ORACLE | **PRIMAVERA**

An Oracle White Paper
September 2009

Mastering Project Management Fundamentals Critical for Successful Earned Value Management

ORACLE

Executive Overview

Earned value management (EVM) is a program management technique that integrates cost, schedule, and technical performance to improve overall project management performance while reducing risk. This white paper explores the state of project management and the challenges in adopting EVM today. It then discusses how aerospace and defense organizations can leverage the EVM framework and fundamentals to establish project management best practices and further continuing maturity.

Introduction

Earned value is an essential element in predicting successful delivery, but to derive information that is the most valuable and realistic, an organization must employ standard and consistent project management practices that deliver that information with a high level of certainty.

Without the fundamentals of project definition, scheduling, and management firmly in place, the primary benefit organizations will see from EVM is in predicting cost and time to delivery rather than an improvement in how effectively they deliver projects. Before tackling the intricacies of EVM, organizations must focus on key project management practices and build a strong foundation for planning, execution, and delivery. By adopting 10 fundamental "EVM lite" practices, organizations will be better prepared to take on the challenges of EVM.

The State of Earned Value Management and Project Management Today

Although EVM is a requirement for aerospace and defense organizations, adoption remains a challenge. Organizations are finding that without reliable and clearly defined project management practices in place, EVM is difficult and too complex. Given the state of project management maturity, this is not surprising. In the 2006 "Project Management Maturity Benchmark" study issued by the Center for Business Practices, on a scale of 1 to 5 (with 1 being ad hoc processes), nearly 90 percent of all organizations surveyed were at Level 1 maturity; 96 percent of the low-performing organizations were at Level 1.[1]

With average maturity levels being so low, insisting on EVM as a standard practice may be a burden, especially given that gathering meaningful data requires greater project management discipline. Some organizations may initially reject implementing the necessary best practices. For those organizations that persevere, users will find that actively using EVM provides the support needed to successfully deliver projects. With consistent use of best practices and supporting tools, organizations will reap the benefits of integrating costs, schedules, and technical performance to provide early, detailed, ongoing, and actionable intelligence on the progress of every project—a crucial success factor in today's billion-dollar defense initiatives in the U.S.

Earned Value Management Requires Organizations to Take a Pragmatic Look at Their Approach to Project Management

By definition, EVM is a program management technique that integrates cost, schedule, and technical performance to improve overall project management performance while reducing risk. Understanding true project status and improving accuracy in forecasting cost and time or schedule required to complete means that project managers need to be extremely focused on the products and deliverables needed for successful completion.

Project management is almost as much art as it is a science; by tackling 10 fundamental practices, organizations will be better prepared to take on the challenges of EVM.

---

[1] The Center for Business Practices surveyed 81 project organizations. The respondents were not limited to a specific industry, and their organizations were of various sizes. For more information, see "Project Management Maturity – A Benchmark of Current Best Practices," 2006, The Center for Business Practices, www.cbponline.com.

EVM operates on the principle that at any point during a project, its status has three dimensions:

- **Planned value:** The work scheduled for a given point in the project and the budget earmarked for that work

- **Earned value:** The work actually accomplished in terms of the budget for that work

- **Actual cost:** The total amount spent on the completed work

These three values—planned, earned, and actual—enable program managers to determine the true performance of a program or one of its projects. Clarifying the difference between planned value and earned value reveals schedule progress; clarifying the difference between earned value and actual costs reveals the cost status of the reported work. According to the author of "Project Management Using Earned Value,"[2] a project team must clearly define three things to create the best-possible opportunity to achieve positive EVM (see Figure 1):

- **Technology:** Also known as scope of the project. As stated in the Project Management Body of Knowledge (PMBOK), the technical is the sum of the products, services, or results provided via the project.[3] Clear definition of technical scope is a prerequisite for successful EVM implementation.

- **Schedule:** The dates planned for completion of the project activities and milestones, which has a direct relationship to the resources, and ultimately, the cost of the project.

- **Cost:** The estimated cost of delivering the products or services that make up the program.

---

[2] Gary Humphreys, *Project Management Using Earned Value,* Humphreys & Assoc., 2002.

