparison testing is also not unprecedented.
7 There was comparison testing between the F-22 and the F-15,
8 and there has been comparison testing as part of other
9 operational tests, including things like tactical vehicles,
10 like the Joint Light Tactical Vehicle and the Humvee.

11 So to me, comparison testing just makes common sense.

12 Senator Ayotte: Of course.

13 Dr. Gilmore: If you are spending a lot of money to get
14 improved capability, that is the easiest way to demonstrate
15 it, to do rigorous comparison tests.

16 With regard to CAS, we are going to do it under all the
17 circumstances that we see CAS conducted, including under
18 high-threat conditions in which we expect F-35 will have an
19 advantage, and other conditions requiring loitering on the
20 target, low-altitude operations, and so forth, in which
21 there are a lot of arguments that ensue about which aircraft
22 might have the advantage, the A-10 or the F-35. But that is
23 what the comparison test is meant to show us.

24 Senator Ayotte: I think that is really important, so
25 that we can understand the capability comparisons there.

1 So, General Bogdan, I wanted to ask you, I had asked a
2 question of General Welsh in March as to when you expect the
3 SDB II to achieve demonstrated full-mission capability for
4 the F-35A.

5 General Bogdan: Ma'am, our program of record has the
6 SDB I coming in, in the end of Block 3F, which is in the
7 2017 timeframe. But SDB II, which is a much more enhanced
8 capability for that precision weapon, is planned for the
9 first increment of our Block 4. That is approximately in
10 the 2021-2022 timeframe.

11 Senator Ayotte: I think that is an important issue as
12 well because the SDB II provides F-35A an ability to kill
13 multiple targets in adverse weather, which is something
14 that, obviously, the A-10 has capability on. So I hope that
15 is taken into consideration as we look at this comparison.

16 Dr. Gilmore: The comparison testing will be done with
17 mobile targets and targets in close proximity to buildings
18 and civilian structures, in particular with mobile targets.

19 As I mentioned, right now, the mobile target capability
20 of the F-35 is problematic, and how much it will be
21 corrected as we get to Block 3F remains to be seen. SDB II
22 in 2022 will provide a weapon that can actually follow the
23 target.

24 Before that, in 2020, laser JDAM also may help in that
25 regard, but the current moving target capability is limited.

1 Senator Ayotte: I know my time is up, but one of the
2 things that continues to worry me is, under the Air Force
3 plan, the A-10s are all retired by 2022. It seems to me
4 that these are still important questions that remain, that
5 very much matter to our men and women on the ground.

6 Thank you.

7 Chairman McCain: Senator Manchin?

8 Senator Manchin: Thank you, Mr. Chairman.

9 And thank all of you for your service.

10 General Bogdan, the GAO report recommends an approach
11 in which new development efforts are managed as separate
12 acquisition programs. GAO recommended this type of separate
13 acquisition program for the F-35 Block 4 follow-on
14 modernization efforts. However, DOD has not concurred with
15 the GAO recommendations and plans to include the F-35 Block
16 4 follow-on modernization efforts under the existing cost-
17 plus contracts.

18 So if DOD did not adopt GAO's recommendation, would
19 that help eliminate cost-plus for the Block 4 phase of the
20 program? Why would they not? I do not know why any of us
21 do not pay attention to GAO, but why the Department of
22 Defense does not makes no sense at all.

23 General Bogdan: Sir, at a strategy level, I am going
24 to defer to Mr. Kendall to answer that.

25 Senator Manchin: Mr. Secretary, I am sorry.

1 Mr. Kendall: Senator, I think we are talking about a
2 distinction here that may not have a difference. The label
3 MDAP, or major defense acquisition program, brings with it a
4 lot of statutory and mandatory oversight.

5 Senator Manchin: Sure.

6 Mr. Kendall: What we plan to do with Block 4 is ensure
7 that it is accounted for separately, that we have an
8 independent cost estimate, that we manage it very
9 intensively, that there is full transparency and visibility
10 into what we are doing.

11 Senator Manchin: I am saying that --

12 Mr. Kendall: All the things that I think are being
13 asked for will be supplied. But if we add to that the label
14 of a major defense acquisition program, that is going to
15 bring a lot of additional bureaucracy and cost. I was
16 hoping to avoid that.

17 Senator Manchin: I agree. We do not want to put any
18 more bureaucracy on top of you than you already have.

19 But then I would ask, Mr. Sullivan, why would GAO make
20 that report, if you thought it was going to throw more
21 bureaucracy on top of it?

22 Mr. Sullivan: We would not want to see any bureaucracy
23 on top of that either. In fact, we did a report last year,
24 we kind of call it our efficiency report. I know the Under
25 Secretary is familiar with it, and agrees with a lot of it,

1 I think.

2 So one of the things we are also attacking when we
3 attack these kind of accountability questions is, let's
4 reduce some of that bureaucracy that they have to deal with
5 if they become an MDAP.

