

Earned Value Management

Fiscal Year 2004 - Lessons Learned

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INTRODUCTION:

During FY 2004, EPA implemented its Earned Value Management System (EVMS) based on the ANSI/EIA-748 Standard and OMB requirements identified in Circular A-11. Earned Value Management (EVM) provides a standard means of objectively measuring work accomplished based on the budgeted value of that work - it is "What you got for what it cost." EVM is a project management technique that integrates cost, schedule, and technical performance measures to monitor and control project resources and compile results into one set of metrics so that effective comparisons can be made. It also helps evaluate and control project risk by measuring project progress in monetary terms.

In the process of implementing its EVMS, EPA learned several valuable lessons that will contribute to positive improvements in its EVMS and related policies, processes, and procedures in FY 2005. These lessons learned are presented in this document to help assist information technology (IT) project managers in their efforts to fully implement EVM on their IT projects in a manner that is consistent with both the letter and spirit of the ANSI/EIA-748 standard, and in line with the requirements of the OMB Exhibit 300 process. The lessons are grouped into the following three major areas:

1. Refinement of Earned Value Management Methods
2. Increasing Consistency of Project Reporting
3. Facilitating Management Analysis of EVM Data

1. Refinement of Basic Earned Value Management Methods

As is often the case when attempting to implement new policies, procedures, and methods Agency-wide, basic competency and understanding are often more crucial than demonstration of highly refined skills and sophistication. While all EPA projects were able to successfully implement EVM methods and demonstrate key EVM competencies, work remains to be done in increasing the overall sophistication and refinement of the EPA EVMS on an organizational level. The following lessons learned will help to further expand and refine the EVMS capabilities of the Agency as a whole.

- **Use EVM Across all Phases of Mixed Life-Cycle Projects:** Many EPA projects are mixed life cycle - i.e., they include resources for Planning, Acquisition

(Development, Modernization, or Enhancement (DME)), and Maintenance activities and milestones. In many cases there are Development activities ongoing at the same time that Operations and Maintenance (O&M) activities are occurring. Though OMB only requires the usage of EVM for the resources and milestones in the DME phase, the Agency will encourage the use of EVM for the O&M resources and milestones of mixed life cycle projects as well. Doing so is in line with the true spirit of EVM, and in many cases, doing so does not impose a greater burden on these projects. In some cases it actually simplifies reporting through usage of a common approach across all system life-cycle (SLC) phases and activities, and provides the Project Managers (PMs) with a more complete picture of the health of the entire project, not just certain segments of the project.

- **Separate Milestones and Associated Resources by System Life-Cycle Phase:** In some projects, milestones include both DME and O&M activities and resources. Though there is nothing inherently wrong with organizing project milestones and resources in such a fashion, it can make reporting of costs in the OMB Exhibit 300 difficult, and can potentially obscure the root cause of variances that may be associated with a particular SLC Phase and not another. Program Offices should separate milestones and their associated resources by SLC phase wherever possible.
- **Separate Milestones and Associated Costs by Contractor Whenever Possible:** Many EPA projects utilize multiple contractors on the same project. Ensuring that milestones are specific to a single contractor -rather than multiple contractors - helps to identify root causes when problems arise. This will also make corrective action planning and subsequent measurement of future progress easier. Project Managers should try to set up their projects so that each contractor has a separate set of milestones. Individual contractor milestone data can then be aggregated for EPA quarterly reports or for the Exhibit 300 if need be after the monthly evaluation is complete.
- **Keep Milestones from Getting Too Large in Duration, Cost, or Scope:** While having too many detailed, micro-level milestones can make reporting burdensome and time consuming, projects should avoid aggregating activities and resources to such a degree that it impacts the PM's ability to identify variances, and develop corrective actions. EVM is most effective when implemented using a "bottom-up" approach that dictates that information is planned and managed in small increments which can be quickly and accurately cumulated to view and manage the project as a whole. Examining small, manageable "chunks" is a more efficient process for identifying problems and root causes, and allows the PM to assess the health and risks of a project more accurately. Generally, small milestones are easier to plan for (their scope can be defined more specifically) and can be measured more objectively than large ones. Project Managers should ensure that milestones (or sub-milestones) are as small and specific as possible, in terms of scheduling.

