Outcome-based Metrics Plus SE = Integrated Program Management, Rev. 10

—Paul Solomon 1/3/2025

Note: This revision incorporates guidance from the PMI *PMBOK® Guide 8th Edition Exposure Draft.* The previous revision referenced the 7th Edition. It includes improved information regarding the product scope, requirements status, and requirements traceability, as follows.

- Plan Scope Management: documents how the project and ***product*** scope will be defined, validated, and controlled.
- Requirements Traceability Matrix: Typical requirements attributes….include…current status (e.g., active, canceled, deferred, added, approved, assigned, completed) and status date. Additional attributes…may include…acceptance criteria.
- The status of configuration management activities.
- Backlog: Including the product requirements and user stories.

More than 20 years ago, the founding fathers of the Earned Value Management System (EVMS) stated their visions for the then-pending EVMS Standard to replace the DOD document, "Cost/Schedule Control Systems Criteria," which had been used since 1967 for capital acquisitions. Their visions, stated below, have not been realized.

A path to effective, Integrated Program Management (IPM) should include changes to regulations and policy to no longer require EVM. However, if EVM is used, it must be linked with systems engineering (SE), the product scope (features and functions), technical performance measurement (TPM), other outcome-based metrics, and risk management. The path should support current policy of the OMB and Office of Personnel Management (OPM). The path should include elimination of the OMB policy and FAR/DFARS requirement for compliance with the EVMS Standard, EIA-748. Instead, DOD should revise, streamline, and transform the "DOD Earned Value Management System Implementation Guide" (EVMSIG) and provide incentives for contractors to use it as a "Government-unique, internal standard."

The path includes the following DOD and OMB actions:

1. DOD tailors and streamlines the *EVMSIG* to incorporate recommendations provided below, called "EVMS-lite." Tailoring reduces the number of guidelines to be covered by compliance reviews from 32 to 20 and modifies five guidelines to emphasize technical performance and to augment "work scope" by adding the product scope including acceptance criteria, rework, technical debt, and risk responses. This will result in significant cost savings.
2. DOD requests to OMB, through the National Institute of Standards and Technology (NIST), that EIA-748 be sunsetted.
3. OMB approves DOD request to sunset EIA-748 based on criteria in OMB Circular A-119 (Circular).
4. OMB revises Circular No. A–11 (2020), *Capital Programming Guide.* Currently, *Capital Programming Guide* cites the EVM standard, EIA-748. For example, it states "the other requirements for good project management, including the use of EVM in accordance with the EIA-748 standard are applicable for development efforts or multiple projects in a program." OMB should develop a plan to sunset the use of the EIA-748 standard and replace it with the proposed "Government-unique," internal standard, as discussed below.
5. DCMA discontinues compliance reviews of EVMS Guidelines.

6. DOD issues policy and guidance to provide incentives for program managers and contractors to link EV, if used, to TPM, product scope, and risk management.
7. DOD issues policy and guidance to provide incentives for contractors to achieve verified cost, schedule, and technical performance objectives and to prohibit payment of award fees when programs are over budget or behind schedule by pre-defined thresholds. The TPMs used for award fee determination shall include some of the specific, measurable, achievable, relevant, and time-bound measures that are included in the SE Plan Outline Version 4 (SEP), Engineering of Defense Systems Guidebook, Feb. 2022 (Eng Guidebook), SE Guidebook, Feb. 2022 (SE Guidebook), DODI 5000.87, and GAO Guides.
8. DOD revises policies, directives, instructions, and guides to incorporate these recommendations.
9. DOD deletes DFARS clause, add guidance for using the Government-unique, internal standard that is proposed below, and make the SE Management Plan (SEMP) a contractual requirement.
10. DCMA eliminate EVMS compliance reviews and develop policies and procedures to increase review of contractors' employment of best practices for SE and IPM. See recommendations that are consistent with the departing EIA-748 compliance reviews in Appendix A.

Federal law, OMB policy, OPM policy, and recent DOD acquisition reform initiatives signal that the federal government and DOD have started down that path. However, the current law, policies and initiatives and plans are insufficient to integrate cost, schedule, technical performance, and risk management.

Failed Vision

The vision of the founding fathers was formulated in 1996 and translated into the acquisition reform objectives of Senators McCain, Collins, McCaskill, and Ernst, and HASC Chairmen Ike Skelton and Adam Smith.

The intended purpose of an EVMS was announced when DOD accepted industry guidelines for EVMS to replace similar DOD criteria in 1996. DOD encouraged industry to develop a *widely accepted industry or international standard*. Per the announcement, "It has been our vision of acquisition reform to":

- *Adopt … commercial practices in lieu of practices unique to the government.*
- *Rely on our contractors to maintain management control systems that protect the public interest.*
- *Shift responsibility from government to industry.*
- *Support the "insight, not oversight" philosophy underlying DOD acquisition reform initiatives.*

In 1999, Gary Christle, one of the founding fathers of EVM, stated his vision in terms of the following:

- The quality of a management system is determined not by the absence of defects, but by the presence of *management value*.
- *Integrate* cost, schedule, *technical performance*, and *risk management.*

In 2009, DOD submitted a report to Congress which assessed the use of EVM. The report was required by the Weapon Systems Acquisition Reform Act of 2009 (WSARA), introduced by Sen. McCain. The report, *DOD EVM: Performance, Oversight & Governance Report* (DOD Report) reiterated Christle's vision and augmented it with objectives regarding the quality of work performed and the integration of SE processes and products with EVM.

In 2014, DOD published the 2014 PARCA Report which stated: "PARCA believes that earned value metrics and technical metrics such as TPMs should be consistent with program progress. Earned Value focuses on the completion of a set of tasks to mature the design. It should be consistent with the set of metrics that indicate the actual **design maturity."**

In April 2021, Stacy Cummings, Acting Asst. Undersecretary of Defense for Acquisition and Sustainment, stated to the Senate Armed Services Committee:

> "Congress removed the burden of resource-heavy reporting requirements of EVM in pilots, resulting in greater focus on delivering working product and value over documentation."

Today, the vision of the founding fathers, as clarified by the DOD and PARCA Reports, has still not been achieved. Focus on the **product** was recently augmented by Ms. Cummings. The vision is sharp and well-defined. However, industry and DOD have either obstructed or declined to take actions that will contractually require IPM.

EIA-748 Not Widely Accepted as a Commercial Practice

Despite the unsubstantiated claim in the DOD EVMS Interpretation Guide, EIA-748 is not a widely accepted industry best practice that is used across the commercial sector. A worldwide survey of EVM users by the PMI, in 2010, disclosed that the private sector has largely ignored EIA-748. When the use of EVM is voluntary and not a contractual mandate, only 17 percent of the respondents used EVM based on EIA-748.

The most recent survey is the *Grant Thornton 2016 Government Contractors Survey.* Seventy percent of respondents stated they would not use EVMS if not required to do so. Twenty-eight percent reported having contracts that require use of EVMS. Of those using EVMS, only 37 percent believe it to be a cost-effective management tool and only 25 percent would adopt EVMS voluntarily.

So, retention of EIA-748 does not support overarching policy in DODD 5000.01, *The Defense Acquisition System* (DAS), that program managers adopt best *commercial* practices that reduce cycle time and cost.

The NDAA for FY 2024, Section 827, establishes a beachhead towards following adopting commercial practices by requiring removal of the DFARS EVMS requirement for software contracts. DAS policy.

Absence of IPM

The failures of EIA-748 to link technical performance (Quality Gap), risk management, and product requirements (product scope or technical baseline) with EVM were first targeted in Software Engineering Institute (SEI) Technical Note CMU/SEI-2002-TN-016, "Using CMMI to Improve Earned Value Management," October 2002. These issues were repeated in the November 2010 article in *Defense AT&L Magazine*, "Earned Value Management Acquisition Reform." A white paper that I submitted as a consultant to PARCA and HQ NAVAIR in 2012 includes recommended revisions to DOD instructions and guides and to DFARS. The white paper included the following Executive Summary.

> **"Executive Summary:**
>
> *This project was undertaken to improve the use of EVM within DOD. EVM can be a better program management tool if contractors revised their processes and reports to consistently integrate technical performance with cost and schedule performance and to utilize SE best practices. However, there are no contractual requirements within the acquisition regulations or Data Item Descriptions (DID) to require the following enablers of IPM:*
>
> 1. *Tie the technical baseline to the EV Performance Measurement Baseline (PMB) and*
> 2. *Tie technical progress to the Technical Performance Measures (TPM) of the program.*
>
> *This project was undertaken to address EVM challenges that were addressed in the DOD Report."*

Some of the recommendations to PARCA regarding TPM have been incorporated into DOD "guidance" (DODI 5000.02, Eng Guide, SE Guide, and EVMSIG). However, contractors normally choose not to link EVM to TPM when they don't have to.

Evidence that the Quality Gap still exists was provided by the DCMA and by a DOD advisory panel.

In April 2016, DCMA reported a common, EVM finding of a lack of objective measures to assess performance, including **"**Measurement does not indicate technical accomplishment." Despite that report, both the DCMA EVMS compliance procedures and the DCMA EVMS Compliance Metrics (DECM) are silent on technical performance.

