Recommendations for EV Policy Updates; EVMSIG and "Agile and EVM Guide" submitted to John McGregor, Director, EVM Division, DoD

Subj: Recommendations for "Agile and EVM Guide" and "EVMSIG" regarding deferred functionality, 8/2/2018

It is recommended that you revise "Agile and EVM: A Program Manager's Desk Guide" (Agile) and EVMSIG to account for deferred functionality.

Current Agile:

ii. A feature will be moved from the current release to a subsequent release.

A feature is part of the baseline and therefore if it changes, it must adhere to the baseline change control process. Baseline change could be processed in accordance with the contractor's approved change control process, taking into consideration whether the change is contractual or an internal management decision. If work has already begun, then the work package should be shut down by the generally accepted practice of setting BCWS to BWCP, and replan the remaining work package budget (BCWS) in the subsequent release identified.

Problem:

Per the current guide, when the CAM replans the remaining BCWS the subsequent release, the negative schedule variance may go away. This is a common and faulty practice in all EVM, not just Agile with EVM. It is common for a block of software to be behind schedule and for the remaining shalls, requirements, features etc. to be transferred to the next block or iteration. However, the CAMs usually plan the time-phased BCWS into future months based on resource availability and fail to add the budgeted cost of work remaining to the first period of the BCWS of the new work package. So the behind schedule condition disappears.

Solution for Agile:

The solution, for Agile, is to account for deferred functionality. More detail regarding Agile is in my article, **Journal of Software Management "Agile Earned Value and the Technical Baseline ,"** Sept. 2009, page 9:

For valid reporting of project status, **EV should reflect the results of deferring functionality from its baselined iteration, build, or block**. When functionality is deferred from the current iteration to the backlog,…the deferral has the following major impacts: If all the requirements planned for iteration are not completed, then the EV for the deferred requirements cannot be earned as part of the iteration. It is behind schedule.

There is a decision to release Build A short of its targeted functionality and baselined requirements. There will be no additional work on Build A subsequent to its release. The requirements that have not been met are deferred into Build B. To report earned value status, close the Build A work package. Open a new work package for the next iteration, Build B, and transfer the deferred requirements (10) and budget (50) to the Build B work package. <mark>Place the budget in the first month of the Build B work package to preserve the schedule variance.</mark> Table 5 illustrates the results of the transfer at the beginning of May.

The solution for all contracts, regardless of Agile, is in my "PARCA Task Order One, Integration of Earned Value Management and Program Technical Status:
Recommendations to PARCA to Revise DoD Level Acquisition Guides and Policies"

Proposed Solution for Account for Deferred Functionality

2. Account for Deferred Functionality,

- **Account for deferred functionality (in a block or release)**
  - If build is behind schedule and is released short of planned functionality:
    - **(Preferred)** Take partial EV and close work package
      - Transfer deferred scope and BCWR to first month of work package of next increment
        » EV mirrors technical performance
        » Schedule variance is retained
      - Disclose shortfall and slips on higher schedules
    - or
  - Take partial EV and leave work package open

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The solution was also published in **CrossTalk, the Journal of Defense Software Engineering** "**Basing Earned Value on Technical Performance**," Jan. 2013

Account for Deferred Functionality In practice, contractors seldom account for deferred functionality when functional requirements are deferred from one build, release, or block to another. Normally, the numbered build and its respective work package are "closed" and 100% of the EV is taken, based on being finished with the build. When this happens, EV fails to disclose the true schedule variance. Also, cost performance is overstated. The solution is to account for deferred functionality. If the build is released short of its planned functionality, the preferred technique is to take partial EV and close the work package. Then, transfer the deferred scope and Budgeted Cost of Work Remaining (BCWR) to the first month of the work package of the next increment. When this is done, EV mirrors technical performance and the schedule variance is retained.

I will look at the EVMSIG for similar problems in the guideline on controlling retroactive changes. However, I expect to the same problem. If so, please improve and clarify the EVMSIG in the Intent and Attributes sections.

Subj: Recommendation for "EVMSIG" regarding deferred functionality, August 3, 2018

As expected, the EVMSIG provides no guidance to account for deferred functionality when a work package is closed prior to completion and the remaining budget is transferred to a new work package. In practice, the schedule variance, which is normally negative, goes away after budget is transferred to the work package for the new block, build, sprint etc.