- **Attempt to Limit Milestones Durations to a Single Fiscal Year (or Less), Whenever Possible:** Many EPA projects had milestones that spanned one or more Fiscal Years (FY). This makes the task of reporting cost, performance, and EVM data in the OMB Exhibit 300 context much more complex. For milestones that are expected to run across FYs, breaking the milestones into phases (Phase 1, Phase 2) that correspond to a period not longer than the FY, or that start or stop at the beginning or end of a FY, often helps in evaluating performance and success given the FY-driven nature of Federal funding decisions and processes. Also, as mentioned previously, EVM is more effective when implemented from a “bottom-up” rather than a “top-down” approach. Milestones should be as small in duration as possible, to help in the identification and resolution of issues that might otherwise be obscured or go unnoticed within the context of large, multi-year milestones.
- **Establish Objective Measures for Determining Earned Value:** Many projects that did not have previous experience using EVM lacked truly objective methods for determining percent complete for their milestones. In some cases this resorted to more subjective methods/determinations for calculating percent complete and Earned Value. Establishing objective measures for earning value on specific milestones or portions of milestones is a crucial step in using EVM as a tool for improving project performance and results. For example, if one of the project’s milestones is “requirements specification completion,” determine how the value for this entire milestone will be earned over time, i.e., how will the percent complete for this milestone be determined? If there are five separate requirements specification documents/deliverables that when completed, constitute overall completion of the milestone, then assign a value to each of these five documents/deliverables. This will allow you to correlate the completion with a definitive percent complete. For example, Specification A, when completed, will constitute a 30% overall completion percentage for the requirements milestone, while completion of Specification B would correlate to a 20% completion percentage.

2. Increasing Consistency of Project Reporting

Using a standard reporting format and implementing a standard reporting cycle, EPA has improved the EVM data for portfolio analysis.

- **Use Standard Template for Reporting:** In the initial stages of the EVMS implementation process at EPA, projects were asked to provide information on key EVM metrics and data for evaluation by management. The format of this information was largely left up to the discretion of the Project Manager. It quickly became apparent that data submitted in a variety of different formats, e.g., Microsoft Word, Lotus 1-2-3, Microsoft Excel, made it very difficult to compare or aggregate data across projects.

As a result, EPA established a standard template for reporting EVM data for FY 2005 and beyond that will help ensure consistent data across projects for use in management analysis. This standardized Microsoft Excel template is now available on the Capital Planning and Investment Control (CPIC) Web site for all projects required to use EVM. Using the template will ensure that EVM calculations will be accurate and complete. It also allows data from multiple projects to be more easily aggregated for purposes of generating the Agency's EVM portfolio package. In addition, the template reduces the burden on the PM, as key metrics are auto-calculated for projects based on basic EVM data inputs. This allows the PMs to focus less on data entry and manipulation, and more on understanding the overall performance and direction of the project, and developing strategies to resolve any cost, schedule, or performance variances.

- **Institute Standard Reporting Cycles:** The Agency also implemented a quarterly review process for EVM data. Project data are submitted to the CPIC EVM team each quarter for purposes of analysis. An initial review of the data is performed, and any issues and/or questions related to the data are discussed and resolved prior to being presented to EPA Senior Management for analysis. This standardized process - in conjunction with the standard EVM template used to report EVM data - greatly enhance the effectiveness of the Agency EVMS.

3. Facilitating Management Analysis of EVM Data

While several of the lessons learned highlighted under Section 1 and 2 above have helped facilitate management analysis of EVM data, several additional lessons learned in FY 2004 have made analysis of EVM data by Agency Management easier.

- **Provide Both Numerical and Graphical Depictions of EVM Data:** Initially, much of the Agency-level data provided to EPA Senior Management for review was textual or numerical in nature; the only graphical display of EVM data was on a single project basis. As the information reported each quarter became more consistent from project to project, additional Agency-level graphical depictions were provided to assist in analysis of the Agency's IT portfolio as a whole (e.g., "Bulls-Eye" chart). These graphical outputs allow for quick recognition of problem projects and trends, and enable management to focus its resources on those projects or issues that require the most attention. Over time the Agency hopes to continue these efforts through use of automated tools and software suites that will enable a broad range of data presentation options, including a variety of graphical depictions for key EVM data.
- **Use Color-Coded Standardized Scoring System:** EPA has developed a color-coded, standardized scoring system - based on the OMB E-Government scorecard –

that quickly allows Senior Managers responsible for reviewing project performance to know where that project stands. Projects with a score of “Green” are considered in good standing, while projects scoring “Yellow” and “Red” indicate concerns that merit additional attention from Agency Management.

CONCLUSION:

By building upon these lessons learned in FY 2004, EPA will further strengthen its EVMS over the course of FY 2005. The Agency also will continue its commitment to continuous improvement in the area of Earned Value Management by focusing on routine quarterly training as well as expansion and improvement in documentation and guidance materials such as these.