The NDAA for FY 2016, Section 809, directed establishment of an advisory panel (Panel) with a view toward streamlining and improving the efficiency and effectiveness of the defense acquisition process and to make recommendations for the amendment or repeal of regulations. In 2018, the Panel reported that "another substantial shortcoming of *EVM* is that it *does not measure product quality.* A program could perform ahead of schedule and under cost according to EVM metrics but deliver a capability that is unusable by the customer…Traditional measurement using EVM provides *less value* to a program than an Agile process in which the end user continuously *verifies that the product meets the requirement*." (*Section 809 Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations*, Vol. 1, January 2018 (Section 809 Report).

NDIA Enables the EIA-748 Quality Gap and Misuse of Management Reserve (MR)

The NDIA permits the quality gap (between EVM, the product scope, and technical performance) in its guidance documents, the *NDIA EVMS EIA-748-D Intent Guide* (*Intent Guide*) and the NDIA guides:

- *A Guide to Managing Programs Using Predictive Measures* (*Predictive Measures*)
- *An Industry Practice Guide for Integrating Agile and Earned Value Management on Programs, December 9, 2022 Version 1.4 (NDIA Agile Guide)*

Furthermore, *Predictive Measures* and *Agile Guide* provide misleading guidance that, if the program is behind schedule in meeting technical performance goals, it can utilize "***more budgets*** …to take corrective action" including additional budget for a feature that was closed but now requires rework.

Intent Guide

Compliance with EIA-748 guidelines does not provide assurance that the technical specifications (product scope) are part of IPM and the WBS. Excerpts from *Intent Guide*:

- Performance measures are one aspect of an IPM as **other processes control the quality and technical content of the work performed.**
- The WBS Dictionary online form may be used to describe the scope of work for all WBS elements. This description ***should*** include, but is not limited to, specific details such as…***technical specifications***.

Predictive Measures

Compliance with EIA-748 guidelines does ***not ensure*** that reported cost and schedule variances reflect the true behind schedule condition or that ***MR will not be used*** to provide more budget to offset cost overruns and corrective actions.

Excerpts from *Predictive Measures*:

1. For any Key Performance Parameter that is not within the allowed limits at a ***specific time*** in the program, more work and ***more budgets**** will be needed to take corrective action. As a result, the EVM metrics must be assessed to confirm that they reflect this *out-of-compliance* condition for the TPM.

   *My comment: Disagree. Meeting the technical objectives is behind schedule. That does not justify adding budget from MR.

2. An example of using the TPM to make ***EVM adjustments*** is shown in Figure 36.

   My comment: Agree. Negative EVM adjustments are appropriate.

3. The TPM's technical compliance is then used to calculate a **"*TPM Informed*" BCWP**…This BCWP is ***not the one reported in the IPMR or the IPMDAR,*** but it is used to inform the program decision makers of the confidence in the IPMR or IPMDAR values.

   My comment: Disagree. The "TPM Informed" BCWP should be formally reported to link EVM with technical performance and provide true variances.

NDIA Agile Guide

The NDIA Agile Guide contains erroneous and misleading guidance regarding rework.

The Introduction states:

"None of the best practices discussed in this Guide negate any of the fundamental practices described in EIA 748 (or) EVMSIG." This claim is inconsistent with those documents when applied to rework or additional effort "discovered on a feature after that feature is closed and signed off by the product owner." Agile Guide states "If the previously completed and closed Feature Work Package truly requires rework, one solution could be to consider opening a new work package in a new release, based on the placement of the rework in the Product Backlog and determine the source of the budget to complete the scope." However, EIA-748 and EVMSIG are silent on rework except for discussion of the material accounting system.

There is no other potential source of budget to complete the deferred scope other than the original control account. In my opinion, MR cannot be that source unless the risk of rework was identified, documented in the risk register, quantified, and included in the establishment of MR budget. If the budget for the newly identified rework is transferred to another work package, then the schedule variance should be retained by making a negative adjustment to cumulative earned value and transferring the budget to complete the scope to the current or subsequent month of the receiving work package. Thus, a schedule variance will be reported that reflects true technical accomplishment of the original PMB.

This rework guidance should be applicable to the whole contract SOW, not just work for which Agile methods are employed. From my experience, contractors often use MR to budget additional tests, rework of code or drawings, trade studies etc. that were not in the original PMB or in identified risks within MR.

It is recommended that:

- NDIA revise EIA-748 and its NDIA Agile Guide to properly account for rework and technical debt.
- DoD revise pertinent IPM guidance to account for rework and technical debt.
- DCMA review guidance and practices verify that contractors properly account for rework and technical debt.

Little Insight and Management Value

The EVM reports submitted by contractors who are compliant with EIA-748 provide little insight and management value to program managers, as discussed below.

2009

Per the DOD Report, the "utility of EVM has declined to a level where it does not serve its *intended purpose*" and contractors "keep EVM metrics favorable and problems hidden." Regarding the reliability of contractor's data, the reported stated, "If good TPMs are not used, programs could report 100 percent of EV even though behind schedule in validating requirements, completing the preliminary design, meeting the weight targets, or delivering software." The DOD Report also stated:

- The program manager should ensure that the EVM process measures the quality and technical maturity of technical work products instead of just the quantity of work performed.
- SE and EVM should be integrated and not stove-piped.

Per the Congressional Record, May 6, 2009, Sen. Susan Collins stated that the GAO observed that contractor EVM reporting lacks consistency and leads to inaccurate data and faulty application of the EVM metric. "In other words, garbage in, garbage out." Collins stated that "With improved EVM data quality, both the government and the contractor will be able to improve program oversight, leading to better acquisition outcomes." She concluded that "I believe this amendment (regarding EVM), Senator McCaskill, and I offer would help to strengthen the Department's acquisition planning, increase and improve program oversight, and help to prevent contracting waste, fraud, and mismanagement." WSARA directed DOD to submit a report to Congress which assessed the use of EVM.

2010

HASC Chairman Ike Skelton marked up the NDAA for FY 2011 to require DOD to review acquisition guidance, including DOD Instruction 5000.02, to "consider whether measures of quality and technical performance should be included in any EVM system.

Per the HASC Panel on Defense Acquisition Reform Final Report, March 23, 2010, one of the primary tools the Department does use for performance measurement (***though not currently for true performance management***) is the EVMS. USD AT&L Dr. Ash Carter recently reported to Congress that the Department intends to improve EVMS and expand on its use to allow for it to become a ***true performance management tool.*** EVMS has experienced a number of issues, notably with contractor implementation and ***data quality***.

2018

The Section 809 Report concluded that "EVM has been required on most large software programs but has not prevented cost, schedule, or performance issues."

2024

2024 GAO Report, GAO-24-105503 Navy Shipbuilding Could Improve Timeliness of Deliveries, May 2024, found that Navy programs measured their achievement of design maturity varied but typically reflected percentages of design drawings or design-specific contract deliverables expected to be submitted at key milestones before construction. Navy shipbuilders noted that using this type of metric does not necessarily provide a clear understanding of overall design maturity. For example, the metrics may overstate design completeness by giving builders credit for submitting design-related documentation without fully accounting for the quality or completeness of associated design. Drawings that appear complete could include design placeholders that lack necessary vendor-furnished information (VFI) for key equipment and, consequently, mask design uncertainties and remaining design work. Further, Navy officials noted cases where builders submitted blank design products, which met the submittal deadline to the Navy but did not contribute to advancing design maturity. See "Fallacy of % Complete EV Technique," below.

Today

In my opinion, DCMA EVMS compliance reviews provide false assurance that the contractor IPM Reports convey valid, reliable information. A contractor may be found compliant with Guideline 7 if its progress assessment is based only on the *quantity* of work performed and *not technical performance*.

Contractors are reimbursed for costs incurred to perform the *work* scope regardless of progress towards achieving the acceptance criteria of the *product scope* because cost-reimbursement contract vehicles are "best efforts" contracts. The "best efforts" clause ensures that the government bears the risk that it will receive nothing for the costs expended except contractor's best efforts. Nonetheless, contractors should be required to report progress towards completing the product scope even if being reimbursed for all costs to perform the work.

The lack of focus on product in the procurement process was discussed in Volume 2 of the Section 809 Report. Per Volume 2, "The current system focuses on process, not product. Former ASN(RDA) Sean Stackley said this focus takes PMs' attention away from the fundamentals of cost, schedule, and performance, and is one of the major contributors to negative acquisition outcomes. This perspective is shared by many stakeholders with whom the Section 809 Panel met and was aptly described by one stakeholder as "mission becoming secondary to perfection of the contract."

EVM is costly but has never been validated as cost-effective. *JSCC*, released by DOD on October 3, 2017, was a research effort to identify EVM cost drivers and value and to investigate the cost premium of additional Government requirements associated with EVM. Per Figure 30 of *JSCC*, 27 % of all survey data points identified a High to Medium cost premium to comply with Government EVM Standards. Of those respondents that identified a High to Medium cost premium, 48% were Government Program Management stakeholders.

Commission on PBBE Reform

The bipartisan, Legislative Commission on Planning, Programming, Budgeting, and Execution (PPBE) Reform published its Final Report on March 6, 2024. In Section X, Required Assessments and Findings, the report's assessment of DoD's use of performance metrics include:

1. These metrics provide information only on the pace of spending, not on the *value received.*
2. EVM systems *purport* to assess expenditures against established delivery benchmarks but have *long been criticized as easily manipulated and inadequate to the task*.

