

**Project Management
Institute
Practice Standard for
Earned Value Management**

Exposure Working Draft

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Preface

The *Earned Value Management (EVM) Practice Standard* has been developed as a supplement to *A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*. The *EVM Practice Standard* is designed to provide readers who are familiar with the *PMBOK® Guide* with a fundamental understanding of the principles of EVM and its role in facilitating effective project management.

The *EVM Practice Standard* assumes that the reader has a basic working knowledge of the project management process groups, knowledge areas and other key concepts, such as work breakdown structures (WBS) and critical path method (CPM) scheduling, which are outlined in the *PMBOK® Guide*. If that is not the case, it is recommended that the reader undertake a review of the *PMBOK® Guide* before reading the *EVM Practice Standard*.

The *EVM Practice Standard* is organized as follows:

Introduction. A brief overview of EVM, highlighting the key management questions EVM can help answer and exploring where EVM fits into the project management universe.

Basic Elements of Earned Value Management. This section discusses the three cornerstones of EVM: ***Planned Value (PV)***, ***Earned Value (EV)*** and ***Actual Cost (AC)***. It examines how these three data points are determined and how they relate to one another.

EVM Performance Analysis and Forecasting. This section describes variances, indices and forecasts that can be developed using ***Planned Value***, ***Earned Value*** and ***Actual Cost***. The chapter also examines how these variances, indices and forecasts can be used to answer essential management questions.

Guidance for the Use of Key EVM Practices. This section outlines basic EVM practices in their project management context, and shows how EVM practices facilitate project planning and control for better management of project cost and schedule performance.

Glossary. This section provides concise definitions of key terms used in earned value management that are introduced in the practice standard.

Appendices. These offer additional sources of EVM concepts and methods for further study and information related to the development of the practice standard.

Chapter 1 Introduction

1.1 The Role of Earned Value Management

Feedback is critical to the success of any project. Timely and targeted feedback can enable project managers to identify problems early and make adjustments that can keep a project on time and on budget.

Earned Value Management (EVM) has proven itself to be one of the most effective performance measurement and feedback tools for managing projects. It enables managers to close the loop in the classic business formula, “Plan, Do, Check, Act.”

EVM has been called “management with the lights on” because it can help clearly and objectively illuminate where a project is and where it is going—compared to where it was supposed to be and where it was supposed to be going. EVM uses the fundamental principle that patterns and trends in the past can be good predictors of the future.

EVM provides organizations with the methodology needed to integrate the management of project scope, schedule, and cost. EVM can play a crucial role in answering management questions that are critical to the success of every project, such as:

- Are we ahead of or behind schedule?
- How efficiently are we using our time?
- When is the project likely to be completed?
- Are we under or over our budget?
- How efficiently are we using our resources?
- What is the remaining work likely to cost?
- What is the entire project likely to cost?
- How much will we be under or over budget?

If the application of EVM to a project reveals that it is behind schedule or over budget, the project manager can use the EVM methodology to help identify:

- Where problems are occurring;
- Whether the problems are critical or not;
- What it will take to get the project back on track.

1.2 EVM and the Project Management Process

Effective use of EVM requires that it be used on projects where the principles of good project management, as outlined in the *PMBOK® Guide*, are being applied. To establish a basic foundation for understanding EVM’s role in effective project management, it is important that we examine the relationship between EVM and the *PMBOK® Guide*’s process groups and knowledge areas.

Project management is primarily a matter of planning, executing and controlling work. Figure 1-1 indicates the areas of project management to which EVM is most applicable.

Figure 1-1: EVM and Project Management

Knowledge Areas	Process Groups				
	Initiating	Planning	Executing	Controlling	Closing
Integration		✕	✕	✕	
Scope		✕		✕	
Time		✕		✕	
Cost		✕		✕	
Quality					
Human Resources					
Communications		✕	✕	✕	
Risk		✕		✕	
Procurement					

Project planning is mostly a matter of determining:

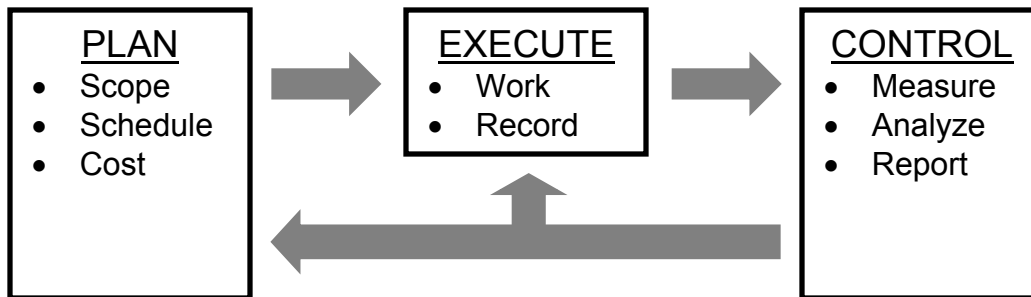
- What work must be done (scope) and in what pieces (work breakdown structure);
- Who is going to perform and manage the work (responsibility assignment matrix);
- When the work is going to be done (schedule);
- How much labor, materials and related resources the work is going to require (cost).