6 But the reason we think it is important here is, number
7 one, the dollars involved are such that, even according to
8 current law, they meet the threshold for an MDAP program.
9 The other thing is, on the F-22 program, we saw something
10 very similar to this. When they decided to baseline new
11 capabilities into the program, they did it under the
12 existing program, and very quickly, a \$2 billion estimate
13 for development of those new capabilities became about \$11
14 billion, and there was no accountability over it because it
15 was in with the baseline program.

16 Senator Manchin: First of all, I appreciate the job
17 the GAO does. I really do.

18 Mr. Sullivan: Thank you.

19 Senator Manchin: I have to make apologies as to why we
20 do not take your recommendations more seriously. You must
21 have considered the bureaucracy versus the cost, as far as
22 the contract versus cost-plus. It had to be significant
23 savings.

24 Mr. Sullivan: Yes. We sympathize with the desire to
25 not have to go through so many reviews and so many offices

1 and comments and everything else. We did the report on
2 that, and it was eye-opening for us to see what they have to
3 go through. But to me, they said if they had to go to a
4 major defense acquisition program, it would cause a year's
5 delay in getting that development effort going. I just do
6 not understand why that would be the case. They are doing
7 many of the things they would be required to do under MDAP
8 anyway.

9 Senator Manchin: Thank you. Let me go on.

10 Yesterday, it was announced that we are sending 250
11 special operations forces to Syria. I understand that it
12 costs us approximately \$1 million to \$1.5 million to train
13 one special operator, equaling to roughly \$375 million for
14 the 250.

15 General, you have indicated recently that the F-35
16 currently costs \$108 million per aircraft. I know it is
17 going to come down to \$85 million, you are hoping, by 2019.

18 Conceptually, if we traded in 10 jets, just 10, we
19 could increase the size of our special forces community by
20 over 650. This is after General Milley came here and said
21 we are about 220,000 short of end-strength ground troops.
22 So we are looking for ways to make sure that we can meet the
23 threats that we have.

24 The F-35 pilot helmets alone cost \$400,000. That is
25 \$10 million for 2,500.

1 As we look at the costs associated with F-35, and
2 considering the current threats we are facing and how most
3 of it is ground threats that we are facing and fighting,
4 does it make sense to spend so much money on the F-35 while
5 we currently depend so much more on our special ops forces
6 around the world, since we have to make some choices?

7 General Bogdan: Senator, what I will tell you is that
8 the department has many different kinds of choices they have
9 to make and try to balance their requirements with the
10 resources that they have.

11 I will tell you that the F-35 is a long-term investment
12 in the defense of this Nation. Our future adversaries are
13 not sitting still. And in the next 10, 20, 30 years, we may
14 very well need the capabilities that the F-35 will provide
15 us to maintain our leadership in the world. So I consider
16 the F-35 as an investment in the future.

17 Senator Manchin: I appreciate that. My time is up,
18 but I am saying we have 2,500 scheduled to be built,
19 correct? Is that the number?

20 General Bogdan: The U.S. services will build about
21 2,443, sir.

22 Senator Manchin: So for 10 less aircraft, we could put
23 650 special ops people on the frontlines right now.

24 General Bogdan: I believe your math is right, sir.

25 Senator Manchin: Okay. Thank you, sir.

1 Chairman McCain: Senator Fischer?

2 Senator Fischer: Dr. Gilmore, in your prepared
3 testimony, you state that cybersecurity testing has revealed
4 deficiencies and that full testing of the logistics
5 operating unit and the logistics information system has not
6 been permitted.

7 Can you give us an overview of the planned
8 cybersecurity tests and whether, based on the deficiencies
9 discovered so far, you believe the testing will be adequate?

10 Dr. Gilmore: If we execute the plan that my office has
11 been working on with the joint operational test team and the
12 program office over the next couple years, that will be a
13 very thorough, rigorous set of cybersecurity tests. The
14 problems that we are running into, as you mentioned, are
15 that the program is reluctant to let us test on the live
16 systems for fear that we might damage them, and they had not
17 made provisions for backup if the systems went down,
18 although they are working on that now.

19 So up to this point, and in the immediate future, we
20 will have to test on surrogate systems and laboratory
21 systems. The program office is making those available to
22 us. That is certainly better than forgoing all testing, and
23 we are learning from that, as was mentioned in my annual
24 report and in my statement.

25 But we need to do much more than that. We need to test

1 on live systems. We are also going to have to find a way to
2 do some sort of cybersecurity assessment of Lockheed's
3 information systems because ALIS is plugged into the
4 Lockheed corporate network.

5 We are working through all of those issues. Over the
6 next couple years, I expect that we will have done very
7 adequate, rigorous, testing. But we are just at the
8 beginning of it.

9 Senator Fischer: General, how is the program office
10 working to address these issues? The doctor mentioned some
11 accommodations there, but there is still the need for live
12 testing. How are you addressing all of this?

13 General Bogdan: Yes, ma'am.

14 What I will tell you today, ALIS, our logistics
15 information system, is operating on the DOD networks. In
16 order for me to be able to allowed to put that ALIS system
17 on the DOD networks, it has gone through, over the last 3 or
18 4 years, vigorous cybersecurity testing and certification
19 from agencies outside the JPO, to include the NSA and DISA.

