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September 27, 2021

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

Subject: Support for Two USD(A&S) Goals

Dear Under Secretary Kausner:

Your mission statement includes six goals that drive delivery of your mission. Please consider my recommendations that support components of two of those goals:

Goal 4: Capability

Increase Weapon System Mission Capability While Reducing Operating Cost

- Improve F-35 Execution (e.g., development..)

Goal 6 Development

- Transform the way We Train and Develop the Acquisition Workforce

**F-35 Block 4 Software (SW) Development, Agile Methods, and Technical Debt**

I covered F-35 Block 4 SW issues in letters dated August 6, August 10, and September 15 and in my letter to Chairman Smith dated August 13. The SASC recently addressed technical debt in its report to accompany NDAA for FY 2022, Section 852, Independent study on technical debt in software-intensive systems.

Per the report, accumulation of “technical debt” is common and has resulted in behind schedule deliveries of needed capabilities and cost overruns. Also, “technical debt” in software systems reflects the use of design approaches that are expedient and lower cost in the short term, but that create a system that increases costs to sustain and maintain the systems over time. This also leads to increasing delays in delivering new features and an inability to fix software defects, vulnerabilities, and design issues due to increasing and often unintended system complexity.

The Agile problems, including the “technical debt” issue, were first reported by the DOT&E in its FY2019 DOT&E Annual Report, Jan. 30, 2020, and in subsequent GAO reports, and legislative oversight hearings. I also covered Agile methods and technical debt in letters to you and other DoD policy makers, the SASC, and the HASC. Now, I am recommending that you implement specific revisions to the DoD Earned Value Management System Interpretation Guide (EVMSIG) which will improve situational

awareness of program status and assessment of the cost, schedule, and technical performance of programs for proactive course correction.

EVMSIG is obsolete. It was published in 2018, before the new AAF policies. Also, it lacks guidance to address the development of embedded software and the use of Agile methods. EVMSIG should be revised to incorporate best practices from GAO guides and to be consistent with AAF policy and DoD instructions. The sources of proposed EVMSIG revisions are in Attachment A, Sources.

The recommendations regarding F-35 development are also applicable to other programs including:

- Software-intensive major capability acquisitions that use Agile methods
- Technical debt issues raised by the SASC, DOT&E, and GAO

Attachment B is a table of requested EVMSIG revisions that are consistent with GAO best practices and AAF policies. A revised EVMSIG will enable improved situational awareness of the F-35 program and all similar programs.

### **Transform the way We Train and Develop the Acquisition Workforce**

My letter to DAU Pres. Woolsey, dated Sept. 14, includes a recommendation to overhaul training and development of the acquisition workforce. The white paper attached to that letter, entitled "The DoD Adaptive Acquisition Framework and Project Management Standards," dated Sept. 13, provides guidance to implement the DAS policy, "Employ Performance Based Acquisition Strategies."

The white paper provides guidance to employ that strategy and to select standards of the Project Management Institute for program and project management (P/PM) training. The overhaul will also support DoD objectives to attract new companies with emerging technologies and to ensure supply chain resiliency.

The cited documents may be downloaded from [www.pb-ev.com](http://www.pb-ev.com) at the Acquisition Reform tab.

I previously supported Katrina McFarland in similar efforts and would be pleased to help you achieve your goals.



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CC:

Chairman Adam Smith, HASC  
Rep. Donald Norcross, HASC  
Kathleen Hicks, Dep. Sec. of Defense

Anthony Capaccio, Bloomberg News  
Michael LaForgia, NYT  
DAU Pres. James Woolsey

## Attachment A Sources of Proposed EVMSIG Revisions

### GAO-20-590G GAO Agile Assessment Guide Excerpts

Includes metrics that measure the quality of the product delivered. For example, **technical debt** provides valuable information regarding the accumulation of deficiencies over time.

Include adequate budget and schedule for *rework* in the performance measurement baseline and integrated master schedule so these will also appear in EVM.

Some programs may assign rework to a separate planning package from the original task. Alternatively, adjustments to earned value can reflect that specific features were not completed or that rework is occurring.

**Burn-down chart:** A visual tool displaying progress via a simple line chart representing the remaining work (vertical axis) over time (horizontal axis). It shows where the team stands regarding completing the tasks that comprise the backlog items.

The accumulation of deficiencies over time, **technical debt**, can present obstacles to an Agile program if not properly managed. For example, as a code base grows, additional functions will rely on the deficient code, causing a degradation in overall system performance. Moreover, as the interest incurred on technical debt continues to rise, teams will devote more time to cleaning up errors instead of producing new features.

### GAO-20-195G GAO Cost Estimating Guide Excerpts

In planning the baseline, programs ought to consider the allocation of risk into the baseline up front—especially when addressing the issue of **rework** and retesting. Experts have noted that to set up a realistic baseline, anticipated rework could be included as a separate work package. Doing this accounts for a reasonable amount of rework while preserving the ability to track variances. Using this approach, programs should include rework in the budget baseline.