Project execution is primarily a matter of doing the planned work and keeping workers and managers informed.

Project control focuses mostly on monitoring and reporting the execution of project plans related to scope, schedule and cost, along with quality and risk. In other words, project control is a process for keeping work performance and results within a tolerable range of the work plan.

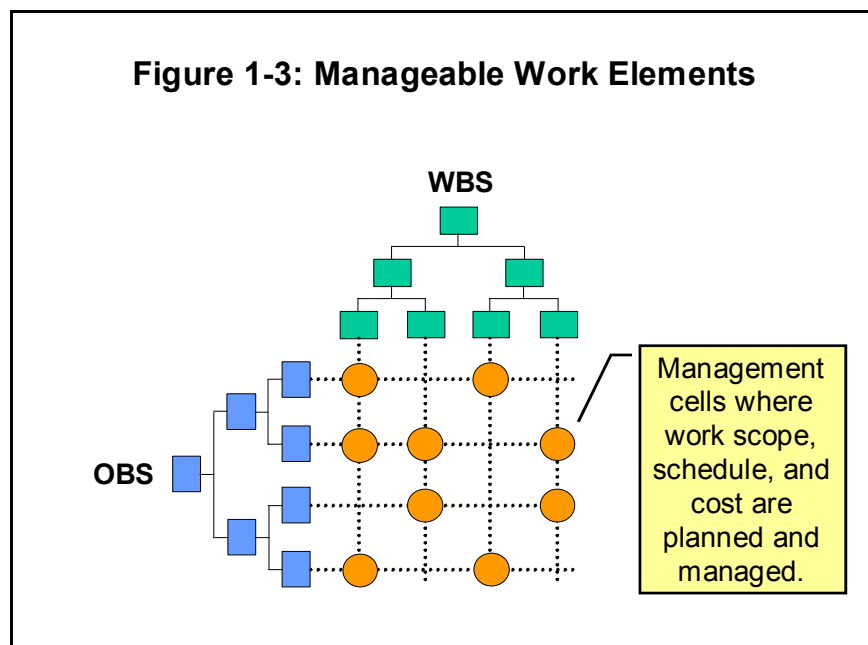
As a performance management methodology, EVM adds some critical practices to the project management process. These practices occur primarily in the areas of project planning and control, and are related to the goal of measuring, analyzing, forecasting, and reporting cost and schedule performance data for evaluation and action by workers, managers and other key stakeholders. See Figure 1-2.

Figure 1-2: EVM and the Basic PM Process



During the project Planning Process Group, EVM requires that a performance measurement baseline (PMB) be established. This requirement amplifies the importance of project planning principles, especially those related to scope, schedule and cost. EVM elevates the need for project work to be executable and manageable, and for the workers and managers to be held responsible and accountable for its performance.

Project work needs to be broken down (using a work breakdown structure) into executable tasks and manageable elements (often called control accounts). Each of the work elements needs to be managed by an individual or a team. All of the work needs to be assigned to the workforce for execution (using an organization breakdown structure, or OBS, yielding a responsibility assignment matrix). See Figure 1-3 and Box 1-1.



Project work needs to be logically scheduled and resourced in a work plan, and the work scope, schedule, and cost need to be integrated and recorded in a time-phased budget, referred to as a performance measurement baseline (see Figures 1-4, 1-5, and 1-6).

Also in the planning process, the means for assessing physical work progress and assigning budgetary earned value need to be established. In addition to routine project management planning, earned value measurement techniques are selected and applied for each work task, based on scope, schedule and cost considerations.

In the project execution process, EVM requires that resource utilization (i.e., labor, materials, and the like) be recorded for the work performed within each of the work elements included in the project plan. In other words, actual costs need to be captured in such a way that permits their comparison with the performance measurement baseline.

In the project control process, EVM requires that physical work progress be assessed and budgetary earned value be credited (using the selected earned value measurement techniques) as prescribed in the project plan. With these earned value data, the planned value data from the PMB, and the actual cost data from the project cost tracking system, the project team can perform EVM analysis at the control account and other levels of the project WBS, and report the EVM results as needed.

In summary, EVM strategically augments good project management to facilitate the planning and control of cost and schedule performance. The key practices of EVM are the following:

- Establish a Performance Measurement Baseline (PMB)
 - Decompose work scope to a manageable level
 - Assign unambiguous management responsibility
 - Develop time-phased budget for each work task
 - Select EV measurement techniques for all tasks
 - Maintain integrity of PMB throughout the project.
- Measure and analyze performance against the baseline
 - Record resource usage during project execution
 - Objectively measure the physical work progress
 - Credit earned value according to EV techniques
 - Analyze and forecast cost/schedule performance
 - Report performance problems and/or take action.