The Final Report included Recommendation 7: Improve understanding of private sector practices.
The DoD PPBE Implementation Plan (PPBE Plan) for Recommendation 7 includes:

1. Engaging with industry to obtain operationalize understanding of best practices within the private sector
2. Promote awareness among DoD stakeholders to enhance decision-making capability.

The GAO report, GAO-20-44 *Improving Program Management*, provides compelling information to justify a change to OMB and DoD policy regarding EIA-748. The report cites Project Management Institute (PMI) documents, which includes *PMBOK® Guide Seventh Edition and the PMBOK® Eight Edition Exposure Draft* (PMBOK 8th draft), as:

1. Widely accepted standards for IPM
2. Utilized worldwide
3. Generally recognized as leading practices for IPM
4. Approved by ANSI

The PBBE Plan states that it must be established that each individual recommendation will improve the Department's processes significantly enough to justify any additional cost to taxpayers for implementation and sustainment. Although there will be implementation costs to adopt private sector best practices, the sustainment cost savings, including elimination of EVM compliance costs, will be substantial. Additional information is provided below in the section, Cost Estimate for *EVMS-lite* (Lower Costs).

Hudson Institute Report, ***Compiling Advantage: Unlocking the Competitive Power of Software Adaptability***

The Hudson Institute Report, *Compiling Advantage: Unlocking the Competitive Power of Software Adaptability*, by former USD Ellen Lord & Dan Patt, March 29, 2024, identifies the key roadblocks in the current system and highlights promising developments and best practices for DoD to get "software right."
Highlights of the Report follow:

- Lower the barriers to entry to get software and updates on operational systems and networks.
- Foster a culture of innovation and agility, and possibly unleash a new industrial base.
- Monitor progress with milestones, burndown charts, and even agile management tasks. (Cites Gergely Orosz, "*What Changed in 50 Years of Computing: Part 1*," The Pragmatic Engineer (blog), March 12, 2024):
    - Don't confuse *effort* with *progress*. It's well understood that hitting milestones is what matters, not how much time an engineer spends writing code. *At least it is at better companies!*
    - The progress of projects is better monitored with milestones, burndown charts, or even JIRA tasks.

To paraphrase the Hudson Institute message, "Buy Products that Work, not SOWs."

HASC Vice Chair Robert Wittman Video Cast

HASC Vice Chair Robert Wittman participated in a video cast, "The Future of the Defense Industrial Base," on April 30, 2024. Regarding contracts, he stated:

"Look at how contracts are put together. You focus on performance, you focus on outcomes, you focus making sure that we are staying on time and on schedule. You have to create some incentives there to make sure that we are doing that.

Our job is not about process. It's about outcomes.

Industry Warnings of Poor Contractor Behavior and EVM Metrics

Even the defense industry has warned that contractors may provide unreliable EVM metrics. A NDIA Letter to DOD, May 11, 2007, with its attached position paper, "Award Fee Incentive Provisions Using EVM Reporting," admitted that:

"in recent years, some defense contracts have misused these incentives (to achieve program contractual outcomes) by tying achievement of certain EVM cost and schedule metrics to award and incentive fees and thereby ***sacrificing objective program status reporting*** in favor of ***"making the number."***…A greater risk posed by the use of these monthly incentives is that they can provide the wrong focus (i.e., ***management of data and reports***). Managing a program using these data outcomes could cause contractors to …taking other ***actions that might be less than optimal in order to maintain high ratios between budgeted cost and schedule and actuals***…EVM will reveal the truth about a program but meanwhile at-completion projections become constrained and ***project managers will not receive reliable information on contract status throughout most of the Program.***"

A similar warning was issued by Council of Defense and Space Industry Associations (CODSIA) in a letter to DOD, Ref: DOD Report to Congress on Implementation of EVM: Request for Industry Input, July 2, 2009. CODSIA warned that incentivizing contractors based on performance data could promote "poor behavior." The pertinent CODSIA excerpt follows:

"In addition, inappropriate contractual incentives, such as focus on incentivizing or penalizing contractors based on performance data, ***promote poor behavior*** in the establishment of program baselines and EVMS implementations. An example would be the continuing use of incentives based on reported performance metrics, such as the cost performance index (CPI) and/or schedule performance index (SPI).

Law: Project Management Standard

Legislation to require the use of a project management standard was the Program Management Improvement and Accountability Act of 2016 (PMIAA). It requires OMB to:

1. Adopt and oversee implementation of government-wide standards, policies, and guidelines for IPM for executive agencies;
2. Establish standards and policies for executive agencies *consistent with* **widely accepted standards for program and project management** (IPM) *planning and delivery*;
3. Establish a 5-year strategic plan for program and project management.

Senator Joni Ernst, one of the sponsors of the PMIAA, expressed her legislative intent in a November 2015 press release. "This bipartisan legislation puts our federal government back on track by streamlining efforts and outlining strategies to correct widespread deficiencies, lax oversight and unnecessary cost overruns incurred by preventable delays in meeting stated program goals and deadlines. By adopting ***widely accepted*** management standards that are ***often used in the private sector***, these commonsense reforms ensure that taxpayer dollars are safeguarded by increasing accountability throughout the federal government. I'm delighted that my

colleagues in the Senate recognize the epidemic of mismanagement that's eating away at the effectiveness of our federal government." Clearly, it was *not* her legislative intent to continue the mandate for EIA-748, a standard that is not used in the private sector.

Also, in 2015, per Senate report 114-162, Sen. McCain showed his interest by offering an amendment to require the GAO to "issue a report examining the effectiveness of the legislation on improving Federal IPM in conjunction with the annual GAO High Risk list."

I have taught EVM to commercial IT companies in India and South Korea for use on fixed-price, product development IT contracts. Their EVM processes and best practices were based on PMBOK® Guide, the only ANSI-accredited project management standard that includes the "product scope" (technical baseline). EIA-748 includes only the "work scope" and is silent on product requirements and risk management. Pertinent IT companies' best practices are described in my article in *The Measurable News*, "Performance-Based EV in Commercial IT Projects," 2010 Issue No. 2.

The best practices of one of these companies, Samsung SDS, include:

1. Defining the requirements baseline for each planned product release
2. Tracing the requirements baseline to the schedule and work packages
3. Tracking status of each requirement
4. Monitoring technical performance with meaningful variance analysis
5. Accounting for deferred functionality
6. Planning and measuring rework
7. Making negative adjustments to EV for accurate status

Regarding rework, the *GAO Schedule Assessment Guide* includes guidance for out-of-sequence activities, such as rework, and the need for knowledge of products from an incomplete predecessor activity to be available to the successor activity.

Applicability to DOD

PMIAA gave a potential waiver to DOD by stating it is not applicable to DOD "to the extent that the provisions…are substantially similar to or duplicative of…policy, guidance, or instruction of the Department related to program management.''

However, current DOD policy, guidance, and instruction related to program management and EVM are *not similar* to or consistent with the ANSI-accredited guide for IPM, *PMBOK® Guide.* Part 2 of the *PMBOK® Guide* is accredited by the ANSI and must be updated every four to five years. The assertion of dissimilarity was made in the November-December 2015 *Defense AT&L* article, "A Contract Requirements Rule for Program Managers (PM)." A PM's needs that are covered by the *PMBOK® Guide* but are not mentioned in EIA-748 include the technical or product baseline, requirements management and traceability, risk management, and project procurement management.

PMBOK® Guide includes standards and principles that meet the needs of IPM but are *absent* from EIA-748 (Table 1). *PMBOK® Guide* covers traditional EVM topics including scheduling (including network diagrams), Performance Management Baseline, control accounts, work packages, earned value, variance analysis, estimate at completion, and MR.

Table 1. *PMBOK® Guide* Standards and Principles that are Absent from *EIA-748*	
Standard or Principle	**Description**
Plan Scope Management **PMBOK 8th draft**	The process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled.
Product scope description	**Documents the characteristics of the product that the project will be undertaken to create. Progressively elaborates the characteristics of the product.**
Product scope	**The features and functions that characterize a product.**
Requirements Documentation	**Requirements baseline; unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders. Components include, functional requirements, non-functional requirements, quality requirements, and acceptance criteria.**
Requirements	**Requirements become the foundation of the WBS. Cost, schedule, quality planning, and procurement are all based on these requirements.**
Requirements Management Plan	**Include…product metrics that will be used.**
WBS Dictionary	**Includes quality requirements, acceptance criteria.**
Scope Baseline	**Includes product scope description, project deliverables, and defines product user acceptance criteria.**
Control Scope	**The process of monitoring the status of the project and *product* scope and managing changes to the scope baseline. Completion of the *product scope* is measured against the product requirements.**
Configuration management **PMBOK 8th draft**	Configuration management activities…include identifying configuration items, recording and reporting their status.
Requirements Traceability Matrix **PMBOK 8th draft**	The requirements traceability matrix is a grid that links ***product requirements*** from their origin to the deliverables that satisfy them…The matrix provides a means to track requirements throughout the product life cycle. Attributes associated with each requirement can be recorded in the requirements traceability matrix….Typical attributes….may include…current status (e.g., active, canceled, deferred, added, approved, assigned, completed) and status date. Additional attributes…may include…acceptance criteria.
Backlog **PMBOK 8th draft**	The backlog reflects the current project needs, including the product requirements and user stories.