The pertinent Guideline is 30, Control Retroactive Changes. Fortunately, the Intent already states "==These procedures must ensure existing cost and schedule variances are not arbitrarily eliminated.==" How it is recommended that the Guideline be revised to cover "deferred functionality."

The EVMSIG is:

Purpose of Guideline: To ensure retroactive changes to previously reported data are limited in order to maintain the credibility of using data to project future cost and schedule performance. The changes should be limited to routine accounting adjustments, definitization of customer-approved contract actions, rate changes, economic price adjustments, or correction of errors.

Management Value: Controlling retroactive changes to budgets or costs for completed work maintains the validity of historic Earned Value Management System (EVMS) cost and schedule variance trends and reflects true program performance. A stable baseline and performance information against that baseline are essential to both internal and external management if informed decisions are going to be made based on the analysis of the system-generated information. Establishment of internal controls over retroactive budget and/or performance adjustments will help maintain visibility of overall project variance from plan. Uncontrolled changes to the PMB limits the ability to conduct predictive analysis.

Intent of Guideline: Retroactive changes involve adjustments to previously reported values for Budgeted Cost for Work Scheduled (BCWS), Budgeted Cost for Work Performed (BCWP), and/or Actual Cost of Work Performed (ACWP) related to completed work. (See Guideline 29 for changes in the freeze period). Retroactively changing data may be necessary under certain conditions and is controlled by the contractor's formal change control procedures==. These procedures must ensure existing cost and schedule variances are not arbitrarily eliminated.== Adjustments resulting from definitization of contract actions should be limited to affected work scope budgets

Attributes

 • A change control process exists that controls retroactive changes to previously recorded values for BCWS, BCWP, or ACWP, including approval and explanation.

The EVMSIG ==should be==:

Recommended changes to EVMSIG (highlighted in ==green== and in *Italics*):

Purpose of Guideline: To ensure retroactive changes to previously reported data are limited in order to maintain the credibility of using data to project future cost and schedule performance. The changes should be limited to routine accounting adjustments, definitization of customer-approved contract actions, rate changes, economic price adjustments, ==deferred functionality==, or correction of errors.

Management Value: Controlling retroactive changes to budgets or costs for completed work ==and for budgets and related work that are transferred from a work package that is closed prior to completion==, maintains the validity of historic Earned Value Management System (EVMS) cost and schedule variance trends and reflects true program performance. A stable baseline and performance information against that baseline are essential to both internal and external management if informed decisions are going to be made based on the analysis of the system-generated information. Establishment of internal controls over retroactive budget and/or performance adjustments ==and/or transfers of budgets and related work==

to another work package, will help maintain visibility of overall project variance from plan. Uncontrolled changes to the PMB limits the ability to conduct predictive analysis.

Intent of Guideline: Retroactive changes involve adjustments to previously reported values for Budgeted Cost for Work Scheduled (BCWS), Budgeted Cost for Work Performed (BCWP), and/or Actual Cost of Work Performed (ACWP) related to completed work *and for the cost or schedule variances of incomplete work*. (See Guideline 29 for changes in the freeze period). Retroactively changing data may be necessary under certain conditions and is controlled by the contractor's formal change control procedures. These procedures must ensure existing cost and schedule variances are not arbitrarily eliminated. Adjustments resulting from definitization of contract actions should be limited to affected work scope budgets.

Attributes

 • A change control process exists that controls retroactive changes to previously recorded values for BCWS, BCWP, or ACWP, *CV, and SV*, including approval and explanation.

- *When budget and related work is transferred from a work package that is closed prior to completion, to a new or different open work package, the Budgeted Cost of Work Remaining (BCWR for deferred work and budget) in the work package that is being closed will be transferred to the current period of the receiving work package. Thus, schedule variance will be retained.*
- *When additional budget is transferred from MR for work that is in an open work package for which the "Percent Complete" or "Units Complete" EVT is being used, then the open work package will be closed and its BCWR will be transferred to the current period of the receiving work package.*   Thus, the additional budget will not be applied to completed work and reduce the cumulative cost variance.

Please contact me if you need clarification or if you want to review case studies/examples of the problems.