20 So the idea that the ALIS system today is somehow
21 untested is not an accurate statement. However, having said
22 that, Dr. Gilmore is correct. I was hesitant last year to
23 give the operational test community the authority to test
24 end-to-end the operational system, because we did not have
25 redundancy in part of the system. If the testing were to

1 knock off that part of the system, I did not have a backup.

2 We are building that backup today. As soon as that
3 backup is in place, we will give the operational test
4 community full authority to test the system as it operates
5 in the field today. That should happen before the end of
6 the year.

7 Senator Fischer: Before the end of the year?

8 General Bogdan: Before the end of the year, ma'am.

9 Dr. Gilmore: I would like to comment, Senator, that we
10 do cybersecurity testing as an integral part of operational
11 testing of systems that have been through DIACAP
12 certifications and NSA certifications, and we get into them
13 every time.

14 So I am not arguing against those certifications, which
15 are specification-based kinds of assessments. They are
16 certainly necessary, but they are hardly sufficient.

17 Commercial organizations such as Microsoft have said in
18 their advice, the advice they provide to their customers,
19 assume that you have been penetrated and do continual red
20 teaming, which is what we do in our operational tests.

21 So the certifications that the general talks about are
22 certainly necessary, but they are hardly sufficient.

23 Senator Fischer: Mr. Secretary, overall, what are the
24 lessons learned from this process? What are we applying to
25 other acquisitions? And how is cybersecurity going to be

1 included in the requirements process? Basically, what are
2 we doing to integrate requirements for cybersecurity into
3 the whole acquisitions process?

4 Mr. Kendall: Cybersecurity is both a ubiquitous and
5 basically an omnipresent problem. Our guidance to the
6 acquisition work force basically is that you have to take
7 cybersecurity into account throughout every phase of the
8 product, development of product lifecycle, and every aspect
9 of it.

10 The department is maturing its capabilities in this
11 area, but I am in agreement with Dr. Gilmore on this, we
12 still have a long way to go.

13 Some of our older systems in the field were not
14 designed with cybersecurity in mind. We have to go back and
15 assess those and take corrective action on those. All of
16 our systems like the F-35 that are in development, we have
17 to integrate into the design process as we go, as well as
18 into all of our business practices.

19 It is a pervasive threat, and I worry particularly
20 about loss of unclassified information, which is much easier
21 to extract and attack. In a logistics system, that is a
22 particular problem because you want to connect to the
23 Internet somehow so you can order parts and so on.

24 So we are working this problem very, very hard. It is
25 not going to be cheap to fix it, and it is not going to be

1 quick to fix it, but we have to do so.

2 Senator Fischer: Thank you, Mr. Chairman.

3 Senator Reed: On behalf of the chairman, Senator
4 Cotton, please?

5 Senator Cotton: Thank you.

6 I know that Senator Donnelly asked about lessons
7 learned from the F-35 program and what we might take forward
8 in other programs, given that some of the challenges of this
9 program go back to some members' high school years. I think
10 we only got through Mr. Sullivan and Dr. Gilmore, though. I
11 would like to hear the answer to that question from
12 Secretary Kendall and General Bogdan.

13 Mr. Kendall: I was thinking, as my colleagues were
14 answering, I think it is a combination of things. But at
15 the end of the day, having a successful program depends on a
16 handful of things, but they are all incredibly difficult and
17 complicated. It starts with reasonable requirements. Then
18 you have to have professional management that is empowered
19 to do its job. You have to have adequate resources. You
20 have to have a system that basically will support people
21 doing the right thing.

22 In our system, as I think others mentioned, there is a
23 very strong bias that is sort of built into our incentive
24 structure towards optimism. It is easier to get a program
25 funded if it costs less. People want everything faster, and

1 they want it cheaper, and they want it to be able to do
2 more.

3 Most of the problems I have seen in acquisitions stem
4 from being in a hurry and being convinced, for whatever
5 reason, that things will be cheaper, better, faster than
6 they will actually be or that history would indicate they
7 would be.

8 My office was formed in 1986 because this problem was
9 so pervasive. I think we have had, frankly, a mixed record
10 of success. One of the things that I hope I have done over
11 the last several years is to put in more realism and to
12 structure programs with a more highly likelihood of success.

13 A lot of the things that we do, like F-35, are
14 incredibly complicated and difficult. Development is
15 inherently very risky. When you create something that has
16 never been created before, and you do it with cutting-edge
17 technology, that is a process that inherently has a lot of
18 unknowns in it, no matter how much risk reduction you do
19 ahead of time.

20 So I think support for sound management, ensuring
21 professionals are in place, resisting the tendency to spend
22 the money just because it is in your budget and you are
23 afraid you will lose it if you do not spend it, which is I
24 think exactly what happened when we started production on
25 the F-35, is something that has to be reinforced throughout

1 the chain of command, starting with the Secretary of
2 Defense.

