

**Paul Solomon**  
**3307 Meadow Oak Drive**  
**Westlake Village, CA 91361**  
Paul.solomon@pb-ev.com

August 6, 2021

The Honorable Gregory Kausner  
USD(A&S)  
1010 Defense Pentagon  
Washington, DC 20301-1010

Subject: Recommendations to Amend NDAA and DoD Policy; Agile Methods, Technical Debt, and Award/Incentive Fees

Dear Undersecretary Kausner:

This letter includes recommendations for you to submit an amendment to the draft NDAA for FY 2022 and to revise DOD policies and guidance regarding Agile methods, technical debt, and related award/incentive fees. The objective is to improve acquisition management of software (SW)-intensive weapons systems.

## **NDAA**

A recent executive summary of the SASC NDAA markup includes a requirement for the Secretary of Defense to:

Enter into an agreement with a federally funded research and development center (FFRDC) to perform a study on technical debt in SW-intensive systems and other military-unique hardware systems.

Although the draft provision has not been publicized, recommended content of the actual provision is provided in the amendment below.

## **Background of Technical Debt**

I have been addressing technical debt in letters to Chairman Smith (Smith), and others since February 2020. Per the first letter, Subj: *F-35 SW Deliveries Using Agile Methods; Schedule Slips and "Technical Debt" per DOT&E, 2/16/20*. The letters cited findings by GAO and DoD DOT&E. Excerpts from the first letter follow:

- Software changes, intended to introduce new capabilities or fix deficiencies, often introduced stability problems and adversely affected other functionality.
- This "technical debt," especially the most significant deficiencies, should be addressed by the program to ensure the System Design and Development baseline configuration of software and hardware is stable, prior to introducing a large number of new capabilities to the software in the new hardware configuration associated with Block 4.

My letter to Smith, Subj: *HR 6395 EH, Sec. 1710N, Agile Program and Project Management (Agile P/PM); Maximum Viable Profit for Minimum Viable Product (MVP)?*, 10/6/20, included the following concern:

...the current policies, guidance, and regulations do not provide sufficient incentives to deliver the MVP within cost and schedule objectives and to reduce the technical debt. More importantly, the lack of disincentives or financial penalties provide no deterrence to contractors from continuing to receive undeserved award fees. Without more contractual definition and oversight, contractors are enabled to earn the Maximum Viable Profit despite delivering a subjectively defined and downwardly revised MVP.

In that letter, I requested an amendment to Sec. 1710N to require GAO to assess the effectiveness and use of incentive and award fees when Agile practices are used to acquire SW that is embedded in weapon systems and other military-unique hardware systems. Sen. Ernst received a copy of that letter and is on the subcommittee that drafted the provision.

Two additional letters to Smith provide more background. Copies were sent to DoD leadership.

*Subj: F-35 SW Deliveries Using Agile Methods; Schedule Slips and “Technical Debt” per DOT&E, 2/16/20 (copies to E. Lord and K. Fahey)*

*Subj: GAO Report: Continuing Failures of F-35 Block 4 SW Development and Agile Methods, 3/19/21 (copy to K. Hicks; contains references to additional, cogent letters)*

The referenced letters and this letter may be downloaded from [www.pb-ev.com](http://www.pb-ev.com) at the Acquisition Reform tab.

### **Status of F-35 SW Modernization**

The F-35 program is over budget and behind schedule. One symptom is the F-35’s Block 4 technical debt. A summary of the reported open deficiencies in the technical debt reveals disturbingly little progress, as follows.

<b>F-35 Block 4 SW Technical Debt</b>		
<b>Date</b>	<b>Open deficiencies</b>	<b>Category 1 Deficiencies</b>
Nov. 2019	873	13
Nov. 2020	872	11
June 2021	864	8

“This (technical debt) may represent a forecast for future trouble as well. Such patterns may lead to technical debt which threatens the successful realization of the product vision.” The preceding assessment was published in a Technical Note (TN) published by the Carnegie Mellon University/SW Engineering Institute (CMU/SEI) which is a FFRDC.

