

EVMS Training Snippet Library: DOE Common EVMS Findings



**Office of Acquisition and Project Management (OAPM) MA-60
U. S. Department of Energy
July 2014**

Achieving Management and Operational Excellence

This EVMS Training Snippet, sponsored by the Office of Acquisition and Project Management (OAPM) discusses the common surveillance findings identified during DOE EVMS Reviews.

DOE Common Areas of Surveillance Findings



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- **Work Authorization**
- **Schedule Integrity**
- **Subcontract Management**
- **Variance Analysis**
- **Estimate at Completion (EAC) Implementation**
- **Management Reserve (MR)**
- **Baseline Control**
- **Scope, Schedule, and Budget Integration**



The purpose of this snippet is to share the most common areas of non-compliance. The preponderance of non-compliances fall into these areas: lack of cost, schedule and scope integration; lack of schedule integrity; inadequate variance analysis; inadequate Estimate at Completion (EAC) implementation; improper use of Management Reserve; and lack of proper control of the baseline. Each of these areas are discussed in more detail in the following slides.



- **Work Authorization Document (WAD) is the agreement between the CAM and Project Manager**
 - Issue: Unapproved before work commences
- **Defines, schedule, and budget at the CA level**
 - Issue: Scope too vague, not tied to Statement of Work and/or Project Execution Plan
 - Issue: WAD doesn't tie to the IMS, PMB, WBS dictionary, Budget control log

The work authorization is the process whereby the scope, scheduled period of performance and the budget for a control account are established. The work authorization document, often called the WAD, 'authorizes' the Control Account Manager, or CAM, to begin work. The WAD is signed by the CAM and the Project Manager to serve as an agreement that both parties have a mutual understanding of the work to be accomplished, the time frame for which the work is to be performed, and the budget authorized for performing that work.

Because the baseline schedule must align to the scope and budget authorized in the WAD, any changes in the baseline schedule and budget baseline must reflect new or deleted scope. If internal changes are made for any replanning actions, the WAD may not need to be updated but the changes must be accurately integrated between the cost and schedule systems. Integration issues occur when the WAD does not contain the same scheduled dates and budget found in other EVMS objects including the IMS, PMB, WBS dictionary, and budget control logs.



- **Provide the authorization to proceed**
 - Issue: Dated after work has begun or not extended when the period of performance is extended
- **Changes to the baseline**
 - Issue: Updated WADs not issued to document incorporation of control account changes in budget, scope, or schedule as a result of contractual changes, application of management reserve, or formal reprogramming such as an OTB

Work authorization means just that – it authorizes the work to begin or continue. Therefore it must be issued prior to the start of any work and be updated with any scope, budget or period of performance changes.

An updated WAD must be issued prior to incorporation of the changes into the baseline. This would include application of Management Reserve, changes due to DOE issued contract modifications, and incorporation of formal reprogramming such as an Over Target Baseline. The Work Authorization Document does not need to be updated due to cost or schedule overruns or under-runs as these are a part of measuring performance against the baseline. The WAD is a document that reflects the baseline, not the estimate at completion.



- **Accurate schedule linkage assures vertical and horizontal integration**
 - Issue: Missing predecessors and successors
 - Issue: Excessive use of float, constraints, lags
 - Issue: Schedules from systems feeding schedule information not incorporated into the IMS accurately; examples include Engineering Project and Performance Reports, Purchasing system, Subcontractor schedules

The intent of the schedule is to be a single plan that depicts the sequence of work activities required to achieve project goals and objectives. As tasks are updated, the critical path is recalculated and forecast finish dates are also calculated. For this to happen, the schedule must be robust and have logical links, reasonable durations, minimal float, and a minimal number of leads, lags and constraints. Some of the more significant concerns found during DOE EVMS Reviews include errors in schedule logic, including missing linkage between tasks causing integration issues. When schedules from other systems are used to status the schedule and that process is done manually, mistakes can be made. For example, if Engineering uses a separate subsystem to evaluate performance, the CAM is responsible to ensure that the status is properly reflected in the IMS.