Conduct Risk Management	**Including planning, identification, risk analysis, response planning, and monitoring risk.**
Risk Responses in Baselines	**Schedule baseline. Changes in the schedule baseline are incorporated in response to approved changes in schedule estimates that may arise from agreed-upon risk responses.** **Cost baseline. Changes in the cost baseline are incorporated in response to approved changes in cost estimates that may arise from agreed-upon risk responses.**
Project Procurement Management	**Project documents that can be considered as inputs to this process include:** **1. Requirements documentation may include…technical requirements the seller is required to satisfy, and** **2. Requirements traceability matrix…links product requirements from their origin to the deliverables that satisfy them.** **3. Work Performance Data contains seller data on project status such as technical performance activities that have started, are in progress, or have completed; and costs that have been incurred or committed.** **4. Work Performance Information includes information on how a seller is performing by comparing the deliverables received, the technical performance achieved, and the costs incurred and accepted against the SOW budget for the work performed.**

Finally, the PMI maintains a certification program for expert use of the *PMBOK® Guide*. The experts receive the Project Management Professional (PMP) certification. Per PMI, "there are more than 1,000,000 PMP certification holders worldwide. They've earned universally recognized knowledge."

Currently, most contractors obtain specialized training for their employees to implement or maintain the narrowly used EIA-748 or hire consultants. The transition to a widely accepted standard may increase the supply of resources, reduce the training and salary costs for DOD EVM process specialists, and reduce program management costs.

Consequently, either a plan to adopt private sector best practices or a plan to incentivize contractors to employ a Government-unique standard that is consistent with the PMI documents and includes a tailored set of EVMS guidelines, is recommended. For federal agencies other than DOD, the first step down that path was the PMIAA mandate to OMB to establish standards and policies for executive agencies consistent with widely accepted standards for IPM planning and delivery. For DOD, the Section 809 Panel took the first step down that path with its recognition that EVM does not measure product quality.

Agencies Should Abandon Use of EIA-748 because it is Impractical

The EVMS Standard was originally developed to be a VCS, as defined by *OMB Circular A-119, Federal Participation in the Development and Use of VCSs and in Conformity Assessment Activities* (Circular). Circular states that "all federal agencies must use VCSs in lieu of government-unique standards in their procurement and regulatory activities, ***except*** where … ***otherwise impractical.***" "Impractical" includes circumstances in which such use would fail to serve the agency's…program needs; be inadequate, or be less useful than the use of another standard.

Federal agencies should decide not to use EIA-748 as a VCS for IPM because it is impractical based on the following evaluation factors in Circular:

1. The prevalence of the use of the standard in the national and international marketplaces.
2. The problems addressed by the standard and changes in the state of knowledge and technology since the standard was prepared or last revised.

EIA-748 is "***otherwise impractical***." It is not used prevalently in the national and international marketplaces by commercial enterprises. Most importantly, EIA-748 does not address the state of knowledge and technology since it was last revised. It is still silent on the product or technical baseline, risk management, and on tracing the requirements baseline to the schedule and work packages. The Quality Gap has not been closed.

EIA-748 is also impractical because the use of automated tools to collect metrics for schedule progress makes the use of the management assessment earned value technique obsolete, as discussed below.

EIA-748's silence on the product is also an impediment to monitoring performance when using Agile methods. Per the GAO report, GAO-23-105867 Defense Software Acquisitions, July 2023, outcome-based metrics track whether software development is achieving desired outcomes. …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.

The DOD Software Modernization Strategy (SW Strat) includes a caveat that "contracting policies, processes, and ***standards*** must ***not hinder***, but empower the vision of this strategy." *The vision for software modernization is simple – "deliver resilient software capability at the speed of relevance. Resilience implies software that is* ***high-quality*** *and secure, able to withstand and recover in the face of challenging conditions."* The caveat in SW Stat further disqualifies EIA-748 from being used as a VCS for software-intensive major capability acquisitions. Additional information about SW Strat and the shortcomings of EIA-748 is contained in the complementary white paper, *Integrating the Embedded Software Path, Model-Based SE, Modular Open System Approach, and Digital Engineering with Program Management*.

Finally, for DOD, the use of EIA-748 fails to serve DoD's program need, as defined by an overarching policy in DAS, to "Employ Performance Based-Acquisition Strategies" that support an "acquisition approach structured around the ***results to be achieved*** as opposed to the manner by which the ***work*** is to be performed."

DOD and other agencies should **Buy Products that Work, not Statements of Work.**

ANSI vs. EIA

The *PMI Standard for EVM* is accredited by ANSI. It was approved as *ANSI/PMI 19-006-2019* on 10/29/2019. Per the ANSI web site, accreditation by ANSI signifies that the procedures used by the standards body in connection with the development of American National Standards meet the Institute's essential requirements for openness, balance, consensus, and due process.

In contrast, EIA-748, was approved by SAE International (SAE). SAE was formerly the Society of Automotive Engineers. Per SAE, an SAE standard is a technical report, documentation of broadly accepted ***engineering practices or specifications for a material, product, process, procedure or test method***. Think about the SAE grade of your motor oil. Major acquisitions that cost over $100 M should be governed by a higher standard. The NDAA provision, when passed, requires a higher, ANSI-accredited standard.

In my letter to Margaret Weichert, Deputy Director for Management, OMB, augments a previous recommendation for OMB to revise the *Capital Programming Guide* requirement to use an EVMS that meets the guidelines in EIA-748. The letter, dated Dec. 16, 2019, Subj: Recommendations to Improve Program Management and EVM, includes the following excerpts:

The following recommendations, if implemented, will fix the VCS problem in the *Capital Programming Guide* and help to close the GAO findings discussed above:

(1) Adopt the VCSs for IPM from the PMI, including ANSI/PMI 19-006-2019 in concert with *PMBOK® Guide*, instead of OMB-developed standards and

(2) Replace EIA-748 in the Capital Programming Guide with ANSI/PMI 19-006-2019 in concert with *PMBOK® Guide*

The bottom line: EIA-748 is not effective or suitable to meet the regulatory, procurement, or program needs of DOD and the other federal agencies.

OMB Memo: Improving the Management of Federal Programs and Projects through Implementing the PMIAA, June 25, 2018

On June 25, 2018, OMB issued a memo which establishes initial implementation guidance to begin a coordinated and Government-wide approach to strengthen IPM practices in Federal agencies and improve Government performance. The memo identified a provisional set of principle-based program management standards that should be applied to internal management processes and be incorporated or aligned with existing program management policies and processes. Appendix 4, Table 1 of the memo included "IPM Standards and Principles" that should be considered when developing IPM implementation plans. These standards and principles are in the areas of Contracting and Acquisition Management (regarding product scope), Project Management (especially keying in on the OMB definition of project which includes "product"), Requirements Management, and Risk Management. The *PMBOK® Guide* includes these same standards and principles, as described in Table 1 (of this white paper) ***PMBOK® Guide***

Standards and Principles that are Absent from *EIA-748*.

The language in the OMB memo is also less stringent than that of Circular. Circular also includes requirements that the agency determine if the standard is practical and effective. It is recommended that OMB and DOD resolve this discrepancy with the concurrence of the appropriate legislative oversight committees.

If the less stringent language in the OMB memo is retained, then agencies may utilize standards developed internally for managing agency programs, but they must generally align and be equivalent to the standards and principles described in Appendix 4, Table 1 of the OMB memo. In that case, agencies may develop internal management processes that utilize a tailored, streamlined *EVMSIG* that is transformed into a Government-unique, internal standard. The transformed *EVMSIG* internal standard is based on principles derived from the *PMBOK® Guide*, such as those in Table 1, above.

OPM/OMB Memo: PMIAA IPM Competencies

Finally, on April 5, 2019, OPM, in consultation with the OMB and the Program Management Policy Council, issued a memo which defined "IPM competencies to select, assess, and train program and project management talent for the 21st century." The memo included four technical competencies which are absent from EIA-748:

1. Quality Management - Knowledge of the principles, methods, and tools of quality assurance, quality control, and reliability used to ensure that a project, system, or product fulfills requirements and standards.

2. Requirements Management - Knowledge of the principles and methods to identify, solicit, analyze, specify, design, and manage requirements.
3. Risk Management - Knowledge of the principles, methods, and tools used for risk assessment and mitigation, including assessment of failures and their consequences.
4. Scope Management - Knowledge of the strategies, techniques, and processes used to plan, monitor, and control project scope; includes collecting requirements, defining scope, creating a work breakdown structure, validating scope, and controlling scope to ensure project deliverables meet requirements (i.e., features, functions).

The *PMBOK® Guide* Standards and Principles in Table 1 are consistent with OPM/OMB objectives.

Recommended Five Step Plan for Acquisition Reform

It is recommended that DOD, OMB, and GAO implement the following five step, sequential plan.