3 Senator Cotton: General Bogdan?

4 General Bogdan: Thank you, Senator.

5 I will not elaborate. The concurrency and the optimism
6 piece are given. I will give you two other things, sir.

7 When you set up a large acquisition program like this,
8 you must ensure that the risk between industry and
9 government is balanced appropriately. If the risk is all on
10 the government, or if the risk is all on industry, you will
11 get bad behaviors from both sides, so it is very, very
12 important to make sure you have the incentive structures
13 right and the risk balanced appropriately between the
14 government and industry. We did not get that right at the
15 early part of the F-35 program.

16 Mr. Kendall, under his leadership, I have been trying
17 to do that for a number of years now, and it has proven to
18 be helpful.

19 The second thing I would tell you that people do not
20 talk about much is leadership continuity. If you have a
21 very large program and very complex, like the F-35, it will
22 do you no good to put leaders in place that are there for
23 only 2 or 3 years. It takes them a year just to understand
24 what is going on.

25 I would tell you our bigger acquisition programs need

1 stable leadership at the top for many, many years to help.

2 Senator Cotton: Are you talking about uniformed
3 leadership or civilian leadership?

4 General Bogdan: Either one, sir. I believe government
5 civilians and military personnel are both very capable
6 acquisition leaders. You just have to leave them there in
7 place for enough time to make a difference.

8 Senator Cotton: To the extent it is uniformed
9 leadership, is that an acquisition challenge or is that a
10 personnel challenge?

11 General Bogdan: It is both, sir. It is absolutely
12 both. How do you provide the incentives for a military
13 person to continue moving up in rank if you leave him in a
14 job for 5 or 6 years? But that is sometimes what is
15 necessary for very big, complex acquisition programs.

16 Senator Cotton: I have heard from some of our partners
17 overseas, and I do not mean just partners in the Joint
18 Strike Fighter, but our security partners generally, when
19 talking about acquiring certain weapons systems that,
20 because they are small compared to the United States, they
21 worry about being a plane with a country rather than a
22 country with a plane.

23 What is the risk that some of the partners in this
24 program face in terms of the cost of this aircraft and the
25 ability to acquire the number of aircraft needed to

1 contribute meaningfully to the program? How many Joint
2 Strike Fighters need a country acquire to have a meaningful
3 contribution to their defense?

4 General Bogdan: That is an interesting question,
5 Senator. I think it really goes to what each country cares
6 about in terms of its resources and what they care to
7 defend.

8 What I will tell you is that even our smallest nations
9 on the F-35 program are looking at least two squadrons of F-
10 35s. The idea that the partnership will be working together
11 to sustain, maintain, and train the airplanes is a huge deal
12 for them, because otherwise they could not afford a fifth-
13 generation capability like they are today.

14 Senator Cotton: Thank you.

15 Senator Reed: On behalf of the chairman, Senator
16 Rounds?

17 Senator Rounds: Thank you, sir.

18 Dr. Gilmore, I am concerned by your testimony that the
19 Marine Corps found they were not able to achieve aircraft
20 repair capabilities at the unit or intermediate levels that
21 would support expeditionary warfare. Can you expand on this
22 and give your assessment as to whether ALIS, or the
23 Autonomic Logistics Information System, is mature enough to
24 support the sustained operations with a land- or ship-based
25 forward-deployed squadron of F-35s at this time?

1 Dr. Gilmore: At this time, it is not sufficiently
2 mature. There are a number of improvements that are
3 planned, as the program moves forward to what is called ALIS
4 3.0, the fully capable version that is meant to be available
5 for operational testing and full operational capability. If
6 those improvements are realized, they will address a number
7 of the issues that are mentioned in my testimony.

8 But currently, there are immaturities in the system.
9 There are lots of time-consuming workarounds that are
10 required in order to keep aircraft flying. There is a heavy
11 reliance on having contractors present.

12 When we move forward to ALIS 3.0, the plan is to fix
13 many of those problems. There is also a concern that I
14 think General Bogdan alluded to when he was talking about
15 tires that there is still too much reliance on sending parts
16 back rather than repairing them closer to the frontlines.

17 But again, the program is working on those issues, so
18 we will see how well ALIS 3.0 does when we get to
19 operational testing. My estimate will be in 2018.

20 Senator Rounds: Lieutenant General Bogdan, can you
21 comment on Dr. Gilmore's assertion that with the current
22 number of aircraft planned for testing use, an 80 percent
23 aircraft availability rate is needed to efficiently
24 accomplish the integrated operational test and evaluation on
25 schedule. What would you assess is the current aircraft

1 availability rate? And does the JPO current projections
2 estimate that the aircraft availability rate will be up to
3 80 percent by the time that IOT&E is scheduled to start? It
4 seems as though right now you are not making that, and yet
5 you are going to have more challenges between now and then
6 to meet that.

7 How are we going to meet the testing guidelines that
8 are laid out in order to meet the deadlines that you have
9 laid out? It does not appear as though it is possible. Can
10 you comment on that and give us your thoughts, please?

11 General Bogdan: Yes, sir. I am not quite sure where
12 the 80 percent comes from.

13 Senator Rounds: Well, in order to have the number of
14 aircraft, just for the number of hours and number of tests
15 you have to do, you have to have 80 percent of them
16 operational. You have not done that yet.