- **Critical path must be derived from and related to the discrete activities planned**
 - Issue: Missing logic on discrete tasks invalidating critical path
- **CAMs must understand their schedules**
 - Issue: CAMs unable to explain basic linkage of tasks, impacts of excessive float or logic issues
 - CAMs must be able to explain the technical requirements of each task in their responsibility

The critical path and near-critical paths are calculated based on precedence relationships, lag times, durations, constraints, and status. Artificial constraints and incorrect, incomplete, or overly constrained logic must be avoided because they can skew the critical path and near-critical paths.

Lastly, while the CAM may not be the actual planner or master scheduler on his/her control accounts, the CAM is responsible for approval of all changes and being able to explain the logic linking the tasks and work packages. If a task has high float, the CAM must be able to justify why it is planned as it is.



- **The prime contractor is responsible for managing the subcontractor using EVM techniques**
 - Issue: Inadequate flow down of system/reporting requirements
 - Issue: Subcontractor not identified in Organizational Breakdown Schedule
 - Issue: Subcontractor schedule not adequately incorporated into the prime IMS at low enough level to facilitate management
 - Issue: Percentage of completion based on payment milestones instead of work performed

The prime contractor is responsible for the subcontractor. Although the DOE does not require subcontractor certification, DOE Order 413.3B requires flow down of the appropriate EVM system and reporting requirements to the subcontractor for any project with a TPC of \$20M or more. Through prime surveillance, the prime monitors subcontractor performance against the system and reporting requirements. Authorization of an FFP subcontract does not relieve the prime contractor from responsibility to utilize EVM to manage the subcontractor and report performance for the entire effort.



- **The prime contractor must update the BCWP and Estimate at Completion (EAC) with the best expectations of performance**
 - Issue: Unreliable Estimates at Completion for subcontractor efforts
 - Issue: Prime not establishing and forecasting for the FFP

Performance earned on subcontracts must comply with the use of acceptable earned value methods. A method not approved is payment based earned value. Said a different way the prime contractor must status BCWP consistent with the way the work is being accomplished. Progress must be measurable and physically verifiable. The prime is responsible for ensuring that the Estimate at Completion includes potential subcontractor claims as 'risks' in addition to the firm fixed price.



- **Variance analysis components: Cause, Impact, Corrective Action**
 - Issue: Not addressing current and cumulative schedule and cost variances separately
 - Issue: Analysis does not address majority of the variance
 - Issue: Root cause not identified
 - Issue: Lack of sufficient detail to identify impact or correction action
 - Issue: Schedule variance not integrated with critical path and float analysis
 - Issue: Corrective Action Logs not maintained or updated timely
- **Variance analysis relationship to Estimate at Completion**
 - Issue: The trend process is not a substitute for variance analysis and EAC

ANSI/EIA-748 requires that variances be identified and assessed. Reporting thresholds are identified for current period and cumulative cost and schedule variances and variances at completion. The variance thresholds are typically in the contract or in the system description. The thresholds may be dollar based and/or percentage based. Each tripped threshold is to be addressed separately with the analysis focused on the issues associated with the majority of the variance.

Variance analysis includes three reporting features: root cause, impact, and corrective action. Root cause is 'the root of the problem', that is, the factor or factors that caused the variance to exist. Once the root cause is ascertained, the impact can be determined. By impact we mean not only the impact to that particular control account but also to other control accounts and the project. Therefore, schedule variance analysis must be integrated with critical path and float analysis to determine the impact to key milestones and potentially project completion.

Corrective action details then can be formulated based on the root cause analysis and the impact of the variance. The corrective actions should be tracked in a log to monitor that identified corrective actions are being accomplished to (a) resolve the root cause to prevent the event from recurring or to (b) mitigate the effects of the variance throughout the project. The review of the corrective action log should be done at least monthly during the variance analysis process. Each corrective action should have a forecasted completion date, a responsible person assigned and tracked to closure.