Step 1: DOD actions:

- DOD review its policy, guidance, and instructions to determine if PMIAA is applicable to DOD because its provisions, regarding a widely accepted standard for program and project management, are *not* substantially similar to or duplicative of…policy, guidance, or instruction of the Department related to program management.
- DOD tailor *EVMSIG* and transform it into an internal, Government-unique standard that incorporates EVMS-lite recommendations. The internal standard will be based on a subset of EIA-748 guidelines and is tailored to accomplish the following objectives:
- Link EVM with SE planning and execution, product scope, technical performance measurement (TPM) and risk management.
- Reduce DCMA compliance review costs.
- Reduce contractor compliance costs.
- DOD request to OMB, through the NIST, that EIA-748 be replaced with the DOD internal standard.
- DCMA discontinue compliance reviews of 12 EVMS Guidelines that are no longer value-added or cost-justified, as specified in EVMS-lite.
- DOD issue policy and guidance to provide award fee incentives for contractors to link EV to the product scope, TPM, risk management, and technical debt by complying with the five tailored Guidelines in Table 3, below and/or by utilizing the award fee guidance and criteria in Eng Guidebook, as follows:

    - **Eng Guidebook CH 2.5 SE Role in Contracting**
        - Another area to which incentives are tied is the EVMS. The PM should ensure that the EVMS, tied to any incentive, measures the quality and technical maturity of technical work products instead of just the quantity of work. If contracts include EV incentives, **the criteria should be stated clearly and should be based on technical performance**. EV incentives should be linked quantitatively with:
            - TPM
            - Progress against requirements
            - Development maturity
            - Exit criteria of life-cycle phases
            - Significant work packages and work products

- When using Agile methods, DOD issue policy and guidance to provide award fee incentives for contractors to exceed the Minimum Viable Capability Release (MVCR) requirements and the Minimum Viable Product (MVP), reduce the product backlog, and reduce technical debt.
- DOD revise policies, instructions, and guides to incorporate these recommendations.

Step 2: GAO actions:

1. Verify that DOD completed above actions.
2. As required by PMIAA, examine the effectiveness of the following on improving Federal program and project management: (1) The standards, policies, and guidelines for IPM issued under section 503(c) of title 31, United States Code, as added by subsection (a)(1).
3. Include the results of its examinations in its "GAO Report on Effectiveness of Policies on Program and Project Management," in conjunction with the High Risk list.
4. Revise *Schedule Estimating Guide.*

Step 3: OMB approve DOD request to replace EIA-748 with the transformed *EVMSIG* standard.

Step 4: DOD establish a 5-year strategic plan for IPM that is consistent with PMIAA and OMB objectives and leads to use of standards and policies that are in accordance with *PMBOK® Guide, ANSI/PMI 19-006-2019,* and the three *GAO Guides.*

Step 5: OMB revise *Capital Programming Guide* to sunset the use of EIA-748 and substitute an interim Government-unique standard based on a tailored, streamlined *EVMSIG*. The tailored *EVMSIG* standard will be based on *PMBOK® Guide* in concert with *ANSI/PMI 19-006-2019* and the three *GAO Guides.*

EVMS-lite

The rationale for and implementing details of this white paper were first included in my letter to Chairman Thornberry, 11/17/13, Subj: Expanded NDAA Defense Acquisition Reform - EV. The letter included recommendations that will result in a net *reduction* of costs for capital acquisitions by reducing regulatory (DFARS) requirements. Currently, contractors are required to comply with 32 guidelines in EIA-748. The recommendations in this document, if implemented, will *eliminate* requirements for contractors to comply with twelve guidelines.

It is also recommended that DOD regulations be revised to require contractor compliance with five *amended* or *tailored* EVMS guidelines, to define "product scope," and to revise the definition of "statement of work" to include "product scope." However, compliance with the five tailored guidelines will not increase acquisition costs because contractors are already required to perform the tasks that are newly cited in those guidelines. Also, DOD program managers now need to obtain the information that will be submitted with the tailored guidelines and the definition of product scope to comply with recent AAF reforms in DAS and DOD Instruction 5000.88, *Engineering of Defense Systems.*

The "product scope" is also defined and differentiated from the "project scope" (work scope) in Appendix A of the revised *DOD Handbook, Preparation of Statement of Work* (SOW), as follows:

Product Scope (the features and functions that characterize a product, service, or result)

Project Scope (work performed to deliver a product, service, or result with the specified features and functions)

The assertions regarding net cost reductions are augmented below.

Eliminate Mandate to Comply with 12 Guidelines

The rationale for eliminating compliance with twelve guidelines includes:

1. Control and reporting by Work Breakdown Structure (WBS) is sufficient. There is no need for reporting by organization.
2. DCAA audits are sufficient; DCMA compliance review is redundant.
3. Compliance adds cost but no program management value.
4. They fail to meet objectives of *Capital Programming Guide* or of the *EVMSIG.*
   a. Capital Programming Guide objectives
      - Early identification of problems, potential corrective actions, and changes to the original goals needed to complete the investment and necessary for agency portfolio analysis decisions.
      - Rely on timely data produced by those systems for determining product-oriented contract status.

   b. *EVMSIG* objectives: "provide joint situational awareness of program status and to assess the cost, schedule, and technical performance of programs for proactive course correction."

5. They are not commercial IPM practices. The twelve guidelines are in Table 2.

Table 2: Eliminate mandate to comply with 12 EIA-748 guidelines		
Guide-line #	**Guideline Topic**	**Rationale to remove compliance requirement**
2.1b	Identify organizational structure	Control by organization (OBS) is not cost-effective(a). Control by product (WBS) is sufficient. This guideline is a non-value added regulatory requirement (NVARR).
2.1d	Control overhead (OH)	DCAA audits are sufficient; DCMA compliance review is redundant. (NVARR)
2.1e	Measure performance by WBS or OBS	Control by product (WBS) is sufficient(a). (NVARR)
2.2d	Identify cost elements (labor, material etc)	(NVARR)
2.2f	Control account budget = sum of work and planning packages	(NVARR)
2.2h	Establish OH budgets	DCAA audits are sufficient; DCMA compliance review is redundant. (NVARR)
2.2j	Target cost goal is reconciled with sum of internal budgets plus MR	(NVARR)
2.3c	Summarize direct costs into organizational elements	(NVARR)
2.3d	Record indirect costs consistent with the OH budgets	DCAA audits are sufficient; DCMA compliance review is redundant. (NVARR)
2.3e	Identify unit costs, equivalent unit costs, or lot costs	Not needed for development programs. (NVARR)
2.3f	Material accounting system provisions	DCAA Material Management and Accounting System (MMAS) audits are sufficient. DCMA compliance review is redundant. (NVARR)
2.4d	Summarize variance analyses by OBS and/or WBS	Control by product (WBS) is sufficient(a). (NVARR)
(a) Three of the guidelines in Table 2 pertain to the OBS, a NVARR. Per *JSCC*, the utility of EVM Data by OBS was rated unfavorably with 62% of the respondents being detractors and a Net Promoter Score of -46%.		

Tailor Five Guidelines

Five guidelines that should be tailored to close the Quality Gap and to add risk management are in Table 3. The tailoring will increase focus on technical requirements, requires use of TPMs, and add "product scope" including rework, technical debt, acceptance criteria (technical baseline) and risk responses to the authorized baseline.

The EAC guideline is modified to incorporate four elements:

1. The Agile methods elements, "product backlog," "technical debt," and MVCR/MVP which did not exist when the first EVMS standard was published.

2. “Risk responses,” which is absent from EIA-748.
3. “Rework” and “technical debt” which are absent from EIA-748.

Contractors are already required to perform the following tasks in their statements of work. Requirements for SE and risk management already cite the following:

1. “Product scope” is already referred to as “technical baseline”
2. “Acceptance criteria” are required by SE requirements such as the SEP, Eng Guidebook, SE Guidebook, and the Integrated Master Plan (IMP)
3. “Risk responses” are required by SE requirements
4. “Rework” and “technical debt” are normal task of engineering development and cost estimates. The proposed change only requires it to be broken out.
5. “Technical performance measures” are already in the guidelines. The proposed change only makes the use of TPMs mandatory, not optional.

Table 3: Modify language of 5 EIA-748 guidelines and the dictionary with regard to contractor compliance		
Guide-line # or Section	**Guideline or Dictionary Topic**	**Tailored Guideline**
1	Define the authorized work.	Add, "Including the work necessary to produce the product scope of the program, including rework and risk responses."
6	Scheduling the work	….requirements of the program. Add "including the product scope (including acceptance criteria), rework, and risk responses." Intent of Guideline: …see Guideline 10. Add "when Agile methods are used to develop embedded software in weapons systems, use the product roadmap, product backlogs, and the MVP. Typical Work Products: Add "when Agile methods are used, include product roadmap, product backlogs, and the MVP.
7	Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	Add, "All technical performance measures that have been identified at major technical reviews shall be used to measure progress in appropriate work packages."
27	Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions.	Add, "Estimates of future conditions include rework, risk responses, and, when using Agile methods, technical debt and the product backlog."
30	Control retroactive changes.	Add, "Retroactive changes to earned value, including negative adjustments to correct cumulative earned value so that it is consistent with achieved vs. planned technical performance, must be made to improve the accuracy of performance measurement data."
EVMSIG 7.2	Dictionary	Add "product scope": "The product scope is the technical baseline and includes the features and functions that characterize a product or result and acceptance criteria."
EVMSIG 7.2	Dictionary	Revise definition of "statement or work" to add "including the product scope."

