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August 14, 2023

Lt. Gen. Michael Schmidt
F-35 Lightning II Joint Program Office (JPO)
200 12th St S
Arlington, VA 22202

Subject: Block 4 Issues, Outcome-Based Metrics, and Systems Engineering Transformation

Dear Lt. Gen Schmidt:

Your testimony to a subcommittee hearing included reducing the cost of F-35 Block 4 and future capability development under your Systems Engineering Transformation (SET) initiative. I have been recommending DOD-wide acquisition reforms (AR) 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.

I worked with Sen. McCain, Andrew Hunter (when he supported Ike Skelton), Katrina McFarland, and Heidi Shyu. I also advised Sen. McCain on F-35 cost and schedule issues. An excerpt from one of Sen. McCain's responses, in 2015, follows.

“Our focus of effort for this Congress will be to provide accountability and arrest the growth in cost and schedule. We must do this in order to achieve a sustainable future for government acquisitions.

Again, I appreciate your continued efforts in working to improve our acquisitions process. Feel free to contact my staff ...with further information.”

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 pending NDAA includes provisions to exempt software contracts from earned value management (EVM) requirements and to increase Congressional oversight of the F-35 C2D2 program, which uses Agile methods. However, I have requested Sen. Duckworth and Rep. Norcross to revise those provisions, during conference, to provide more specific detail and eliminate ambiguity. I sent similar requests to USD La Plante regarding policy and guidance.

Excerpts from the letters are in the Appendix. The white paper cited in the Appendix, *Integrating the Embedded Software Path, Model-Based Systems Engineering, MOSA, and Digital Engineering with Program Management*, July 22, 2023, may be downloaded from www.pb-ev.com as well as this letter and cited letters. Please consider all of the above for application to your program.

I would be pleased to provide additional information or advice to you or your staff, *pro bono*.



Paul Solomon

CC:

Hon. William La Plante USD(A&S)
Hon. Heidi Shyu, (USD(R&E))
Hon. Andrew Hunter, AF Asst. Sec. for AT&L
Hon. Jack Reed, Chair, SASC
Hon. Adam Smith, Ranking Chair, HASC
Hon. Tammy Duckworth, SASC
Hon. Susan Collins, Defense Appropriations Subcommittee
Jon Ludwigson, GAO
Shelby Oakley, GAO
Anthony Capaccio, Bloomberg News

Appendix: Letters to DOD Officials and Legislators

Date	Recipient, Subject	Excerpts
10/25/11	McCain, Cost Controls on the F-35 and Need for Acquisition Reform of Earned Value Management	<p>Neither PMs nor the OSD PARCA Office can be assured that a contractor’s performance metrics are valid or accurate. Neither GAO nor any agency has ever validated that a contractor’s use of EVM will</p> <ul style="list-style-type: none"> • Integrate cost, schedule and quality/technical performance. • Provide an early warning of real or pending issues that require corrective action. • Ensure accurate status and Estimate at Completion (EAC). <p>I have been proposing acquisition reforms that would remove the loopholes in DFARS.</p>
1/21/15	McCain, Cost Controls on the F-35 and Need for Acquisition Reform of Earned Value Management	<p>Dr. Gilmore reported serious deficiencies with hardware and software used to develop data files that are needed to identify enemy radar and “are essential to conducting effective combat operations against advanced enemy air defenses.” He also reported deficiencies in the Block 2B software in fusion, radar, passive sensors, identification friend-or-foe and electro-optical targeting.</p> <p>recommended that GAO examine the DCMA’s EVM compliance surveillance reports to determine if DCMA has detected and reported inconsistencies between the reported earned value and actual technical performance achieved. I would be happy to assist the GAO, <i>pro bono</i>, in developing an audit program.</p>
7/17/23	Duckworth, Proposed Amendment to NDAA for FY2024, Sec. 815, Earned Value Management System Requirements	<p>amending the NDAA for FY2024, Sec. 815, Modifications to EVMS Requirements. The current provision includes:</p> <p>“Update subpart 234.2 of the Defense Federal Acquisition Regulation Supplement (DFARS) to exempt all software contracts and subcontracts from EVM requirements.”</p> <p>The scope of the exemption should be clarified to include, as discussed in DoD policy regarding the software acquisition pathway:</p> <p>“software embedded in weapon systems and other military-unique hardware systems.”</p>
7/21/23	Duckworth, GAO Report and Need to Revise NDAA Sec. 815, Earned Value Management	<p>Today’s GAO report on defense software acquisitions recommends the use of outcome-based metrics to track whether software development is achieving desired outcomes, including capability delivered. My previous letters to you discussed the systemic absence of outcome-based metrics in Earned Value Management Systems (EVMS). Please act on my recommendation (July 17 letter) to amend the NDAA for FY 2024, Section 815.</p> <p>The GAO report is “DEFENSE SOFTWARE ACQUISITIONS Changes to Requirements, Oversight, and Tools Needed for Weapon Programs,” GAO-23-105867, July 2023. GAO found that existing policies and</p>