17 General Bogdan: To finish IOT&E in a year, you are
18 correct, sir. I do not believe we will, by the time IOT&E
19 starts, get anywhere near 80 percent.

20 Today, the fleet is hovering around 60 percent aircraft
21 availability. The best we have seen so far are the U.S. Air
22 Force airplanes at Hill Air Force Base. When they deployed
23 to Mountain Home this winter, they achieved about a 72
24 percent aircraft availability rate.

25 What we have seen is our newer airplanes are doing much

1 better. But I will tell you it is very unlikely that we
2 will get to 80 percent. So what that means is IOT&E may
3 take longer than we anticipated. That would be the major
4 result of that.

5 Senator Rounds: We talked a little bit, and I am going
6 to follow up on Senator Ayotte's question a little bit,
7 considering the A-10. As I look back to the information
8 that has been provided for us, if you compare the two
9 aircraft today, the A-10 time on-station is an hour to 1.5
10 hours; F-35B, and this is from what I can see the planned
11 operational capabilities, of 25 minutes to 40 minutes on-
12 station. With weapons, the A-10, four air-to-surface
13 weapons; F-35B under the 2B software, two air-to-surface
14 weapons, under the 3F, six air-to-surface weapons. The fuel
15 burn under the F-35 A and B, 10 percent to 20 percent than
16 F-16, 50 percent to 70 percent higher than A-10, which would
17 suggest that we are also going to need additional
18 capabilities just to service them close by those areas.

19 On the gun itself, the F-35, and this is the way it was
20 designed in the first place, apparently, the F-35,
21 apparently, was not designed with a gun in mind, a
22 lightweight 25 mm cannon, 402 rounds total, or about a four-
23 second burst; A-10, a 30 mm cannon, 1,150 total rounds, 17
24 seconds, and an A-10 round is double the weight of that
25 carried by the F-35.

1 Clearly, when we talk about having a similar mission,
2 we are talking about doing the job in completely different
3 ways. Would that be a fair assessment?

4 Dr. Gilmore?

5 Dr. Gilmore: Yes, the F-35, when you talk about close-
6 air support, it will do it much differently than the A-10.
7 We are going to do those comparison tests, the ability to
8 perform CAS, between the A-10 and the F-35 as an integral
9 part of operational testing.

10 We are not going to say that that F-35 has to perform
11 CAS the same way the A-10 does. We are going to let the F-
12 35 pilots take advantage of the systems on that aircraft,
13 deal with some of the limitations you mentioned as well as
14 they can, and see how well the missions are carried out in
15 terms of the ability to strike targets in a timely manner,
16 and accurately, and then report on that.

17 There are numerous arguments about how well each
18 aircraft will do under different circumstances and different
19 threats. Clearly, the F-35 should have an advantage in
20 higher threat environments than the A-10 does. So the
21 comparison testing and our report will illuminate all of
22 that.

23 Senator Rounds: Mr. Chair, I am out of time, but
24 Secretary Kendall looks like he wants to respond. I think,
25 in fairness, we ought to give him an opportunity.

1 Mr. Kendall: Thank you, Mr. Chairman.

2 I am a huge proponent and fan of the A-10. I am an
3 Army officer. It was purposely designed to be a close-air
4 support aircraft, and it was a very good design for that
5 purpose. But if you estimate time to do air-to-air, it is
6 hopeless. The F-35 is designed as an aircraft that can do a
7 variety of missions, air dominance, strike, and close-air
8 support.

9 It does close-air support differently. It does not
10 have the features that you mentioned. Those are all real
11 world numbers that I think you gave. But what is different
12 now than the time the A-10 was conceived is the use of
13 precision munitions and the ability of a wide variety of
14 aircraft to put a munition like a small-diameter bomb
15 exactly where they want it to go.

16 So the Air Force today does close-air support with B-1
17 bombers, for example, something that traditionally would not
18 have been possible. So times have changed.

19 If we could afford it, I think everybody would like to
20 keep the A-10 in the inventory because it is such a good
21 special purpose aircraft for that one mission. But given
22 the constraints we have on both the size of our force
23 structure and the financial resources that we have,
24 maintaining a one-mission aircraft in the Air Force was not
25 something that could fit into the balance that we were

1 trying to achieve.

2 Senator Rounds: Thank you.

3 Thank you, Mr. Chairman.

4 Senator Reed: On behalf of Chairman McCain, Senator
5 Lee, please?

6 Senator Lee: Thank you, Mr. Chairman, for calling this
7 hearing.

8 And thanks to all of the witnesses for your testimony
9 today.

10 The Utah delegation has had the opportunity to witness
11 firsthand the rollout of the F-35 in the Air Force as the
12 388th and the 419th fighter wings at Hill Air Force Base in
13 Ogden, Utah, prepare to reach initial operating capacity, or
14 IOC, later this year.

15 We have also been able to see the development of the
16 logistics and maintenance functions of the F-35A at the
17 Ogden Air Logistics Complex, which has been so effective
18 that they have been called to assist both the Marine Corps
19 and the Navy in meeting the modernization goals for their
20 respective variants of the F-35, and we are very proud of
21 that.