The process of identifying and tracking trends is not a substitute for variance analysis and updating the estimate at completion when necessary.

Estimate at Completion



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- **Use metrics, i.e. To Complete Performance Index (TCPI), to assess EAC realism**
 - Issue: EAC reasonable tests not being -done or ignored
- **Estimate At Completion Updates**
 - Issue: Timely EAC review/reassessment not accomplished during variance analysis process
 - Issue: Comprehensive estimates not done at least annually
 - Issue: Best – Worst – Mostly EACs; best and worst equal to most likely
 - Issue: EAC not integrated with risk
- **EAC Missing Key Components**
 - Issue: Subcontractor REAs not promptly reported at some level
 - Issue: All trends should be reportable in EAC within a reasonable period

Variance analysis and preparation of the estimate at completion go hand in hand. Once the impact of the variances has been determined, the CAM can factor those impacts into the estimate at completion calculation. The project manager should assess the reasonableness of the PMB-level EAC. A commonly used metric for this purpose is the To Complete Performance index (TCPI). There are also formula based EAC calculations to provide a range to help ascertain if the current EAC is reasonable. A caution when using these formulas is they do not replace the CAM's knowledge of the impacts of the variances on the work remaining.

The CAM should be updating the Control account estimate-to-complete as often as necessary to provide a timely and realistic EAC. In addition to the monthly EAC review, the ANSI/EIA-748 requires comprehensive EACs at least annually. A comprehensive EAC basically consists of re-estimating the work remaining, similar to what was done in the bid process.

The contractor should be developing and reporting three EACs: best case, worst case, and most likely. To arrive at these three estimates, risk factors must be considered.

Certain events trigger EAC updates. Subcontractor requests for equitable adjustment need to be promptly reported in the EAC in at least the worst case scenario. Also the tracking of trends should be assessed when updating the EAC each month.

Management Reserve (MR)



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- **MR is budget set aside for internal future changes, controlled by the contractor**
 - Issue: MR justification inadequate – emerging trends
 - Issue: MR is being harvested from control accounts that under-run
 - Example: Setting BAC to EAC and excess budget moved to MR
- **The use of MR without maintaining scope, schedule, and budget integration is distorting DOE project performance and masking unfavorable earned value trends**
 - Issue: Specific examples leading to compliance confusion are subcontractor firm fixed price (FFP) REAs, planning package conversions, design evolution, and global risk realization
 - Need to distinguish between variance-only risks and other risks
 - Planning package conversions need adequately document change in scope or assumption (G/L 10 and 14)

Management Reserve is an amount of budget withheld for management control purposes that can be applied because of unexpected growth within the currently authorized work scope, rate changes, risk handling, and other project unknowns. It may be used for current and future needs but it may not be used to offset accumulated overruns or under runs.

MR is typically used for internal scope changes at the CA level. Other allowed uses may be for elements planned beyond the next calendar month (also known as the freeze period).

Common findings include MR usage with vague justifications such as emerging trends and taking a budget under-run at complete and moving it back to MR. MR cannot be used to mask trends nor can it be harvested.

MR may be used for subcontract negotiations completed before the work has started and for changes in subcontract scope in the future.

Not all risks are the same. Risks of cost overrun or schedule slippage are not acceptable uses for MR if the budget is only to offset variances.

Guideline 10 states that work packages derived from planning packages must be based on the same scope as contained in the planning package prior to their conversion. If a change in scope or assumptions is found during the conversion process allowed by Guideline 14, then this should be justified separately in the change process.



- **Changes must be tracked in a time phased log that reconciles with the Contract Performance Report (CPR)**
 - Issue: Inconsistent use of baseline control logs
- **Changes must be processed in a timely manner, prior to authorization of scope effort beginning**
 - Issue: Current period/retroactive budget changes processed after the planned start date and/or actual start date and accumulation of charges

Changes to the baseline are a matter of fact – they will happen. Therefore it is critical to maintain logs to document:

1. What was changed in terms of scope, schedule, and budget,
2. Why it was changed, for example contract modification or internal re-plan,
3. Which budget elements changed, such as the Performance Measurement Baseline, Management Reserve, Contract Budget Base, Undistributed Budget, by which Budget Change Request (BCR) / Baseline Change Proposal (BCP), and
4. When it was changed.