My recommendation to implement EVMS-lite were included in a white paper submitted as a consultant to PARCA in 2012. The white paper was the basis of an article in *CrossTalk, the Journal of Defense Software Engineering*; "Basing Earned Value on Technical Performance," Jan. 2013.

Cost Reductions

There will be a significant reduction in development costs if the EVMS clause eliminated. Of course, the most important consideration is that program managers will have better insight into program cost, schedule, and technical performance by receiving valid, reliable information.

Program managers expect contractors to utilize SE and risk management practices per AAF directives and guides DoDD 5000.01, DoDD 5000.02, DoDI 5000.87, and DoDI 5000.88. These SE and risk management practices and related work products, including technical performance parameters are either absent from or not required by EIA-748. However, they are elements of *PMBOK® Guide* Standards and Principles that are in Table 1.

Employ DoD Digital Engineering Strategy to Lower Costs, Close the Quality Gap

Table 4 references the need to use automated tools to collect *metrics* of the performance, progress, speed, cybersecurity, and quality of software development. That need was first stated in the DoD Digital Engineering Strategy, June 2018 (DE Strat) and amplified in DoDI 5000.87, DoDI 5000.88, DoDI 5000.97 and *DoD Data, Analytics, and AI Adoption Strategy*.

The automated collection of metrics will lower costs and close the Quality Gap by providing a pathway to automatic transfer of schedule performance information from the completed digital artifacts in the engineering model to the EVM data base instead of the manual entry of a management assessment of the estimated percent complete. Also, the collection of automated metrics for schedule progress precludes and makes obsolete the use of the earned value technique, management assessment (of percent complete) because earned value will be a function of completed digital artifacts as authoritative sources of truth (ASOT).

The use of completed DE artifacts as the base measures of EV will provide valid, reliable information for decision making instead of misleading information when estimated percent complete is based on "objective indicators" that are not consistent with meeting the requirements, technical performance, rework, and technical debt.

The following information was derived from the article, "Basing EV on Technical Performance," in *CrossTalk, the Journal of Defense Software Engineering*, Feb. 2013.

Fallacy of % Complete EV Technique

1. **Ignores technical performance**
   - **% of drawings, lines of code, test points is "objective" but, as practiced, may indicate original plan, not current estimate**
2. **Misleading if denominator increases**
   - ***"Hold"* % at 95% until done; Common practice (trick?)**
   - **Numerator may include rework**
   - **DAG 4.3.3.4.2 (Critical Design Review) propagates the fallacy**
     - **Rule of thumb: 75%-90% of…product drawings, software design specifications and associated instructions…complete**
3. **EV and the cost performance may be overstated when…based on % of drawings or code completed without regard to the technical maturity of the evolving design. As a result, the EAC may be understated."**

Source: Basing Earned Value on Technical Performance, CrossTalk—January/February 2013

1

The use of milestones for estimated percent of work complete is also precluded by the *GAO Schedule Assessment Guide*. GAO's Best Practice Checklist includes "The schedule contains primarily detail activities, and milestones are not used to represent work."

Goal 1 of DE Strat is to formalize the development, integration, and use of models to inform enterprise and program decision making. Excerpts follow.

Use models to support engineering activities and decision making across the life cycle

Exchange of information between technical disciplines or organizations should take place via model exchanges and ***automated transformations***.

Goal 2 of DE Strat is to provide an enduring, ASOT. Excerpts follow.

Use the ASOT as the technical baseline

Stakeholders should use the ASOT to make informed and timely decisions to manage ***cost, schedule, performance, and risks***. For example, contract deliverables should be traced and validated from the authoritative source of truth. This will allow stakeholders at various levels to respond knowledgeably to the development…of the system, thereby avoiding technical and management barriers to mission success.

Use the ASOT to produce digital artifacts, support reviews, and inform decisions

As the technical baseline matures…Stakeholders will generate digital artifacts.

Authoritative Sources for Tailored Guidelines

The tailored guidelines are consistent with the following documents:

- GAO Agile Assessment Guide (GAO Agile)
- *GAO Cost Estimating and Assessment Guide, Best Practices for Developing and Managing Program Costs* (GAO Cost)
- *GAO Schedule Estimating Guide* (GAO Schedule), when updated, to be congruent with the other Guides, as shown in Table 4.
- AAF directives and guides (including the Eng Guidebook and SE Guidebook and the recently revised SEP), DE Strategy
- SW Strat
- *DoD Data, Analytics, and AI Adoption Strategy* (Data Strategy)

Pertinent excerpts from these documents are included in Table 4.

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**

GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
GAO Agile	Chapter 5	..in Agile development, the term requirement is rarely used. Instead, it is replaced with terms such as 'epic' or 'user story' and often represents a capability, feature, sub-feature, or more granular expectation for the system being developed. This guide considers both product backlog items and user stories to be a form of requirements.

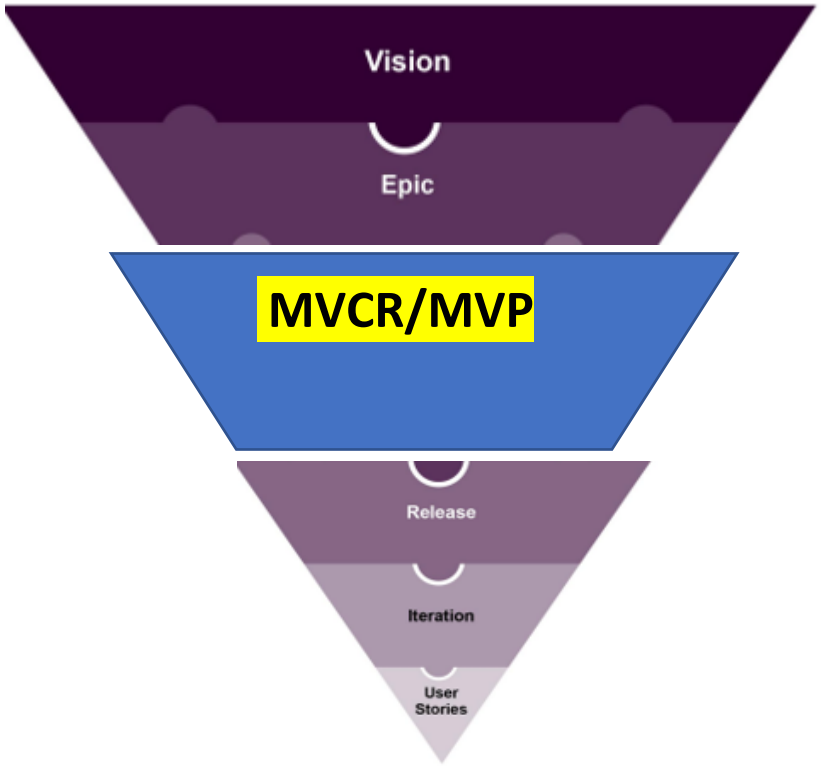
Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
GAO Agile	Chapter 4, Figure 4 (revised by author per Note) >	Agile programs typically use five levels of planning to progressively define work, as illustrated in Figure 4. (Should be 7 levels, per Note) Note: (The GAO Agile Assessment Guide shows five levels of planning. The revised Figure 4 below includes two additional levels, the MVCR and the MVP. The MVP is discussed elsewhere in the GAO Agile Assessment Guide). 
GAO Agile	Appendix 2	MVP
GAO Cost	Chapter 7	Because a product-oriented WBS reflects cost, schedule, and technical performance on specific portions of a program, it represents a cost estimating best practice.
GAO Cost	Chapter 18	Determine which performance measures will be used to objectively determine when work is completed. These measures are used to report progress in achieving milestones and should be integrated with technical performance measures. Progress and milestone events should represent measurable performance in terms of quality and technical performance as well as cost and schedule.

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
		Measures used to report progress in achieving milestones should be integrated with technical performance measures. Management should use the EVM data captured by the CPR data to integrate cost and schedule performance data with technical performance measures
DoDD 5000.01	1.2.a	Deliver Performance at the Speed of Relevance.
DoDD 5000.01	1.2.a.(1)(e)	Actively Manage Risk.
DoDD 5000.01	1.2.g.	Employ a Disciplined Approach.
DoDD 5000.01	1.2.g.(2)	Program goals for cost, schedule, and **performance parameters** (or alternative quantitative management controls) **will** describe the program over its life cycle. Approved program baseline parameters **will** serve as control objectives. Deviations from approved acquisition program baseline parameters and exit criteria will be documented, recorded, and reported to the Milestone Decision Authority (MDA) or Decision Authority.
DoDD 5000.01	1.2.k	Employ Performance Based-Acquisition Strategies. "Performance-based strategy" means a strategy that supports an acquisition approach structured around the ***results to be achieved*** (technical baseline or product scope) as opposed to the manner by which the ***work*** is to be performed (statement of work).
DoDD 5000.02	4.1.b.(6)	Establish a risk management program to ensure program cost, schedule, and performance objectives are achieved, and to communicate the process for managing program uncertainty.
DoDI 5000.87	3.3.b(2)	Programs will…actively manage technical debt.
DoDI 5000.87	3.3.b(3)	The sponsor and program office will develop and maintain a product roadmap to plan regular and iterative deliveries of software capabilities. Develop and maintain program backlogs that identify detailed user needs in prioritized lists.