[3] "DoD Acquisitions: Contracting for Better Outcomes," testimony from the Government Accountability Office (GAO) before the U.S. House of Representatives Subcommittee on Defense on September 7, 2006.
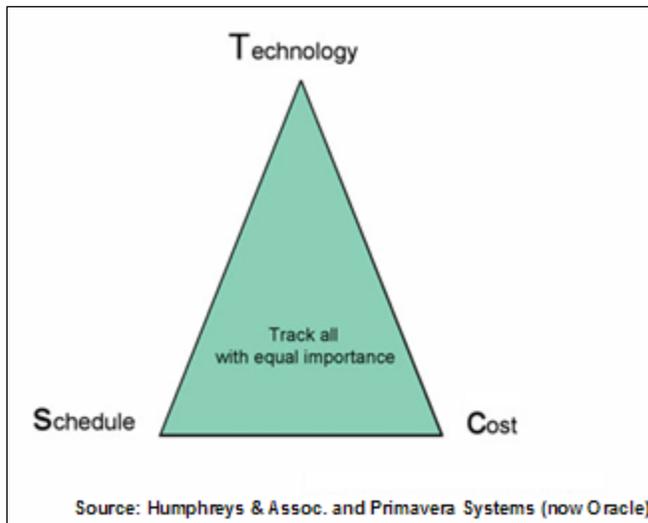
Figure 1. The three legs of a project

A Means to an End: Using Earned Value Management to Establish Project Management Best Practices

The greatest benefit gained by using EVM is its ability to predict project outcome and potentially prevent project failure. Relevant reporting requires accurate data, which can be obtained only by adoption of practices that support the key process areas required for compliance with the American National Standards Institute (ANSI)/Electronics Industry Association (EIA) standard 748. Organizations requiring process improvement can look to the 32 guidelines, divided across five categories, to determine where they should begin to develop their best practices. Although these guidelines, or process areas, do not provide the best way to meet the requirements, they do offer a descriptive framework of which steps must be included for compliance. The five categories are

- **Organization:** This section defines the work elements in a work breakdown structure (WBS) for the program and the organizational breakdown structure (OBS), which collectively establishes the framework for the integration of planning, scheduling, work authorization, budgeting, and cost management processes.

- **Planning, scheduling, and budgeting:** This section provides more-granular direction regarding the actual project planning process—including goals, milestones, and products— required to determine progress. It also describes various budget requirements such as undistributed budget and management reserve.

- **Accounting considerations:** This section drills down into what is required to capture and summarize direct and indirect costs from accounting systems as well as to track labor, subcontract, material, and other direct costs at the control account level.

- **Analysis and management reports:** This section describes reporting requirements for summary information, variance reporting for schedule and cost, and how to report data elements within the WBS and the OBS. Reporting also requires management action based on EVM analysis.

- **Revisions and data maintenance:** This section provides guidelines for managing technical, schedule, and cost change; budget reconciliation; and documentation support.

Implementing a project management methodology can be an exhaustive exercise; the PMBOK contains eight categories and 44 specific process areas as part of its framework. As noted above, most organizations lack the maturity to implement even a fraction of the suggested key process areas. The ANSI guidelines may be the answer. They were established to ensure that government organizations reduce project waste, but they can serve a broader purpose: helping organizations focus on building up best practices that will improve their ability to successfully deliver projects on time and within budget.

Getting Started: Using the ANSI/EIA-748 Standard as a Framework

Successful project management is critical to overall organizational effectiveness. According to *CIO* Magazine's 2007 survey, "State of the CIO," project management is the greatest skill set needed, according to 54 percent of the survey respondents. And, to become more effective, 72 percent have centralized their project management functions.[4] This provides a telling story.

The greatest benefit to be gained by using EVM is the ability to predict project outcome and potentially prevent project failure.

Organizations are chronically immature in their project management practices and continually look to existing frameworks such as PMBOK, PRojects IN Controlled Environments (PRINCE 2), or methodologies developed by consulting firms as the basis for their own practices. These frameworks all have their strengths but can be highly esoteric and difficult to apply in a real-world setting. EVM takes a pragmatic stance by asking the question "Are you getting what you paid for?" This can and does resonate with organizations. In a 2005 survey conducted for Oracle Corporation, 61 percent of the respondents found that EVM was critical in helping them attain organizational goals for capital investment.[5] To develop project management proficiency,

---

[4] The Project Management Body of Knowledge.

