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Congressional Committees

F-35 Joint Strike Fighter: DOD's Proposed Follow-on Modernization Acquisition Strategy Reflects an Incremental Approach Although Plans Are Not Yet Finalized

The F-35 Joint Strike Fighter is the Department of Defense's (DOD) most expensive and ambitious acquisition program. In April 2017, we reported that acquisition costs alone are estimated at nearly \$400 billion, and operating and sustainment costs are estimated to be over \$1 trillion.¹ Meanwhile, due to evolving threats and changing warfighting environments, DOD has begun planning and funding the development of new capabilities for the F-35, known as F-35 follow-on modernization.² The research, development, test and evaluation (RDT&E) funding needed for the first modernization phase, known as Block 4, is projected to be over \$3.9 billion through 2022, which would exceed the statutory and regulatory thresholds for what constitutes a major defense acquisitions program (MDAP), and would make it more expensive than many of the other MDAPs already in DOD's portfolio.³

However, DOD does not plan to make the F-35 Block 4 a separate MDAP. Instead, DOD plans to manage it under the existing F-35 acquisition program baseline. As we recommended in our April 2016 report, the modernization program should be designated as its own separate MDAP, similar to the F-22 modernization program. In that report, we also recommended that the Secretary of Defense hold a Milestone B review and manage F-35 Block 4 as its own separate and distinct MDAP with its own acquisition baseline and regular cost, schedule, and performance reports to Congress.⁴ Because DOD did not concur with our recommendation, we suggested that Congress consider requiring DOD to do so. Congress has since mandated in the National Defense Authorization Act for Fiscal Year 2017 that the Secretary of Defense submit a

¹GAO, *F-35 Joint Strike Fighter: DOD Needs to Complete Developmental Testing Before Making Significant New Investments*, [GAO-17-351](#) (Washington D.C.: Apr. 24, 2017).

²The baseline development program is separated into mission systems software blocks. Block 3F is the last block of the baseline development program and is the foundation for Block 4. Block 4 is expected to be developed and delivered in four increments—currently referred to as 4.1, 4.2, 4.3, and 4.4. The first increment of Block 4 will primarily be software, as well as some new capabilities and correct deficiencies of nine capabilities carried over from the current development program such as the prognostics health management system down-link and communication capabilities. Program officials expect increments 4.1 and 4.3 to be primarily software updates, while increments 4.2 and 4.4 will consist of more significant hardware changes.

³DOD Instruction 5000.02 defines a major defense acquisition program as one either identified by DOD or one in which the estimated eventual total expenditure for research, development, test and evaluation (RDT&E) is more than \$480 million or for procurement is more than \$2.79 billion. DOD Instruction 5000.02, Operation of the Defense Acquisition System Encl. 1, Table 1 (Jan. 7, 2015, incorp.ch. 2, eff. Feb. 2, 2017). (Hereinafter cited as DODI 5000.02 (Jan. 7, 2015, incorp. ch. 2, eff. Feb. 2, 2017)).

⁴GAO, *F-35 Joint Strike Fighter: Continued Oversight Needed as Program Plans to Begin Development of New Capabilities*, [GAO-16-390](#) (Washington D.C.: Apr. 24, 2016).

report by the end of March 2017 containing the basic elements of an Acquisition Program Baseline for the F-35 Block 4 and also required that we review DOD's report.⁵ Instead of submitting the report by the end of March 2017 as required by the act, DOD issued a letter to congressional defense committees stating that it intends to submit the baseline report in August 2017. We plan to review DOD's report when it becomes available and will brief the congressional defense committees on our findings at that time.

Meanwhile, we conducted this review to provide Congress an update on the current status of DOD's F-35 Block 4 development and procurement plans. Specifically, this report describes DOD's planned approach to F-35 Block 4 modernization as of May 2017 and assesses the extent to which that approach is likely to reflect key elements of a knowledge-based acquisition strategy.