- **Change Request package must be complete**
 - Issue: Budget Change Request (BCR) / Baseline Change Proposal (BCP) missing key attachments such as the scope, schedule, budget before and after the change, and a new Work Authorization document
- **Changes are limited to (a) time phasing within current schedule start and stop dates, or (b) changes to scope, schedule, and budget due to contract modification, formal reprogramming, or internal Management Reserve uses**
 - Issue: Budget transfers without scope and vice versa
 - Issue: Improper re-planning, such as use of MR to eliminate variances

Budget Change Requests (BCR), a term typically used to signify within Performance Baseline (TPC, CD-4, KPP adjustments), and Baseline Change Proposals (BCP), a term used to signify changes to the Performance Baseline (reference Snippet 4.6 on Baseline Control Methods), must include attachments that define the scope, schedule, and budget both before and after the change. Approval of a BCR or BCP may necessitate that a new or updated Work Authorization document be signed and issued. Work cannot start until authorized, so the change must be processed in a timely manner so as not to hold up work.

Re-planning within a control account does not require an updated Work Authorization document because it doesn't change the three elements of scope, schedule, or budget. Re-planning within a control account only changes the time phasing so it does require a BCR with the before and after snapshot of the schedule baseline.



- **All documents supporting the approved procedures must tie to each other in terms of scope, schedule, budget, actual cost, etc.**
 - Issue: Key documents do not align in terms of figures and dates
 - Examples include but not limited to:
 - Work Authorization Document to Control Account Plan to Schedule
 - Responsibility Assignment Matrix to Control Account Plan
 - Contract /Project Budget Base Log to Management Reserve, Undistributed Budget, Performance Measurement Baseline log

System integration is key to an Earned Value Management System because the EVMS is not a stand-alone system; rather it is comprised of many systems including the contractor's planning, scheduling, cost accumulation, budgeting, and work authorization systems. It is imperative that the contractor's system provide a complete audit trail for any increment or decrement of work through the various management subsystems. Therefore, the documents resulting from each of the supporting processes must tie to each other with key elements such as scope, schedule, time-phased budget, actual costs, estimates at completion, and baseline transactions traceable among documents.

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History

Earned Value Management (EVM) is a systematic approach to the integration and measurement of cost, schedule, and technical (scope) accomplishments on a project or task. It provides both the government and contractors the ability to examine detailed schedule information, critical program and technical milestones, and cost data.

- EVMS Surveillance Standard Operating Procedure (ESSOP) - 26 Sep 2011 (pdf)
- EV Guideline Assessment Templates - (MS Word)
- DOE EVMS Cross Reference Checklist - (pdf)
- DOE EVMS Risk Assessment Matrix - (MS Word)
- Formulas and Terminology "Gold Card" - Sep 2011 (pdf)
- Slides from the OECM Road Show: Earned Value (EV) Analysis and Project Assessment & Reporting System (PARS II) - May 2012 (pdf)
- DOE EVM Guidance

EVM TUTORIALS

Module 1 - Introduction to Earned Value (pdf 446.86 kb) July 17, 2003

This module is the introduction to a series of online tutorials designed to enhance your understanding of Earned Value Management. This module's objective is to introduce you to Earned Value and outline the blueprint for the succeeding modules. This module defines Earned Value management. It looks at the differences between Traditional management and Earned Value management, examines how Earned Value management fits into a program and project environment, and defines the framework necessary for proper Earned Value management implementation.

<http://energy.gov/management/office-management/operational-management/project-management/earned-value-management>

For information relative to EVMS procedures, templates, helpful references, and training materials, please refer to OAPM's EVM Home page. Check back periodically for updated or new information.

Thank you