[5] *CIO* Magazine, "The State of the CIO," 2007, www.cio.com/state/stateofcio.pdf

organizations need to look at the critical elements of EVM as pragmatic stepping stones to prioritizing which project management processes are most important to successful delivery:

- **Statement of work (SOW):** Fundamentally, the SOW emphasizes developing a strong scope and supports robust management requirements as well as providing the baseline for controlling future change management best practices. Clarity in the SOW will reduce the risk of project derailment because of miscommunication or poor management expectations. SOWs ideally should include a broad description of the nature of the project work as well as the expected results and responsibilities of the internal organization and the contractors. It should also include expected project phases, work locations, work sequences, compliance requirements, and terms of delivery.

- **Work breakdown structure (WBS):** A WBS forces an organization to focus on the necessary work components and define the critical activities that make up each phase of a project. These components are essentially work packages that contain three essential elements: detailed scope, direct and indirect cost estimates, and a time frame for completion.

  - **Organization:** The standard refers to organization in the context of the project or program, but for organizations implementing best practices, viewing this from a broader perspective can help instill a project management culture. Defining authorized work elements and program organizational structures emphasizes the need for the distinctly defined scope and clearly defined roles required for accomplishing projects, including authority and responsibility.

  - **Control accounts:** Control account managers (CAMs) own their particular segments of the project or program. They are responsible for planning the scope, determining the estimates, building the timelines, and allocating resources. They are also responsible for collecting the metrics that determine the work packages' progress. For organizations unfamiliar with earned value or lacking the process maturity of organizational project management, using these practices promotes accountability by designating ownership of specific project segments.

  - **Program scheduling:** For many organizations, project management does not begin with determining what needs to be done or what the relationships are between the various components of the project but with a deadline that forces project teams to create backward-looking timelines. Starting with a WBS removes many of the mysteries of successful scheduling. As organizations begin to break project work into controllable components, the relationships and, more importantly, the dependencies between the projects are highlighted. Project managers can see where overconstraints might exist and can take proactive measures to prevent them.

  - **Budget allocation and resource planning:** One of the key differences between project organizations that actively use earned value and those that do not is that those proficient in EVM realize that cost and value are true indicators, not just schedules. These organizations

understand that knowing the estimated cost of completion will provide a realistic report of project progress and greater insight into which resources are required to complete the project on time. Many organizations, especially those with increasing investment in technology, are requiring hard-and-fast budget estimates for new projects. To get necessary funding and, more importantly, to keep that funding, business units require accurate and consistent reporting.

Using the Earned Value Management Top 10 Fundamentals to Support Continuing Maturity

As organizations put their framework in place, they can start implementing best practices by employing 10 steps often defined as "EVM Lite." This methodology maps to the ANSI/EIA-748 standard on EVM and its guidelines—including planning, scheduling, baselining, analyzing, and reporting—designed for large programs. Realistically, most organizations execute projects on a much smaller scale than the DoD. Although full-blown EVM may be overkill for these types of projects, employing the 10 guidelines listed below will successfully support a standard methodology regardless of project size (see Figure 2).
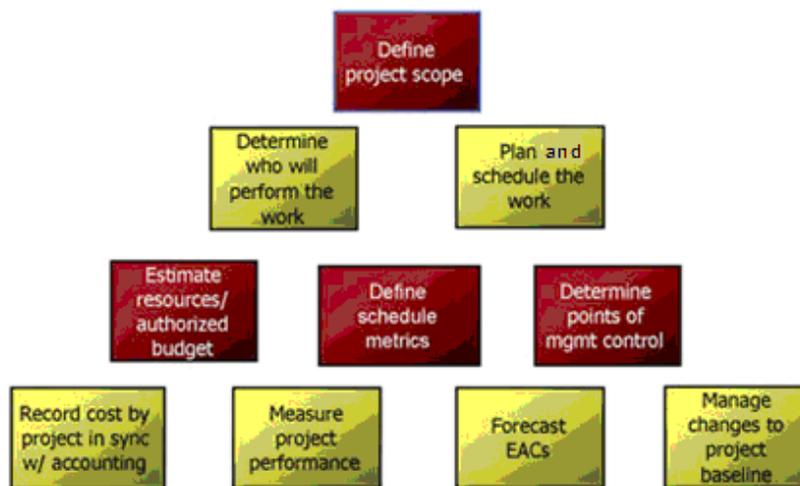

Figure 2. The 10 fundamental principles of EVM

1. **Define project scope:** Using a WBS, the EVM approach begins with a detailed dissection of a project into its components. The approach applies to all projects, including the complex, multimillion- or billion-dollar projects typically associated with the defense agencies and their contractors.