22 The men and women who are working to train on, test,
23 and to keep these jets in the air are models of American
24 ingenuity and hard work and patriotism and dedication at its
25 very best. I hope this Congress will provide them with the

1 resources that they very much need in order to continue
2 succeeding in their mission.

3 General Bogdan, one of the main obstacles for the F-35A
4 reaching its IOC goals this year, of course, involves the
5 continued development of ALIS, which is, of course, used to
6 manage the logistics and supply chain for maintaining the F-
7 35, not just now during the rollout, but throughout its
8 lifetime.

9 Can you tell me how is the Joint Program Office working
10 with industry to ensure this capability is functional and
11 fully integrated into this weapons platform in a timely and
12 effective manner?

13 General Bogdan: Thank you, Senator.

14 The ALIS system right now that the Air Force needs at
15 Hill Air Force Base is on track to be about 60 days later
16 than we planned. The biggest issue we have right now is
17 getting the maintenance and supply chain and configuration
18 management of the engine, the F135, integrated into the ALIS
19 system. That has proven to be more difficult than we had
20 anticipated, because it requires both Lockheed Martin and
21 Pratt & Whitney's backend ERP, enterprise resource planning
22 systems, to talk to each other and to connect with ALIS.

23 We have worked with Lockheed Martin across the whole
24 company as well as some of their teammates, and we have
25 brought in some software experts from within DOD to try over

1 the last few months to figure out where those difficulties
2 lie. The good news there is we understand where the
3 difficulties are. Now we just have to go and execute.

4 Like I said, I think we are probably going to be about
5 2 months late getting that done, but I think we, from a
6 technical standpoint, will be able to get it done.

7 Senator Lee: Okay, that is good to know. It is good
8 anytime you can at least contain a delay and look forward
9 and conclude that you have a known quantity.

10 Because of budget reductions and the inability to
11 retire the A-10, the Air Force is concerned about a
12 potential shortfall of experienced uniform maintainers to
13 transition to F-35 units and keep those weapons safe and
14 keep them functional.

15 So, General Bogdan, has the Air Force been able to
16 resolve this problem in the short term? And what long-term
17 complications do you see that might still exist for ensuring
18 that a generation of maintainers is being trained to keep
19 pace with the process of integrating the F-35 into the Air
20 Force?

21 General Bogdan: Yes, sir.

22 In the short term, when the Air Force was faced last
23 year with a shortage of maintainers for their IOC capability
24 at Hill Air Force Base, they asked the program office to
25 populate an entire squadron at Luke Air Force Base with

1 contractor logistics support personnel. We did that. The
2 62nd squadron at Luke Air Force Base today on the flight
3 line is maintained with approximately 110 contractors as
4 opposed to blue suit maintainers. That gave the Air Force
5 the flexibility to take those maintainers that would have
6 been at Luke Air Force Base and transfer them to Hill Air
7 Force Base for IOC.

8 That is just a Band-Aid, though, and that is a short-
9 term fix. In the long term, I believe the Air Force needs
10 the ability to move maintainers around for the growing fleet
11 of F-35s. We are committed to working with them to increase
12 the throughput of maintainers through the schoolhouse and to
13 work with our partners and to work with the Guard and
14 Reserve in the Air Force who can provide some of that
15 manpower.

16 I will defer to the Air Force on those solutions,
17 though, sir.

18 Senator Lee: Let me ask you one more question as my
19 time is expiring.

20 Can you tell me, did the Department of Defense
21 originally intend the F-35 to be a direct replacement for
22 the A-10 in close-air support missions? Or was it designed
23 to work with other Air Force and joint force systems to
24 fulfill the department's needs as far as close-air support
25 goes? And what is your assessment of how the services will

1 be able to work together to meet close-air support needs
2 through integrated and joint operations?

3 General Bogdan: Sir, what I will tell you is, over
4 time, the evolution of the way we conduct close-air support
5 in the Department of Defense has evolved. It is no longer a
6 single airplane out there talking to a ground controller and
7 dropping a single weapon. It is a much more integrated
8 fight. It is much more reliant on multi-platforms and
9 multiple communication systems with both the ground and the
10 air.

11 Given that, the F-35 in the future, today and in the
12 future, will have the capabilities to seamlessly integrate
13 into that network to perform close-air support.

14 Senator Lee: Thank you very much.

15 Thank you, Mr. Chairman.

16 Senator Reed: Thank you, Senator Lee.

17 The chairman is on his way back from the second vote.
18 I am also told that Senator Blumenthal and Senator King are
19 coming for questioning.

20 But at this point, if I may, on behalf of the chairman,
21 take a short recess, perhaps for just a few moments until
22 the chairman returns. We will stand in recess until the
23 chairman returns. Thank you.

24 [Recess.]