### DOD INSTRUCTION 5000.88, ENGINEERING OF DEFENSE SYSTEMS Excerpts

The PM will implement and describe in the Systems Engineering Plan a technical baseline management process as a mechanism to manage technical maturity, to include a mission, concept, functional, allocated, and **product baseline**.

### DoDI 5000.87 OPERATION OF THE SOFTWARE ACQUISITION PATHWAY Excerpts

Use an iterative, human-centered design process to define the **minimum viable product** (MVP).. Insights from MVPs help shape scope, requirements, and design.

Technical debt consists of design or implementation constructs that are expedient in the short term but that set up a technical context that can make a future change costlier or impossible. Technical debt may result from having code issues related to architecture, structure, duplication, test coverage, comments and documentation, potential bugs, complexity, coding practices, and style which may accrue at the level of overall system design or system architecture, even in systems with great code quality.

**Attachment B**

<b>Proposed Revisions to EVMSIG</b>					
<b>GL</b>	<b>GL Title</b>	<b>Section</b>	<b>Is</b>	<b>Should be</b>	<b>Source</b>
1	Define the Authorized Work Elements	Purpose	...contracted work scope to support effective management and control of the program.	...contracted <b>product baseline and</b> work scope to support effective management and control of the program.	DoDI 5000.88
1	Define the Authorized Work Elements	Management Value	...WBS...ensure the entire scope of work is captured, defined, and subsequently allocated to the organizations responsible for the performance of the work. It facilitates data collection and traceability and provides a control framework for integrated program management, configuration management, work authorization, tracking, and reporting purposes.	...ensure the entire <b>product baseline and</b> scope of work <b>are</b> captured, defined, and subsequently allocated to the organizations responsible for the performance of the work. It facilitates data collection and traceability and provides a control framework for integrated program management, configuration management, work authorization, tracking, and reporting purposes.	DoDI 5000.88
1	Define the Authorized Work Elements	Intent of Guideline	The WBS must also include all subcontracted work scope. A well-developed WBS provides the program manager with a framework that defines all contract work scope (e.g., Statement of Work, Design Build Specifications, etc.) and technical criteria.	The WBS must also include all subcontracted work scope <b>and planned rework</b> . A well-developed WBS provides the program manager with a framework that defines all contract work scope (e.g., <b>product baseline,</b> Statement of Work, Design Build Specifications, etc.) and technical criteria.	GAO-20-195G, GAO-20-590G, DoDI 5000.88

Proposed Revisions to EVMSIG					
GL	GL Title	Section	Is	Should be	Source
1	Define the Authorized Work Elements	Typical Work Products	<ul style="list-style-type: none"> <li>Traceability matrix from Government requirements (e.g., SOW, Build Specifications) to WBS</li> </ul>	<ul style="list-style-type: none"> <li>Traceability matrix from Government requirements (e.g., <b>Product baseline, product backlog, minimum viable product</b> (MVP), SOW, Build Specifications) to WBS</li> </ul>	DoDI 5000.88,  DoDI 5000.87
6	Scheduling Work	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>Roadmap</li> <li>Prioritized backlog</li> <li>Epics and features in program schedule</li> </ul>	GAO-20-590G
7	Identify Products and Milestones for Progress Assessment	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>Product backlog</li> <li>Burndown charts</li> <li>Technical debt</li> </ul>	GAO-20-590G
8	Establish the Performance Measurement Baseline	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>Product backlog</li> <li>Epics and features in program schedule</li> </ul>	GAO-20-590G
10	Determine Discrete Work and Objective Measures	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>Product backlog</li> <li>Epics and features in program schedule</li> </ul>	GAO-20-590G
14	Identify MR and UB	Intent of Guideline	Scope and associated budgets that may reside in UB include:	Add to Intent: <ul style="list-style-type: none"> <li>Planned rework</li> </ul>	GAO-20-195G,  GAO-20-590G
22	Calculate Schedule Variance and Cost Variance	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>Product backlog</li> <li>Epics and features in</li> </ul>	GAO-20-590G,  DoDI 5000.87

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<b>GL</b>	<b>GL Title</b>	<b>Section</b>	<b>Is</b>	<b>Should be</b>	<b>Source</b>
				program schedule <ul style="list-style-type: none"> <li>• Burndown charts</li> <li>• Technical debt</li> </ul>	
26	Implement Corrective Actions	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>• Product backlog</li> <li>• Technical debt</li> <li>• Burndown charts</li> </ul>	GAO-20-590G,  DoDI 5000.87
27	Maintain Estimates at Completion	Typical Work Products		Add to Typical Work Products: <ul style="list-style-type: none"> <li>• Rework</li> <li>• Product backlog</li> <li>• Technical debt</li> <li>• Burndown chart</li> </ul>	GAO-20-195G,  GAO-20-590G,  DoDI 5000.87