To assess DOD's planned approach for the F-35 Block 4, we met with F-35 and other DOD program officials to obtain an understanding and the context for the methodology the department used for its approach. We also requested and reviewed supporting documentation related to Block 4, such as cost, schedule, and capabilities planning documents. We then compared DOD's planned acquisition approach for Block 4 with DOD acquisition policy and guidance as well as acquisition best practices to determine the extent to which DOD's Block 4 approach is knowledge-based.⁶

We conducted this performance audit from March 2017 to August 2017 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient and appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

DOD Is Planning an Incremental Acquisition Approach, but Concurrency May Pose Risk

Since our April 2016 report, the F-35 program has made progress in further defining its Block 4 modernization acquisition approach. Our review of available program documentation and discussions with program officials indicate that DOD plans to take an incremental, knowledge-based approach that will develop Block 4 capabilities in four increments. In April 2017, the Joint Requirements Oversight Council validated the F-35 Block 4 requirements document, known as a Capability Development Document that primarily establishes requirements and specific capabilities expected in the first two increments, known as Block 4.1 and Block 4.2. The Capability Development Document notes that the program will return to the Joint Requirements Oversight Council to revalidate the new requirements for future increments and if any significant cost, schedule or quantity changes occur. This approach is consistent with DOD policy and acquisition best practices and thus facilitates transparency and oversight.⁷ We have reported in

⁵Pub. L. No. 114-328, § 224.

⁶DODI 5000.02 (Jan. 7, 2015, incorp. ch. 2, eff. Feb. 2, 2017); Defense Acquisition Guidebook; [GAO-01-288](#); [GAO-02-701](#); [GAO-06-368](#); [GAO-07-388](#); and [GAO-08-619](#).

⁷An incremental approach builds on mature technologies and provides time, money, and other resources for a stable design, building and testing of prototypes, and demonstration of mature production processes.

the past that DOD policy and acquisition best practices support an incremental, knowledge-based approach to system development and procurement.⁸

DOD's proposed schedule is also incremental and knowledge-based, with distinct systems engineering reviews and test activities planned for each increment. In addition, DOD officials stated they plan to structure the Block 4 contract so that each increment will have its own group of contract line item numbers (CLINs) that correspond to the capabilities associated with that increment. According to program officials each CLIN would establish, among other things, the requirements, cost or price, and schedule for the work to be performed under each increment so that cost and schedule progress under each CLIN can be measured and tracked.⁹ Once implemented, this approach should support more informed management and oversight by allowing decision makers to track costs and progress across individual development efforts.

While DOD has broadly established an incremental, knowledge-based framework for its Block 4 modernization acquisition strategy, DOD officials noted that, due to budget uncertainties and the ongoing change in program leadership, they are reassessing key cost, schedule, and capability aspects of the approach. As a result, the release of the Block 4 request for proposals, originally scheduled for the third quarter of fiscal year 2017, has been postponed until later in the year, and the report mandated by Congress, that at a minimum should contain the basic elements of an acquisition program baseline for Block 4, may now be submitted in August 2017.¹⁰ DOD plans to update that report annually. According to program officials, each update will reflect changes since the prior report to include cost, schedule, and performance baselines for any new increments as well as the progress of existing increments. Over time, baselines will be established for each increment and each increment will be tracked against its respective baseline.

Going forward, an area of potential concern we identified is the apparent planned concurrency between Block 4 development and the procurement of Block 4 aircraft. Our assessment of DOD's most recent Block 4 schedule (from August 2016) indicates that DOD was planning to request funding in February 2018 to purchase the first aircraft with the initial increment of Block 4 capabilities. This will come as part of DOD's fiscal year 2019 budget request, more than 2 years before the development and testing of the first increment is complete. In addition, program officials acknowledged that the aircraft's current data processor is operating at maximum capacity, and an updated processor with increased capacity is likely needed for the first increment of Block 4 to function as intended.¹¹ F-35 program officials acknowledge this risk and note that an updated processor may not be available until the second increment of Block 4. This

⁸GAO, *Defense Acquisitions: DOD's Revised Policy Emphasizes Best Practices, but More Controls Are Needed*, [GAO-04-53](#) (Washington, D.C.: Nov 10, 2003).