25 Senator Reed: Let me once again, on behalf of Chairman

1 McCain, call the hearing to order and, at this time,
2 recognize Senator King for his questions.

3 Senator King?

4 Senator King: Mr. Gilmore, one of the concerns that I
5 have, and it has been touched on in this hearing, is the
6 length of time this platform is expected to serve, roughly
7 20 years from now, 30-plus years from initial inception. I
8 think back to any product I may have bought in 2004. I was
9 originally thinking of Senator Graham's flip phone. I would
10 not want to be flying that in 2040.

11 Are we building upgradability into this airplane so
12 that it can keep up with the times? In other words, is it
13 designed with that in mind?

14 Dr. Gilmore: That question is to me, Senator?

15 Senator King: Yes, sir.

16 Dr. Gilmore: Well, I will defer the details to General
17 Bogdan. This aircraft is going to be much more upgradable
18 than the F-22s was. But having said that, we have already
19 identified the need for an upgrade from the now being
20 installed Technical Refresh 2 processor, which provides
21 additional capability relative to the processors that have
22 been in the aircraft to this point. We have identified a
23 need for an upgrade to that, a Technical Refresh 3
24 processor.

25 In this program, moving from one processor to another

1 is not nearly as arduous a problem as in the F-22, where
2 there was a lot of software that was developed with features
3 that were tied very specifically to the processors in order
4 to maximize capability. But it is still not a trivial
5 matter, as has been demonstrated recently by the stability
6 problems that we now hope have been resolved with the
7 Technical Refresh 2 processor.

8 So upgradability is being built in, but that does not
9 mean it is going to be trivial to execute.

10 Senator King: General Bogdan? Quickly, because I have
11 several of the questions. But what is your thought, are we
12 going to be able to upgrade this airplane so that is not
13 going to be obsolete in 2025?

14 General Bogdan: I believe we will, sir. There are a
15 few points I will make.

16 One is, when we do replace the next version of the
17 computer or the brains in the airplane, we are requiring
18 open standards and modular open system architecture, which
19 will allow for the incorporation of new sensors and new
20 capabilities much easier.

21 Second, when we first originally designed the airplane,
22 we knew many of our partners and FMS customers would want to
23 put unique weapons on the airplane, so we have created a
24 system that will allow us to integrate multiple kinds of
25 weapons on the airplane, not trivial, but in an easier way.

1 So from both those perspectives, I believe the airplane
2 is adaptable and growable.

3 The third is, many of the capabilities inherent in the
4 airplane today that make it special are software-based.
5 Therefore, in the future, as new capabilities come on, like
6 electronic warfare and electronic attack, we will be able to
7 upgrade the software in an easier way than you would the
8 hardware.

9 Senator King: I think this has to be an important part
10 of our whole acquisition process as we are buying 40-year
11 assets, the Ohio class submarine, the B-21, on and on.

12 Secretary Kendall, was the attempt at jointness in this
13 project a mistake in retrospect?

14 Mr. Kendall: It is a good question, Senator. I think
15 the honest answer is I am not sure.

16 I was present at the inception of F-35. It started out
17 as a technology program that was instituted by one of my
18 predecessors when I was on the staff.

19 We are now thinking about the follow-on aircraft for
20 the Navy and the Air Force. I do not think we are going to
21 repeat this. First of all, I think the design parameters
22 are going to be quite different for the follow-on aircraft
23 for the two services. We did get some benefit from
24 commonality, but there is very little commonality in the
25 structure. So I think we still could get some of those

1 benefits without having to have a single program.

2 Senator King: You could get benefits in terms of?

3 Mr. Kendall: Common avionics, common sensor systems,
4 and so on. So I think those still could be achieved without
5 having a common program, necessarily.

6 I think you would have to make that decision kind of as
7 your plans for modernization and acquisition became more
8 real and material as to whether or not it paid off or not.
9 I think it is astonishing to me, frankly, that we have been
10 able to keep this program together for so long, keep the
11 three services fully committed, and keep all of our
12 international partners fully committed. We have two that
13 are on the fence right now. But at this stage of the game,
14 everybody is still in.

15 Pulling all that off is not a small achievement. That
16 is very hard to do. So I think we have to think very
17 carefully about that. The more complexity you have in a
18 program, the more risk you have. I do not know that the
19 savings are necessarily worth that complexity and the risk
20 that goes with it.

21 Senator King: Thank you.

22 Thank you, Mr. Chairman.

23 Senator McCain: Senator Blumenthal?

24 Senator Blumenthal: Thanks, Mr. Chairman.

25 I thank you all for your being here today and for your

1 insights on this very challenging program. It is as complex
2 as it is critical to our national defense, and we should
3 expect on this committee, and the American public should
4 anticipate, that a weapons platform of this complexity will
5 also have bumps in the road in its development and research.
6 I take it none of you would disagree with that basic
7 preposition.

8 Despite that bumpy road, at some point, the F-35 as a
9 whole has already made significant advancements in a number
10 of areas. In particular, the F135 program provides truly a
11 fifth generational power capability to the fleet.

12 Every low-rate initial production LRIP contract, as I
13 understand it, for the F135 has been on or below cost. The
14 recent announcement of the LRIP lots 9 and 10 will bring the
15 price down another 3.4 percent from the LRIP 8.