2. **Define required resources:** In this step, the manager loads the master schedule to provide a comprehensive estimate of all resources, including both agency and contractor time and materials.

3. **Plan and schedule:** The next step is to create a master schedule, using a critical path method (CPM) tool to ensure that the vital elements of the project are scheduled appropriately.

4. **Estimate required resources:** Budgets are created during this step, which incorporates scope, schedule, and resources for each segment of the WBS. These are the three primary responsibilities of every project manager at every stage of a project.

5. **Determine metrics required:** An EVM methodology compares the master schedule against the metrics of planned value and earned value as well as the actual cost to determine the two key status indicators: the cost performance index and the schedule performance index (SPI). Project managers set performance thresholds so the system clearly indicates when a project is performing outside desired thresholds.

6. **Form a project performance baseline:** Using the master plan of the scope and schedule, an EVM approach creates a baseline for performance comparisons throughout the project.

7. **Record all direct costs:** This involves tracking all direct costs associated with the project and ensuring that they are aligned with the authorized estimated budget. Project managers should report regularly on costs, but exact periods will vary from project to project.

8. **Manage the remaining work:** Because EVM compares actual progress against planned progress, it focuses attention on where to invest resources in the balance of the project, enabling the management-by-exception practices discussed earlier.

9. **Forecast final schedule and cost results:** Using the earned value methodologies, the next step is to estimate the project's final costs so that the project manager can anticipate and address any cost overruns.

10. **Manage project changes:** Finally, an effective EVM methodology simplifies management of the inevitable changes throughout a project's lifetime. In this way, the approach reflects the true scope and status of the evolving effort.

Applying EVM techniques pragmatically enables organizations to begin building critical disciplines that will set the stage for maturing their methodology. Once these practices are recognized and accepted, organizations can leverage tools to adopt these practices as a standard to increase their ability to get the most benefit from more-formal EVM methods.

Conclusion

Although EVM is a requirement for aerospace and defense organizations, adoption remains a challenge. The greatest benefit gained by use of EVM is its ability to predict project outcome and potentially prevent project failure. To develop project management proficiency, organizations need to look at the critical elements of EVM as pragmatic stepping stones to prioritizing which project management processes are most important for successful delivery. As organizations put their framework in place, they can start implementing best practices by employing the 10 "EVM Lite" practices, which map to ANSI/EIA-748 on EVM and its guidelines—including planning, scheduling, baselining, analyzing, and reporting—designed for large programs.

About the Authors

Gary Humphreys has more than 30 years of program management experience in both government and commercial environments, specializing in performance measurement/earned value systems design, development, and implementation. He was the first U.S. Army Team Director to conduct an Earned Value Management System (EVMS) Tri-Service Demonstration at the Litton Data Systems Division. He has developed a successful consulting practice operating out of Orange, California. As the premier consultant in this field, he has assisted more than 500 clients, from aerospace firms to utilities companies, to England's Inland Revenue Service (IRS) and shipbuilding companies in North America, Australia, and Europe. He served as both the past vice chairman and chairman of the National Defense Industrial Association (NDIA) Management Systems Subcommittee (MSS) and as a member of the NDIA Procurement Planning Committee. He is the author of "Measuring Project Performance," in *Systems Development Management* (Auerbach, 1982), and coauthor of *Project and Production Scheduling* (Probus, 1987) as well as numerous articles for the American Production and Inventory Control Society (APICS) linking manufacturing resource planning (MRP II) and earned value.

Margo Visitacion, formerly a marketing manager in the public sector and aerospace-and-defense areas at Primavera Systems, Inc. (now Oracle Corporation), is currently vice president of research at Forrester Research.

ORACLE®

Mastering Project Management Fundamentals
Critical for Successful Earned Value
Management
Updated September 2009
Author: Gary Humphreys and Margo Visitacion
Contributing Author: Margo Visitacion

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200
oracle.com

Oracle is committed to developing practices and products that help protect the environment

0909