Subj: Systemic issue of Program Manager's Low Estimate at Completion (EAC), August 6, 2018

Please consider my recommendation to fix a DoD-wide, systemic issue regarding Estimates at Completion (EAC).

DoD Systemic Issue of Unrealistic, Low Program EACs

Before I retired, I believed that there was a systemic issue in major DoD EMD contracts. Program anagers intentionally fail to report EAC growth on a timely basis in order to preserve funding, avoid Nunn-McCurdy reviews, or meet award fee goals. My opinion was based on direct experience on the F-35, Global Hawk, B-2, and Fire Scout programs as well frequent communication with the earned value and systems engineering communities.

There have been no changes to regulations or guidance since my retirement and continued cost growth on major acquisitions. The systemic problems still (2016) exist per the attached DCMA report, slide 20. The problem was also stated in the 2009 DoD EVMS report that was required by WSARA.

The attached memos and findings provide real examples of discrepancies. The latter memo includes a sample transaction in which the reported EAC included a **negative value** of $3.3 M in order to plug the numbers and mask true cost performance. The other memos include examples of recording impossible,

early completion of unfinished work or of shaving labor rates at the control account level in order to plug to the approved, reported program EAC.

Recommendation

It is recommended that you revise the Earned Value Management System Implementation Guide (EVMSIG) to include, in the program EAC, the program manager's assessment of the CAMs' variance analyses and EAC assessments that will have an impact on the program EAC but have **not yet** been incorporated into control accounts. This normally happens when there is a lag between the CAM's communication of estimated, future cost increases (Estimate to Complete or ETC) and the approval of the increase EAC for incorporation into the control accounts.

The current guideline includes guidance for the program EAC to account for dollarized **risks and opportunities** but is **silent** on the ETC impact of cost overruns/underruns that are already **issues** and, consequently, have not been identified as risks/opportunities.

In my experience, it is **common practice** for the program manager to *fail* to approve documented EAC growth on a timely basis or to include the EAC impacts of variance analyses in the program EAC. The program manager's failure often causes CAM's to distort or plug the time-phased ETC to balance to the approved, lower EAC. The CAM may plug the numbers by shaving or curtailing the time-phased ETC, by using negative ETC, or by shaving labor rates.

I believe that these assertions can be corroborated by DCMA and recommend that you request that the DCMA EVMS surveillance monitors obtain evidence.

The "is" and "should be" Guideline follows.

Current Guideline 27, Maintain EAC: (IS):

Purpose of Guideline:

To ensure estimates of the cost to complete the remaining requirements on a program are periodically reassessed. A most likely estimate of the total cost for completing all authorized program work is maintained and reflects future impacts and risks/opportunities not yet captured in performance.

Intent of Guideline:

Control Account Managers (CAMs) review control account EACs monthly, and update as required, based on the EVM performance metrics, variances analyzed and assessment of remaining work.

The program EAC accounts for dollarized risks and opportunities that are related to the risk management process and are tracked at the program level but have not yet been realized and/or incorporated into control accounts….The program manager or designated manager should review, and update as needed, the EAC for Undistributed Budget (UB) and SLPPs considering factors such as current program rate performance and identified risks.

Attributes:

Contractor's externally reported EAC and internal EAC reconcile and have clear traceability based on the identified risks and opportunities or other identified factors.

**"Should be"** Guideline:

Purpose of Guideline:

To ensure estimates of the cost to complete the remaining requirements on a program are periodically reassessed. A most likely estimate of the total cost for completing all authorized program work is maintained and reflects future impacts and risks/opportunities not yet captured in performance <mark>and the EAC impacts of cost variances that have not yet been incorporated into control accounts.</mark>

Intent of Guideline:

Control Account Managers (CAMs) review control account EACs monthly, and update as required, based on the EVM performance metrics, variances analyzed and assessment of remaining work.

The program EAC accounts for dollarized risks and opportunities that are related to the risk management process and are tracked at the program level but have not yet been realized and/or incorporated into control accounts <mark>as well as and the EAC impacts of cost variances that have not yet been incorporated into control accounts.</mark>

….The program manager or designated manager should review, and update as needed, the EAC for Undistributed Budget (UB) and SLPPs considering factors such as current program rate performance and identified risks and <mark>the EAC impacts of cost variances that have not yet been incorporated into control accounts. .</mark>

Attributes:

Contractor's externally reported EAC and internal EAC reconcile and have clear traceability based on the identified risks and opportunities, <mark>the EAC impacts of cost variances that have not yet been incorporated into control accounts,</mark> or other identified factors.