16 To date, the F135 conventional takeoff and landing
17 engine cost has been reduced by 47 percent since the initial
18 flight test engines. The STOVL engine cost has been reduced
19 by 34 percent in the same time period. These are real
20 achievements.

21 In addition, Pratt & Whitney has already identified
22 technology improvement options that will increase the
23 thrust, durability, and fuel efficiency that could
24 ultimately save billions of dollars for this program.

25 The F135 is meeting the key fiscal year 2020 milestones

1 -- again, my understanding -- for mission capability and
2 engine reliability.

3 Are those facts accurately stated, so far as the panel
4 knows?

5 General Bogdan: Sir, they are very accurate.

6 Senator Blumenthal: Thank you.

7 All that said, I know that questions have been raised,
8 General Bogdan, about the F135 performance. I take it from
9 your testimony that quality has not been an issue, so far as
10 the Pratt & Whitney supplier performance has been concerned?

11 General Bogdan: Sir, 2 or 3 years ago, I would have
12 told you that I was worried about that. I will tell you
13 that Pratt & Whitney has done a good job of standing up a
14 quality organization within Pratt & Whitney Military Engines
15 that has dug down deep into their supply chain and helped
16 improve that significantly.

17 Senator Blumenthal: Thank you.

18 Their supply chain, a lot of it is based in
19 Connecticut. I can tell you from my experience in
20 Connecticut that our suppliers and manufacturers have
21 recognized the challenge we face for this century,
22 literally. This weapons platform will be critical to our
23 national defense throughout the century.

24 We can look back and draw lessons, and we should, from
25 the challenges that caused that improvement to take place,

1 and maybe even the overall conceptual framework, as you
2 suggested, Secretary Kendall. Should there have been more
3 individualization of the platform for different services?
4 But I can well recall that the conventional wisdom not so
5 long ago was that the services ought to get together and
6 collaborate and buy a single fighter. And that was the
7 wisdom du jour of contracting in its day, and now maybe
8 lessons point in a different direction.

9 So I hope that we will learn lessons from this
10 procurement experience, but I think there has to be a
11 recognition that this weapons platform will do things that
12 no fighter engine or platform has done in the past.

13 Would you agree, Dr. Gilmore?

14 Dr. Gilmore: The investment ranking is large, and the
15 need that we have is large to deal with the threats that
16 currently exist. If the F-35 does not succeed, we will be
17 in a pickle.

18 Senator Blumenthal: We have a common national interest
19 in making sure it succeeds?

20 Dr. Gilmore: Yes.

21 Senator Blumenthal: Would you agree, Mr. Sullivan?

22 Mr. Sullivan: Yes, I would. We definitely need to
23 have this moving forward. This is the fifth generation.

24 Senator Blumenthal: Thank you.

25 Thank you, Mr. Chairman.

1 Chairman McCain: Let me just say, in summary, it has
2 been a scandal and the cost overruns have been disgraceful.
3 And this committee, in our authorization responsibilities,
4 will take whatever actions we can to prevent a reoccurrence.
5 It should not take 15 years and still not have an aircraft
6 IOC, and with cost overrun after cost overrun.

7 So I guess my question, finally, Mr. Sullivan, do you
8 think that we have learned the lessons and taken sufficient
9 measures to prevent a reoccurrence? Or do we need to do
10 some more?

11 Mr. Sullivan: I think there is always room to do more.
12 I do not think we have learned all the lessons yet. But I
13 would say that if you go back 5 or 6 years, or go back to,
14 say, 2010, we are not seeing as many F-35s or these big
15 programs with requirements that are not achievable. So I
16 think we are learning some lessons that way.

17 Some of that could be because of budget constraints.
18 Some of it is from the work that Congress has done.
19 Frankly, I think the department has done a good job of
20 trying to implement and drive down into the culture some
21 better practices that talk about better buying power
22 initiatives.

23 We have a long way to go, though. I mean, there is
24 still way too much cost growth on these programs. We are
25 not using enough looking at requirements in an incremental

1 way, using open systems, as Senator King was talking about.
2 There are a lot of things that we can do to create more
3 efficiencies.

4 Senator McCain: Dr. Gilmore?

5 Dr. Gilmore: I think Block 4 will be a good test of
6 whether we have learned lessons. As mentioned in my written
7 statement, I see a number of unrealistic assumptions with
8 regard to Block 4. So I hope, as Secretary Kendall and
9 General Bogdan take a look at how to structure that program,
10 that they take a look at those issues. That will be a good
11 test.

12 Senator McCain: Secretary Kendall and General Bogdan,
13 I hope you will pay attention to Dr. Gilmore's words,
14 particularly given his responsibilities to the Department of
15 Defense as well as to the Congress.

16 I thank the witnesses. I believe that most of the
17 takeaway from this is that we are making progress, that we
18 have challenges that lie ahead, but there have been some
19 significant improvements, as opposed to some years ago.

20 So I thank the witnesses for their hard work.

21 This hearing is adjourned.

22 [The information referred to follows:]

23 [COMMITTEE INSERT]

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[Whereupon, at 11:54 a.m., the hearing was adjourned.]