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		<p>guidance do not support DOD oversight of non-software pathway weapon programs using Agile. 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.</p>
8/1/23	La Plante, Software Acquisition Policy and Congressional Oversight Issues	<p>the wording of NDAA Sec. 815 is ambiguous in that it cites “software contracts and subcontracts.” In implementing the DFARS changes, please ensure that they are applicable to both applications and embedded software.</p> <p>b. There are two paths within the software acquisition pathway: applications and embedded software. Except where specifically noted, the guidance in this issuance applies to both paths equally.</p> <p>Second, Table 3 of the white paper that was sent previously (Integrating the Embedded Software Path, Model-Based Systems Engineering, MOSA, and Digital Engineering with Program Management, July 22, 2023) includes proposed revisions to policy and guidance. The guidance includes outcome-based metrics, the value of capability delivered, and the technical work products that should be measured for their quality and technical maturity.</p> <p>no longer be a DFARS requirement to measure the quantity of work performed to develop software. Of course, contractors may continue to voluntarily use EVM for software development if they believe the myth, in the DoD EVMS Interpretation Guide, that EVM is a “program management tool to provide joint situational awareness of program status and to assess the cost, schedule, and technical performance of programs for proactive course correction.”</p>
8/8/23	Norcross, F-35 C2D2 Oversight Issues Omitted from House Version of NDAA Sec. 219	<p>The latest delay to completing F-35 Technical Refresh-3 (TR-3) and continuing Block 4 cost growth justify increased oversight of the C2D2 delivery program. However, NDAA for FY 2024, Sec. 219 fails to address findings or recommendations of the GAO and DOT&E regarding the program’s lack of:</p> <ol style="list-style-type: none"> 1. Performance metrics and outcome-based metrics. 2. Clear articulation of the capabilities required in the Minimum Viable Product (MVP), focused testing, comprehensive characterization of the product, and full delivery of the specified operational capabilities. 3. Continual assessment of the value of capability delivered to support iterative software development. <p>Please revise Sec. 219 to close the project monitoring and control deficiencies cited above and to authorize GAO to assess the timeliness and effectiveness of DOD’s and the program’s corrective actions.</p>

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8/11/23	Norcross, GAO Assessment of Reported F-35 Block 4 Modernization Expected Costs	<p>The objective of the additional scope is to determine if Lockheed Martin (LM) has been reporting F-35 Block 4 Modernization expected costs that are accurate, reliable, and “most likely.”</p> <p>Please increase the scope of the GAO assessment that was requested in my letter dated August 8, Subj: “F-35 C2D2 Oversight Issues Omitted from House Version of NDAA Sec. 219.” The objective of the additional scope is to determine if Lockheed Martin (LM) has been reporting F-35 Block 4 Modernization expected costs that are accurate, reliable, and “most likely.”</p> <p>Justifications for the Assessment (2020 and 2017)</p> <p>Per GAO-23-106694 Testimony Before the Subcommittee on Tactical Air and Land Forces, HASC:</p> <p>“Our ongoing work also continues to identify that the program does not provide a holistic Block 4 cost estimate, inclusive of all years incurred and expected costs... in its annual Block 4 reports to Congress.”</p> <p>This finding, in 2023, is “déjà vu” to a similar GAO finding in 2020 and to a US Court of Appeals conclusion in 2017. Both assessments, regarding the EAC were cited in the attached letter to (then) Chair Smith, Subj: Request for Supplemental GAO Investigation, F-35 Modernization, dated May 12, 2020.</p>