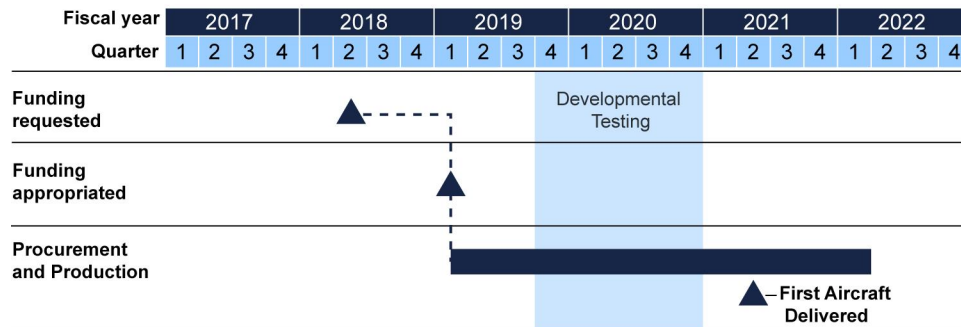
⁹According to DOD officials they plan to initially award CLINs associated with block 4.1 and pre-development for block 4.2. Subsequently, DOD and the contractor plan to execute a bilateral contract modification to award CLINs for subsequent blocks.

¹⁰The National Defense Authorization Act for Fiscal Year 2017 requires the Secretary of Defense to submit to the congressional defense committees a report that contains the basic elements of an acquisition program baseline for Block 4 Modernization including: cost estimates for development, production and modification; projected key schedule dates, including dates for the completion of a capabilities development document, an independent cost estimate, an initial preliminary design review, a developmental contract award, and a critical design review; technical performance parameters; technology readiness levels; and annual funding profiles for development and procurement.

¹¹Due to diminishing manufacturing sources and the need for increased data processing capacity, program officials are pursuing the development of a new data processor that they intend to incorporate into the aircraft as part of a technology refresh effort, known as Technology Refresh 3. A data processor is computer hardware that processes instructions sent to it by the aircraft's computer and software programs.

poses a risk that the testing and delivery of the first increment of Block 4 capability may not be achievable as planned. As a result, DOD may be negotiating prices for those aircraft without knowing if or when the more advanced capabilities will be delivered and whether they will function as required. Consequently, Congress will be faced with the challenge of making funding decisions with limited information. Figure 1 illustrates this concern.

Figure 1: Production of Aircraft with the Initial Increment of Block 4 Capabilities Will Be Funded 2 Years before Developmental Testing Is Complete



Source: GAO analysis of DOD data. | GAO-17-690R

According to our past work, programs that limit concurrency between development and procurement are more likely to deliver promised capabilities within estimated cost and schedule parameters.¹² Concurrency has been a significant contributor to many of the problems with the baseline F-35 acquisition program, which is currently expected to cost more than \$104 billion, or 45 percent, over the original estimate, and to be more than 5 years behind schedule.¹³ As of April 2016, DOD estimates a total of nearly \$2 billion in concurrency costs in the baseline program.¹⁴

We are not making any recommendations at this time because program officials told us that the concurrency issue is being considered as part of their reassessment of Block 4. We will therefore reassess this issue when DOD's F-35 Block 4 baseline report is issued and brief the congressional defense committees on our findings.

¹²GAO, *Defense Acquisitions: Opportunity Exists to Strengthen Acquisitions by Reducing Concurrency*, [GAO-12-486](#) (Washington, D.C.: April. 20, 2012) and *Best Practices: Capturing Design and Manufacturing Knowledge Early Improves Acquisition Outcomes*, [GAO-02-701](#) (Washington, D.C.: July 15, 2002).

¹³GAO, *Defense Acquisitions: Assessments of Selected Weapon Programs*, [GAO-17-333SP](#) (Washington, D.C.: Mar. 31, 2017).

¹⁴Department of Defense, Office of the Under Secretary of Defense, Acquisition, Technology, and Logistics, *Action Memo: Fifth Report to Congress on F-35 Concurrency Costs* (Washington, D.C.: Apr. 5, 2016).

Agency Comments

We provided DOD with a copy of this report and they returned technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees and the Secretary of Defense. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staff have any questions about this report, please contact me at (202) 512-4841 or sullivanm@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report were Travis J. Masters (Assistant Director), Susan Ditto, Emily Bond, Kristine Hassinger, Jennifer Leone, Jillena Roberts, Hai Tran, Nathaniel Vaught, and Robin Wilson.

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

Michael J. Sullivan
Director, Acquisition and Sourcing Management

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