Chapter 2 provides a detailed explanation of the three basic elements of EVM: ***Planned Value, Earned Value and Actual Cost.***

Figure 1-4: Work Plan – Gantt Chart

Task						May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	8	4	4										
2	32		8	8	8	8							
3	14					0	14						
4	12							6	6				
5	18								9		9		
6	16										8		8
Σ	100	4	12	8	8	8	14	6	15	0	17	0	8
CUM	-	4	16	24	32	40	54	60	75	75	92	92	100

Figure 1-5: Work Plan -- Area Chart

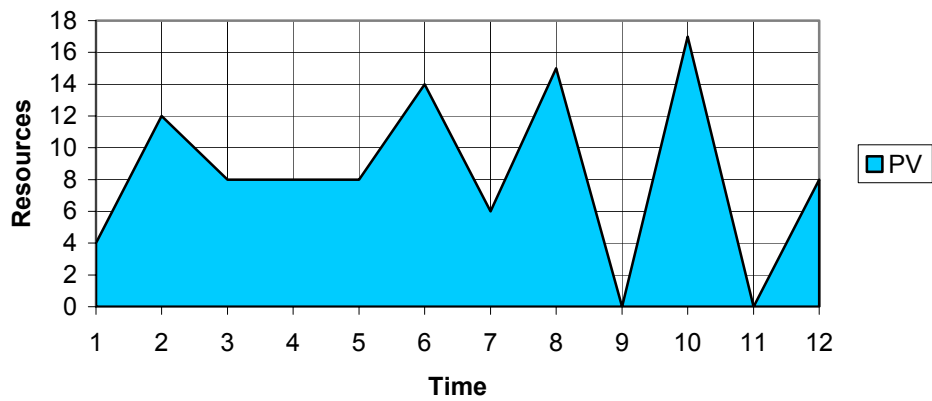
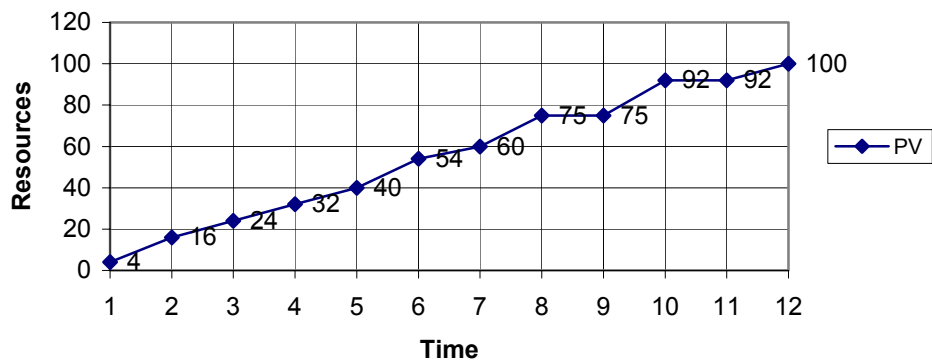


Figure 1-6: Performance Measurement Baseline (PMB)

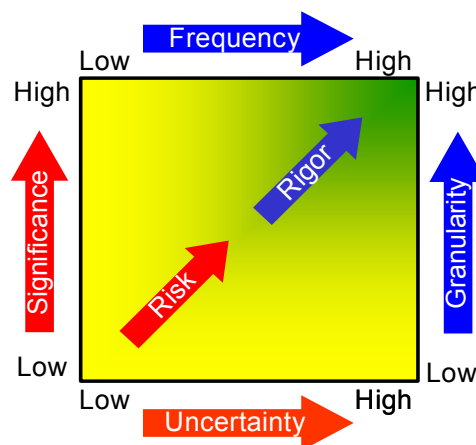


Box 1-1: Scaling EVM to Fit Varying Situations

Obviously, project situations can and do vary in numerous ways. EVM, as well as project management, needs to be tailored to fit the specific situation if it is to be effective and efficient. Project situations vary along two fundamental dimensions: the significance and the uncertainty of the project. The first has to do with the impact of success or failure and the second has to do with the likelihood of success or failure. Factors that affect significance include financial, political, and environmental considerations, while factors that contribute to project uncertainty include its size, complexity, and duration. These and other uncertainty factors can interact with the project management maturity of the performing organization to amplify or dampen their effects.