I would be glad to provide further clarification and evidence.

curtail finding 06-24.pdf   Excerpts from EAC findings.pdf   closure of $3.3 M finding.pdf   DCMA 2016 rpt to NDIA on tech perf.p

Subject: Recommendations for EVMSIG Guidelines: Discrete Rework, August 7, 2018

The EVMSIG is silent on "rework." Please consider recommendations to Guideline 10: Determine Discrete Work and Objective Measures and Guideline 12: Level of Effort (LOE) Planning and Control. Also, FYI, examples of EVM compliance findings regarding rework, called "engineering changes," provide insight on the consequences of improper planning of rework.

In my experience, program managers and EVM surveillance monitors paid insufficient attention to rework during contract award, Integrated Baseline Reviews, and program execution. As a result rework was

1. Underestimated and budgeted
2. Placed in Management Reserve (MR) instead of in the Performance Measurement Baseline (PMB) as summary level planning packages

3. Measured as Level of Effort (LOE) instead of discretely
4. Omitted from the Integrated Master Schedule (IMS) and the critical path because of being misclassified as LOE.

Justification

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

Excerpt from article:

Plan Rework and Track it Discretely

Rework is frequently not adequately planned in the PMB and IMS. The rework can include rework of requirements analysis, design, and test tasks. Even if rework is belatedly budgeted from management reserve, it is often measured as level of effort, or if measured discretely, as a percent of the planned iterations. Neither technique reports progress towards developing or meeting the technical requirements. The solution for better understanding and management of rework begins with the proposal and the negotiated contract value. The program should verify that realistic rework assumptions and estimates are included in suppliers' proposals and negotiated values. The estimates should include productivity/quality measures such as rework percent and defect density. The program should review the adequacy of budget and schedule for rework in the PMB.

Rework should be planned in a separate planning package from the original task. When converted to a work package, it should be measured discretely based on technical maturity targets. Establish interim milestones for rework with associated TPM planned values or quantified functionality based on meeting requirements. Then take interim EV based on net achieved technical performance. Make a negative adjustment to EV when necessary for accurate status reporting. If rework is not in a separate work package and if EV had been taken for achieving a technical milestone, correct EV and the IMS when there is subsequent knowledge that the milestone completion criteria are now unmet. The milestone should be re-opened and a negative adjustment should be made to EV. Cumulative EV must reflect net technical progress.

Guideline 10 is:

Guideline 10: Determine Discrete Work and Objective Measures

Intent of Guideline:

Discrete work is defined as a specific product or service with distinct and measurable outputs that are relatable to the program's technical objectives. These measureable outputs are where program status can be measured objectively. Examples of measureable products or outputs include design efforts, a tool design package, a build-to-package, a shop order, a part number, a purchase order, or any other definable product.

Guideline 10 should be:

Discrete work is defined as a specific product or service with distinct and measurable outputs that are relatable to the program's technical objectives. These measureable outputs are where program status can be measured objectively. Examples of ==measurable== products or outputs include design efforts, a tool design package, a build-to-package, a shop order, a part number, a purchase order, or any other definable product. ==*Planned rework of these same measurable products or outputs should first be budgeted in planning packages and, subsequently, measured in discrete work packages.*==

Guideline 12, add the following to Intent to be consistent with Guideline 10:

==*Rework of measurable work products or outputs that are the outcome of closed, discrete work packages such as rework of design efforts, a tool design package, a build-to-package, a shop order, a part number, a purchase order, or any other definable product may not be planned as LOE.*==

Examples

The attached memos include examples of surveillance review findings in which "engineering changes" were misclassified as LOE. In these findings, not only was the rework misclassified as LOE, it was also underestimated and unbudgeted. The contractor transferred budget from MR to reduce the cost overruns in rework.

Finding 06-54: MR was used to issue budget to cover net increases in costs for (engineering) Changes that "do not" qualify for MR. Changes should be addressed with EAC recognition only. At the end of August, there was an unfavorable cumulative cost variance of ($4.7 million) for STOVL Changes, which are LOE. The budget transactions caused a false, favorable current period cost variance (CV) for September of $3.4 million for the surveillance sample. Consequently, cost performance, including CPI, beginning September 2006 is misleading.