### **Requested Oversight Amendment**

When developing the proposed amendment, I used GAO-20-590G *GAO Agile Assessment Guide* (Agile Guide) as a source. The Agile Guide is intended to address generally accepted best practices for Agile adoption, execution, and control. The Agile Guide used information from four of my articles or tutorials. Those references provide additional, in-depth, detailed information for acquisition reform. The references in Agile Guide are also available at the “Articles and Tutorial” tab of [www.pb-ev.com](http://www.pb-ev.com). The references follow.

**Solomon**, Paul J. “Agile Earned Value and the Technical Baseline” *Managing for Success*. The Data & Analysis Center for Software. (September 2009.)

———. “Basing Earned Value on Technical Performance.” *CrossTalk*. (January 2013.)

———. Software Engineering Institute. “Using CMMI to Improve Earned Value Management.” *Software Engineering Process Management*. Pittsburgh, Pennsylvania: Carnegie Mellon University, Software Engineering Institute. (October 2002.)

———. *Tutorial: Integrated Systems Engineering with Earned Value Management and Program Management, Contractually and Practically*. NDIA Systems Engineering Conference. Tampa, Florida: October 22, 2018.

## **Need for Amendment and Acquisition Reform**

I predict that the findings and recommendations in the FFRDC study, as well as the previous findings by GAO and DOT&E, will inform DoD of the need to improve DoDI 5000.87, SW Acquisition and DoDI 5000.02.

There is a need to improve instructions and guides regarding

- Technical debt
- Lack of performance targets for SW metrics
- Agile SW metrics provide insufficient insight into quality and schedule performance

There is also a need to improve DoDI 5000.88 regarding requirements traceability, maintaining the performance measurement baseline when using Agile methods, and rework.

## **Proposed Amendment to NDAA for FY 2022**

Please consider submitting an amendment to the NDAA which addresses the product backlog in addition to the technical debt, as follows.

1. Specify the SEI as the preferred FFRDC.

2. Request SEI to assess the following when Agile practices are used on the F-35 program and other programs to acquire SW that is embedded in weapon systems and other military-unique hardware systems:
  - Does the contractor maintain traceability in requirements decomposition from the source requirement (e.g., feature) to lower-level requirements (e.g., user story) as well as from the road map to the prioritized backlog?
  - Are metrics identified and tracked that are used to impact decision making? Do the metrics allow traceability from the road map through releases and items in the product backlog?
  - The extent to which award/incentive fee criteria are used that are dependent on:
    - a. Achieving the goals and features of each software iteration and increment in the Product Roadmap (or backlog) on a timely basis and
    - b. Reducing the total open deficiencies in the technical debt, especially Type I or critical deficiencies.

### **Proposed Revisions to Adaptive Acquisition Framework (AAF)**

Neither DoDI 5000.87 nor the other acquisition policies and guides in the AAF cover the use of incentive or award fees to “acquire products...that satisfy user needs with measurable and timely improvements to mission capability, material readiness, and operational support, at a fair and reasonable price” (DoD Directive 5000.01).

Consequently, please consider the following remedy.

Revise DoDI 5000.02, “Operation of the AAF,” to add award/incentive fee criteria that are dependent on:

- a. Achieving the goals and features of each software iteration and increment in the Product Roadmap (or backlog) on a timely basis and
- b. Reducing the total open deficiencies in the Technical Debt, especially Type I or critical deficiencies.

### **Here to Help**

I offer to support your team or SEI, *pro bono*. I was a “Visiting Scientist” at the SEI. I published the technical note referenced in the Agile Guide and was on a team that assessed similar problems with failed IT modernization at the IRS. I also was a consultant to the IT industry in India as well as to Samsung. (See article, *Performance-based EV in Commercial IT Projects*, 2020 Issue No. 2.) I also have a letter of appreciation from Sen. McCain for support to the SASC on acquisition reform and F-35 oversight.



Paul Solomon  
818-212-8462

CC:

Sen. Joni Ernst, SASC  
Chairman Adam Smith, HASC  
Kathleen Hicks, Dep. Sec. of Defense  
Anthony Capaccio, Bloomberg News  
Michael LaForgia, NYT