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
DODI 5000.87	3.3.b(11)	Each program will develop and track a set of metrics to assess and manage the performance, progress, speed, cybersecurity, and quality of the software development, its development teams, and ability to meet users' needs. Metrics collection will leverage automated tools to the maximum extent practicable. The program will continue to update its cost estimates and cost and software data reporting from the planning phase throughout the execution phase.
DoDI 5000.88	3.4 Program Technical Planning and Management a. SE Plan	(3) For MDAPs, ACAT II, and ACAT III programs, the SEP will contain these elements, unless waived by the SEP approval authority: (b) The engineering management approach to include ***technical baseline management; requirements traceability; configuration management***; ***risk***, issue, and opportunity management; and technical trades and evaluation criteria. (c) The software development approach to include architecture design considerations; software unique risks; software obsolescence; inclusion of software in technical reviews; ***identification, tracking, and reporting of metrics for software technical performance,*** process, progress, and quality; software system safety and security considerations; and software development resources. (g) ***Specific technical performance measures and metrics, and SE leading indicators to provide insight into the system technical maturation relative to a baseline plan.*** Include the maturation strategy, assumptions, reporting methodology and maturation plans for each metric with ***traceability of each performance metric to system requirements and mission capability characteristics.*** (k) The timing, conduct, and ***entry and exit criteria for technical reviews***. (l) A ***description of technical baselines*** (e.g., concept, functional, allocated***, and product***), baseline content, and the technical baseline management process.
DODI 5000.88	3.4.b Technical Baseline Management	If practicable, the PM will establish and manage the ***technical baseline*** as a ***digital authoritative source of truth***.
DODI 5000.88	3.4.c Configuration and Change Management	(3) Provide for ***traceability of mission capability to*** system requirements to ***performance*** and execution ***metrics.***
DODI 5000.88	3.4 f. Risk, Issue, and Opportunity Management.	(2) Risk management plans will address risk identification, analysis, mitigation planning, mitigation implementation, and tracking. ***Technical risks and*** issues will be reflected in the program's IMP and Integrated Master Schedule (IMS).

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
DODI 5000.88	3.6.a SW Engineering	The development and sustainment of software can be a major portion of the total system cost and should be considered throughout the acquisition life-cycle.
DODI 5000.88	3.6 a (1) (b)	Consider establishing a software factory with multiple pipelines to deliver capability in a series of manageable, minimum viable products, to gain user acceptance and feedback for the next viable product. The software factory includes the trained personnel, culture, architecture, processes, and tools that automate the activities in software development, build, test, and delivery cycles.
DODI 5000.88	3.6 a (2) (b), (c)	The program may automate collection of metrics as much as possible. For those metrics that cannot be automated initially, the program may develop a plan for moving toward automation.
DODI 5000.97	3.2 DE CAPABILITY. b. DE Capability Elements.	(1) DE Ecosystem. (d) A DE ecosystem may include, but is not limited to, government -to-government, contractor-to-government, and contractor-to-supplier digital collaboration. These collaborative digital environments are key to involving all stakeholders in developing models, executing simulations, and performing analysis and optimizations for the digital models or digital twins. (3) Digital Threads. (b) The digital thread allows different audiences with different perspectives to extract data from and adjust usage of models to carry out different activities, including, but not limited to: 5. Cost estimating. (4) Digital Artifacts. Digital artifacts are the digital products and views that can be dynamically generated directly from digital models. These artifacts are created from the standards, rules, tools, and infrastructure within a DE ecosystem. Some common examples of digital artifacts include, but are not limited to: (k) Schedules.

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
DE Strat	1.3 Use models to support engineering activities and decision making across the life cycle	Exchange of information between technical disciplines or organizations should take place via model exchanges and ***automated transformations***.
DE Strat	2.3 Use the authoritative source of truth across the lifecycle	As the ***technical baseline*** matures…stakeholders will generate ***digital artifacts***. Use the authoritative source of truth to: 1. ***produce digital artifacts***, support reviews, and inform decisions 2. make informed and timely decisions to manage ***cost, schedule, performance, and risks***.
SW Strat	3 Unifying Principles	Resilient software must be defined first by execution stability, ***quality***, and dependable cyber-survivability. These attributes can be achieved at speed by aggressively adopting modern software development practices that effectively ***integrate performance*** and security throughout the software development lifecycle. More Than Code - Software modernization is more than just code development. It includes the many ***policies, processes, and standards that take a concept from idea to reality.*** Considerations such as ***contracting*** and intellectual property rights, as well as transition from development to fielding, are often overlooked and underappreciated. These policies, processes, and standards ***must not hinder, but empower the vision of this strategy.***
Eng Guidebook	3.4.2 Software Engineering	Programs should employ a highly iterative approach that quickly demonstrates small progressive updates and *provides* hands-on stakeholder participation so as to reduce rework and help focus the MVP solution.
SE Guidebook	Introduction	The developer's SEMP, which is the contractor-developed plan for the conduct, management, and control of the integrated engineering effort, should be consistent with the Government SEP to ensure that Government and contractor technical plans are aligned.
SEP	1 Introduction	Describe the program's plan to align the Prime Contractor's SEMP with the PMO SEP.
SEP	2.1 Requirements Development	Program should maximize traceability and the use of models as an integral part of the mission, concept, and technical baseline to trace measures of effectiveness, measures of performance, and all requirements throughout the life cycle from … requirements

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
		authoritative sources into a verification matrix, equivalent artifact, or tool that provides contiguous requirements traceability digitally. Program should trace all requirements from the highest level … to the lowest level (e.g., component specification or user story). This traceability should be captured and maintained in digital requirements management tools or within model(s). The system Requirements Traceability Matrix should be a model output that can be embedded in or attached to the SEP, or the SEP should contain a tool reference location. … The matrix should include the verification method for each of the identified requirements.
SEP	3.1 Technical Schedule	Provide the current technical schedule derived from the IMP/IMS for the program, including activities/tasks and event milestones such as … MVP/MVCR.
SEP	3.2.2 TPMs	The program should add, update, or delete TPMs documented in the SEP. This section should include: A set of TPMs covering a broad range of core categories, rationale for tracking, intermediate goals, and the plan to achieve them with as-of dates SE leading indicators to provide insight into the system technical maturation relative to a baseline plan The maturation strategy, assumptions, reporting methodology, and maturation plans for each metric with each performance metric traced to system requirements and mission capability characteristics Whether any contractual provisions relate to meeting TPM goals or objectives Description of how models, simulations, the digital ecosystem, and digital artifacts will be used to support TPM tracking and reporting. Description of the traceability among Key Performance Parameters; KSAs; key technical risks and identified TPMs.

Table 4: Elements of GAO Guides and **AAF Directives and Guides Needed in Tailored Guidelines**		
GAO or AAF Document	**Section**	**Excerpt** **Note: parenthesized comments are not in document)**
		Identify SW measures for SW technical performance, process, progress, and quality.
Data Strategy	Strategic Goals	The next layer in the Hierarchy is insightful analytics and metrics, the foundational models and visualizations required for DoD leaders to understand their domain and the key variables impacting outcomes in those domains**.**
Data Strategy	Implementation Planning	Outcomes-based performance indicators will be established, refined, and monitored… Ensure (performance) measures are supported by authoritative data sources and maximize the use of automated data collection methods for efficient performance monitoring.
Data Strategy	Appendix A	Accuracy: Data that correctly reflect proven, true values or the specified action, person, or entity. - How frequently do data values match ground truth?
Data Strategy	Appendix A	Linked: - Are the data linked such that relationships and dependencies can be uncovered and maintained? Trustworthy: - Do the data represent a source of truth?

Implementation of alignment with or adoption of *PMBOK® Guide* and *PMI EVM Standard*

To be cost effective, it is important to specify which elements of *PMBOK® Guide* and the *PMI EVM Standard* should be cited and reviewed for incorporation into IPM policies and processes. I recommend that the scope be narrow and be focused on the topics in Table 3 plus requirements traceability, risk management, and procurement management.

The specific recommended actions follow:
Replace requirement to comply with EIA-748 guidelines with requirement to comply with the tailored, streamlined *EVMSIG* standard to be developed based on the *PMBOK® Guide*.

Acquisition Data and Analytics shall develop compliance guidelines based on the *PMBOK® Guide* and shall publish the new guidelines in a transformation of the *EVMSIG*. The transformation will be renamed "DOD Program and Project Management Internal Standard (IPMIS)."

The IPMIS should be based on the following:

The PPMIS equivalent of 20 EIA-748 earned value guidelines remaining after eliminating the 12 guidelines in Table 2.
ii. The tailored guidelines in Table 3.
iii. Guidelines to be developed that incorporate the standards and principles of Table 1.

DCMA will retrain or augment its compliance review staff to add the SE skills necessary to review contractor employment of best SE and IPM practices.

It is important to note that the use of the "product scope" is optional in the *PMBOK® Guide*. Therefore, the wording of the new guidelines and the IPMIS should unambiguously require use of the product scope to preclude contractors from continuing to exploit the "Quality Gap" loophole.