Finding 07-16: Retroactive Adjustment to BCWP and Past Cost Performance When the budget for EAC 4 Change Curve Sunk Costs was added in June, it created a de facto, retroactive increase to cumulative BCWP. However, the CAM did not request or obtain prior approval of EVMS Management to make retroactive changes to budgeted costs for completed work. The retroactive increase in BCWP created a favorable, current period cost variance and a significant improvement to the cumulative cost variance and CPI. The total budget for sunk costs, including EAC 4 Change Curve as well as other statements of work was $ 10.4 M (BCR AV002400). In the opinion of the EVMS Joint Surveillance Team, cost performance and CPI may be overstated. More importantly, retroactive budgeting of completed tasks and the resultant improvement to cost performance may mask true cost and schedule performance and lead to underestimating the costs and duration of the remaining effort. This problem is a recurrence of similar findings that were issued subsequent to the rebaseline that occurred after EAC 4. (See memo TD21—EVM-07-31, attached). These findings were rescinded because they were referred to the DCMA monitor at Lockheed Martin for action.

I would be glad to provide further clarification and evidence.

memo 06-98risk mit and LOE changes.pdf   memo 07-68changecurvefa

Subject: Recommendations for EVMSIG Guidelines 1 and 7: Integrate Systems Engineering, August 9, 2018

The EVMSIG contains only one reference to systems engineering (SE). The Intent section of Guideline 1 states: "The WBS is defined, developed, and maintained throughout the system life cycle based on a disciplined application of the SE process for program management execution" I have been advocating the that EVM be integrated with the SE process and SE work products since 2001 when I was the industry keynote speaker at the DCMA Engineering Conference. It has not yet happened. I started to address INCOSE conferences in 2003.

Now, we have an opportunity to improve the EVMSIG to shift practices towards my objectives. The Defense Acquisition Guidebook (DAG) and the Systems Engineering Plan Outline vs. 2.0 provide detailed SE guidance and artifacts that should be incorporated into the EVMSIG Guidelines 1 and 7 for consistency, as follows:

Guideline 1, Define WBS

Typical Work Products

Is:

- Statement of Work (SOW)
- Work Breakdown Structure (WBS)
- Traceability matrix from government requirements (e.g., SOW, Build Specifications) to WBS

Should be:

- Traceability matrix from government requirements (e.g., SOW, Build Specifications, and, for development programs, the system's technical requirements including artifacts of the functional, allocated, and product baselines) to WBS

Guideline 7 : Identify Products and Milestones for Progress Assessment

Typical Work Products

Please add the following to **Typical Work Products**

- Documented progress against requirements
- Documented exit criteria of the System Functional Review, Preliminary Design Review, and Critical Design Review

Please consider including the above recommendations in the next revision. I would be glad to provide further clarification and justification.

I expect that some stakeholders will object that some of the terms are "too military" and not "commercial." However, as I have alleged, EIA-748 is a *de facto* military standard already. Just look at some of the terms that are already in EVMSIG:

- Cost and Software Data Reporting
- Integrated Program Management Report (IPMR)

- Authorized, Unpriced Work
- Over Target Baseline etc.

I believe that the above revisions support the intent of the DAG section which discusses incentives to 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." I discussed this I yesterday's email.

Subj: EVMSIG recommendation on TPM, Oct. 31

The systems engineers at my tutorial at the NDIA Systems Engineering Conference agreed with my findings and recommendations. My previous recommendations for the EVMSIG failed to include a specific fix to remove the optional use of technical performance measures (TPM). The EVMSIG has a thorough discussion of TPMs in Guideline 2.2b, including

- "Interim measures are defined as the detailed schedule is established to ensure performance is measured as objectively as possible"
- "Documented technical performance goals"

 However, it lacks a typical work product regarding TPMs to measure interim performance in a work package.

The current "Typical Work Products" is:

• Internal schedules and/or Integrated Master Schedule (IMS)
• Integrated Master Plan (IMP)
• Contract and modifications
• Control account plan
• Documented technical performance goals
Recommendation:

Should be:

Typical Work Products:

- Documented technical performance goals *and technical performance measures that have been identified at major technical reviews for measuring interim progress*