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The Honorable Donald Norcross  
Ranking Member, HASC Subcommittee on Tactical Air and Land Forces  
2216 Rayburn House Office Building  
Washington, D.C. 20515

Subj: Oversight of F-35 C2D2 Major Subprogram's Outcome-based Metrics

Dear Ranking Member Norcross:

The *DOT&E FY 2023 Annual Report F35*, January 2024, again reported schedule delays of F-35 Block 4 Open-Air Testing. As usual, "software maturity... contributed to the slow progress in development." It is requested that your oversight of the Continuous Capability Development and Delivery (C2D2) Program for the F-35 Aircraft Major Subprogram include an assessment of the sufficiency and effectiveness of outcome-based metrics used for Block 4 and Technical Refresh-3 elements of the F-35 program."

Those metrics must provide the F-35 program office with knowledge of the schedule, technical and cost performance towards completing the F-35 modernization plan, as defined in the Block 4 Modernization Capability Development Document. That document specifies required capabilities and associated capability gaps that drive incremental improvements under an agile acquisition framework.

Per a GAO report, DOD should ensure that all programs using Agile have policy and guidance that encourages the use of oversight approaches tailored to their program, to include using outcome-based metrics and continually assessing the value of capability delivered to support iterative software development.

The report is DEFENSE SOFTWARE ACQUISITIONS Changes to Requirements, Oversight, and Tools Needed for Weapon Programs, GAO-23-105867, July 2023. Per the report,:

"Without incorporating the oversight of Agile software development into acquisition policy and guidance for all programs, ...including outcome-based metrics, and continually assessing the value of capability delivered to support iterative software development, acquisition officials may not be able to conduct effective oversight. This could result in greater risk of programs not meeting the needs of operational users in a timely and cost effective manner." GAO also stated, "Without the use of outcome-based metrics and continually assessing the value of what was delivered against user needs, a program using Agile software development might deliver capabilities and features that are not essential to the customer and that could contribute to schedule and cost overruns."

I have sent recommendations regarding outcome-based metrics and C2D2 to yourself, USD(A&S) LaPlante, Vice Chair Wittman, and Gen. Schmidt, as follows.

<b>Letters Regarding F-35 C2D2 Outcome-Based Metrics and Digital Engineering</b>		
<b>Date, To</b>	<b>Subject</b>	<b>Excerpts</b>
1/29/24 LaPlante	Outcome-based Metrics that Work to Build a Product that Works; F-35 Block 4	LM reported that another slip to F-35 TR-3 software acceptance was likely. Rep. Wittman warned the delayed TR-3 rollout will create further scheduling issues in the Block 4 upgrade. ...Technical Baseline Review (TBR) of the Block 4 upgrade to provide recommendations on improvements related to the modernization schedule, development infrastructure, software tools, and workforce capacity. Please refine the scope of the TBR to include an assessment of the use, sufficiency, and effectiveness of outcome-based metrics.
12/ 12/23 Wittman	Your Comments on F-35 Digital Engineering and Lessons Learned	In today's F-35 hearing, you and Dr. LaPlante expressed concerns and objectives concerning good systems engineering, the future use of digital twin technology, and applying lessons learned going forward. I would appreciate your oversight of DoD's implementation of those recommendations going forward.
9/12/23 Norcross	Updated Request for Oversight of F-35 C2-D2 Oversight Issues including F-35 Block 4 Modernization Expected Costs	<b>Your Action</b> The latest slips provide more reason for you to take the recommended actions in the preceding letters: Aug. 8, Subj: F-35 C2-D2 Oversight Issues Omitted from House Version of NDAA Sec. 219 Aug.11, GAO Assessment of Reported F-35 Block 4 Modernization Expected Costs Also, for more justification, please read the attached letter to Lt. Gen. Schmidt, Subj: Block 4 Issues, Outcome-Based Metrics, and Systems Engineering Transformation, dated Aug. 14.
Schmidt 8/14/23	Block 4 Issues, Outcome-Based Metrics, and Systems Engineering Transformation	Your testimony to a subcommittee hearing included reducing the cost of F-35 Block 4 and future capability development under your Systems Engineering Transformation initiative. I have been recommending DOD-wide acquisition reforms and increased oversight regarding the integration of SE with program management and performance-based/outcome-based metrics for twenty years. Recent foci include digital engineering and Agile methods. The recommendations focus heavily on software-intensive systems and are applicable to the F-35. Please consider applying my recommended changes to DFARS and DOD policy and guidance to your program. Unfortunately, there has been no effective progress towards defining and institutionalizing technical performance/outcome-based metrics or on providing accurate status and situational awareness of program execution for proactive resolution of issues impacting cost, schedule, and technical achievement of program objectives. Your program still does not provide "expected costs... in its annual Block 4 reports to Congress." The white paper cited in the Appendix, <i>Integrating the Embedded Software Path, Model-Based Systems Engineering, MOSA, and Digital Engineering with Program Management</i> , may be downloaded from <a href="http://www.pb-ev.com">www.pb-ev.com</a> as well as this letter and cited letters. Please consider all the above for application to your program.

USD(A&S) LaPlante committed to establish validated metrics for cost, schedule, and technical performance metrics. In his SASC confirmation hearing, he answered a question on metrics, as follows:

51. If confirmed, what steps would you take, if any, to require contractors to report valid <b>measures of cost, schedule, and technical performance for all acquisition pathways?</b>	If confirmed, I will work across the Department and with the industrial base— current and emerging—to validate, improve, or establish appropriate <b>metrics</b> across the acquisition pathways.
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Lockheed Martin (LM) commits to use Agile software methods to reduce the cost and schedule of F-35 development on its website, as follows:



## Advancing the Digital Enterprise

- Digital Twin
- Model-Based Engineering
- Agile Software Development

Reducing the cost and schedule of aircraft development, operation and sustainment to set the new standard of connected protection.

In April 2019, former F-35 PEO Mathias stated at a HASC Subcommittee hearing that:

This agile framework, known as C2D2 provides *timely, affordable, incremental* warfighting capability improvements.

The F-35 Program is working to transition to C2D2 faster, more flexibly, and more affordably by breaking down and delivering in smaller increments, ultimately reducing our cost of doing business. There are three aspects to reducing this cost of doing business – agile delivery, capability verification, and open systems.

The latest F-35 program delays are evidence of the program’s recurring failure to perform. We need valid outcome-based metrics to provide real situational awareness and early warning of potential failures so that prompt corrective actions can be taken. I have provided guidance and a template for the right metrics and process in the white paper that is cited in the letter to PEO Schmidt.

It’s time for LM to put its metrics where its mouth is. Your intent to perform the oversight activities recommended in the letters may finally prod LM to develop, implement, and use credible F-35 outcome-based metrics. There will also be a collateral benefit if outcome-based metrics are institutionalized in the National Defense Industrial Strategy Ecosystem and implementation plan.

Yours truly,

A handwritten signature in cursive script that reads "Paul J. Solomon". The signature is written in black ink on a light pink rectangular background.

Paul J. Solomon

CC:

HASC Hon. Robert J. Wittman

HASC Hon. Adam Smith

USD(A&S) Bill LaPlante

Hon. Heidi Shyu, (USD(R&E))

Hon. Andrew Hunter, AF Asst. Sec. for AT&L

Anthony Capaccio, Bloomberg News