NDIA SE Division White Paper

NDIA SE published the white paper, "Moving from predictive planning to empirical planning for SE; Evolving SE for a Modern Engineering Product Development Environment, March 2024, Version 1.0. The paper focuses on delivering ***product*** while providing ongoing management of the ***technical baseline*** and incorporation of new information. NDIA SE recommends an incremental and iterative design approach with a recast of requirements into a set of ***outcome-based*** capabilities that incrementally deliver the solution. Appendix B includes excerpts from the NDIA SE white paper, a table that highlights significant differences between the white paper and EIA-748, and excerpts from my 2006 INCOSE white paper that describes how to implement some of the NDIA SE recommendations.

Conclusion

DOD and OMB should discontinue use of EIA-748 because it is impractical and ineffective. It fails to serve OMB and DOD's procurement and IPM needs and is not a commercial practice. It has failed to keep current with changes in the state of knowledge and technology and is less useful than the PMBOK® Guide. It is a barrier to entry to new competitors and needed talent. The end of the path should be a set of internal management processes and/or a VCS for IPM, as required by the PMIAA, and OMB/OPM policy. *PMBOK® Guide* is the most widely accepted IPM VCS and its components should be included in the internal management processes.

The recommendations above are needed to fulfill the visions of EVM's founders, to implement the acquisition reforms and legislative intentions of senators and congressmen, to halt systemic findings like those in the DOD Report, to comply with the PMIAA, and to reduce costs.

EIA-748 guidelines focus on the ***statement of work***, not **product scope** or the results to be achieved. In contrast, the *ANSI Standard for Project Management*, included as Part II of PMBOK® Guide, states "The success of the project is measured against the **project objectives and success criteria**." In other words, **Buy Products that Work, not Statements 0f Work**."

But wait. There's more. The white paper, *Earned Value Management: "When you come to a fork in the road…*," includes best practices and metrics for IPM with no need for a Government-unique internal standard for EVM or EVM compliance reviews. Those practices, "Something of Value," meet the PBBE Commission's call for performance metrics that provide information on the *value received.* The "fork" paper calls for replacing EIA-748, which lacks management value, with Something of Value.

Note: All articles and references, except the PARCA white paper, are available at www.pb-ev.com.

Appendix A Selected Elements of PMI Standards Mapped to EIA-748 Guidelines (GL) and DODI 5000.88					
EIA-748 GL	**EIA-748 Guideline text**	**DODI 5000.88 Reference**	**PMI EVM Std. Section**	**PMBOK Guide Section**	**DCMA Assess Contractor Employment of SE and IPM Best Practices**
none		3.4.d.(1) IMP 3.4.i. **Product baseline**	3.2		Develop the IMP to include the scope management plan (including ***product scope***), requirements management plan, schedule management plan, cost management plan, quality management plan, …, risk management plan, and procurement management plan.
1	Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.	3.4.c. Configuration and Change Management 3.4.c.(1) ***functional, physical, and performance characteristics of the system design.***	3.2.1, 3.2.4	5, 5.3.3.1	The WBS is used as the single structure that integrates the product scope, schedule, and cost baselines together at a common level. The WBS decomposes the scope of work to be carried out by the project team, and a WBS dictionary defines the scope (including product scope) of work for each WBS component. The product scope is the ***features and functions*** that characterize a product, service, or result.
2	Identify the program organizational structure, including the major subcontractors, responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.	3.4.a.(b) ***requirements traceability*** 3.4.a.(g) ***Specific technical performance measures and metrics***.. with ***traceability of each performance metric to system requirements and mission capability characteristics.***	3.2.4, 3.2.6		The project team develops a responsibility assignment matrix (RAM) that tracks the scope (including product scope) to the responsible organization (OBS) in which all work scope and resources or cost under the EVM approach, if employed are mapped to control accounts. For procurement planning, the project team determines whether to use EVM for any procurements…, how the vendors will integrate EVM data into the overall project's EVM data and how performance management periods will be aligned. If EVM is flowed down to vendors/subcontractors, then

Appendix A Selected Elements of PMI Standards Mapped to EIA-748 Guidelines (GL) and DODI 5000.88					
					plans should be adjusted to acknowledge the need to develop how Schedule, Cost, Risk, and other Project Management Knowledge Areas are fed from input provided by the vendors/subcontractors.
3	Provide for the integration of the planning, scheduling, budgeting, work authorization, and cost accumulation processes with each other, and, as appropriate, the program work breakdown structure and the program organizational structure.	3.4.f.(2) ***Technical risks and issues will be reflected in the program's IMP and IMS.***	3.3, 3.3.1.2		In creating the PMB, five Knowledge Areas (Project Scope Management, Project Schedule Management, Project Cost Management, ***Project Risk Management***, and Project Resource Management) need to be integrated in such a manner that the scope (including product scope), schedule, ***risk***, and cost are associated at a common level across the baselines (either CA, WP, or activity) with an established performance measurement method.
6	Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.	3.4(k) The timing, conduct, and ***entry and exit criteria for technical reviews***.		**6.2.2.1**	The project WBS, deliverables, and ***acceptance criteria*** documented in the scope (including product scope) baseline are considered explicitly while sequencing activities.
7	Identify physical products, milestones, ***technical performance*** goals, or other indicators that will be used to measure progress.	3.4.a.(b) ***Software technical performance*** 3.4.a.(g) ***Specific technical performance measures and metrics***	3.2.2.2		Determine the measurement method, technique or criteria to be used for progress evaluation of the activity types within a WP. Measure progress towards achieving the scope (including product scope) and technical performance goals for each CA.
none		3.4.a.(g) ***Specific technical***		1.2.4.7	Collect work performance data… including reported percent of work physically

Appendix A Selected Elements of PMI Standards Mapped to EIA-748 Guidelines (GL) and DODI 5000.88					
		performance measures and metrics			completed, quality and technical performance measures, etc.
none		none	3.3.1.2		Whenever work and budget moves into, out of, or within the project, one or more CAs change. Any change should always be reflected on the RAM and authorized through change control.
none		3.4.a. SEP (3).k , (3).l	3.3.3	6.2.1.1, 5.3.3.1	Align the scope baseline, comprised of the project scope statement, WBS, and WBS dictionary, with work and planning packages. The detailed project scope statement, either directly or by reference to other documents, includes the following: ***Product scope*** description. Progressively elaborates the characteristics of the product described in the requirements documentation. Deliverables. Any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project. ***Acceptance criteria***. A set of conditions that is required to be met before deliverables are accepted.

Appendix B Excerpts from NDIA SE Division White Paper, "Moving from predictive planning to empirical planning for SE; Evolving SE for a Modern Engineering Product Development Environment, March 2024, Version 1.0.

SE coupled with Agile and DevSecOps practices is a key enabler to successful execution in an environment where focus is on **delivering product while providing ongoing management of the technical baseline and incorporation of new information.**

Establishing **traceability** between the Agile technical work, the work breakdown structure (WBS), and the integrated master schedule (IMS) and claiming Agile and iterative progress to inform overall program cost, schedule, and technical status.

This paper specifically proposes an approach to improve and modernize Systems Engineering requirement management, design, and review activities as part of the acquisition process with emphasis on value delivery. In addition, improvements are proposed that create an opportunity for the contractor and the DoD to review the program's progress more frequently based on iterative reviews enabling the DoD to provide valuable feedback to the contractor based on visible progress using models and demonstrations.

Progress is based on these demonstrations of integrated functionality.

Preference is on the Product-based WBS which focuses on the implementation of functionality and shifts planning and progress evaluation to focus on the completion of elements of the working system.

Iteratively and incrementally verify and validate the system.

There are multiple approaches to verify and validate the system; however, an Agile approach at the integrated system level provides the lowest risk of rework and the greatest opportunity to optimize feedback.

The product backlog provides a prioritized list of capabilities to maximize value delivery and address risks early within team capacity.

Key to successful execution is that verification and validation test approaches mature in step with the capabilities of the system. As features are completed, so are their matching acceptance and operational utility tests, building up to a test suite for each Minimum Viable Product (MVP) that then aggregates into the system level final acceptance tests to ensure a fieldable product. This reduces the risk of latent defects or non-compliances for each MVP so that each successive MVP builds on a stable and tested baseline.

Note: Guidance for implementing some of the recommendations in the NDIA white paper is provided in my INCOSE paper, "Using Earned Value to Track Requirement Progress, published in 2006.

Abstract. It is necessary to track the status of each requirement as it moves through engineering life cycle activities. Measures that reflect the status of the requirements are essential to monitor program status and serve as a scorecard to indicate that requirements are being implemented on schedule. This paper provides guidance to use the tools of requirements traceability to plan and measure the progress of the requirements management activities. The requirements traceability matrix can be used as a scheduling source and as a set of base measures of Earned Value. Finally, the importance and value of comparing the schedule variances of the requirements management and tracing activities with the variances of other project activities is discussed.

Differences between the NDIA SE Division White Paper and EIA-748	**SE White**	**EIA-748**

	paper	
Technical baseline or product scope	Yes	No
SOW	No	Yes
Traceability: Technical baseline to schedule	Yes	No
Technical maturity/visible progress of integrated functionality	Yes	No
Planning and progress evaluation based on quality of work completed. Authoritative Sources of Truth for schedule progress are outcome-based, verified, and validated features.	Yes	No
Planning and progress evaluation based on objective measures of quantity of work completed (i.e. drawings, user stories, lines of code etc.)	No	Yes
Cost performance based on objective measures of quantity of work completed	No	Yes