As project significance and uncertainty increase, the rigor with which EVM is applied also needs to increase. There are two basic dimensions to EVM rigor: the granularity and the frequency of the measurement of project performance. Granularity refers to the level of detail to which the project work scope is broken down using a WBS. Frequency is the time interval at which project performance is assessed, analyzed and reported, ranging from daily to monthly or longer. EVM implementation can be scaled along these two dimensions (granularity and frequency) to achieve the degree of rigor required by the significance and the uncertainty of the project. The figure below shows a notional model of the “risk-rigor” relationship.

EVM Rigor as a Function of Project Risk



Chapter 2 Basic Elements of Earned Value Management

As indicated in Chapter 1, EVM relies on three key data points:

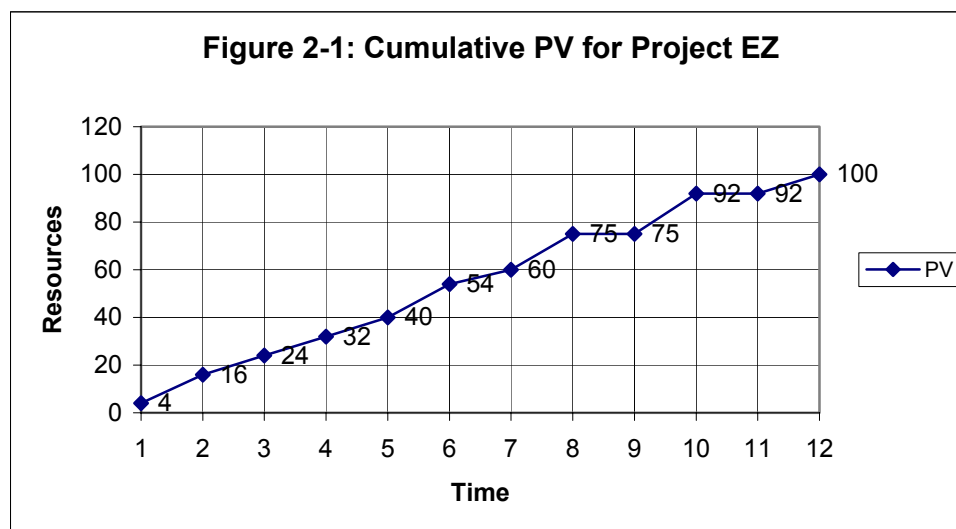
- **Planned Value**
- **Earned Value**
- **Actual Cost**

This chapter will describe each of these data points and discuss how they are derived. We will use a simple example, “Project EZ”, throughout this chapter and the next to help explain these data points and other essential elements of EVM. Project EZ is a hypothetical project that could represent anything from the building of a house, to the development of a new software program, to the production of an airplane, or a host of other projects. The fundamentals of EVM are the same, regardless of the type or size of project to which they are being applied.

2.1 Descriptions of the Basic EVM Elements

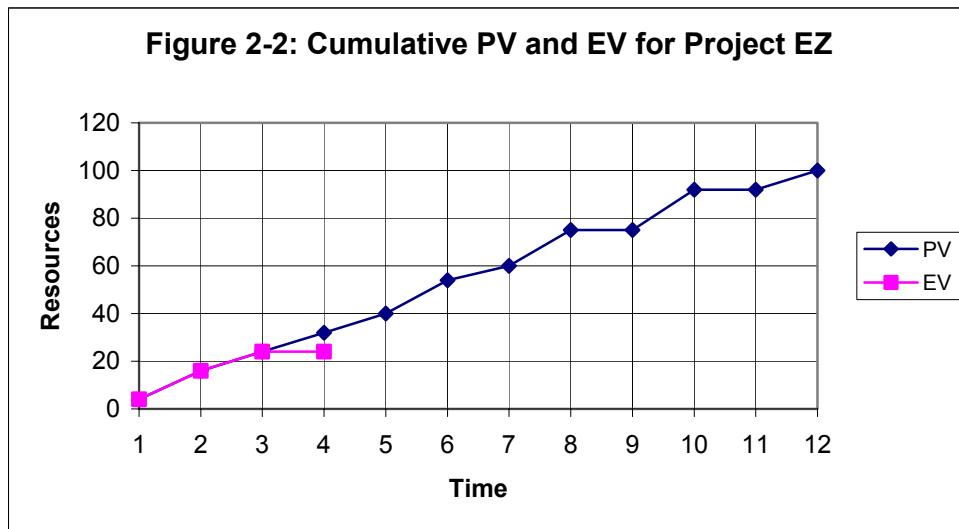
What is Planned Value?

Planned Value (PV) describes how far along a project is supposed to be at any given point in the project schedule. It is a numeric reflection of the budgeted work that is scheduled to be performed, and it is the established baseline (also known as the performance measurement baseline) against which the actual progress of the project is measured. Once it is established, this baseline may change only to reflect cost and schedule changes necessitated by changes in the scope of work. Also known as the **Budgeted Cost for Work Scheduled (BCWS)**, **Planned Value** is usually charted showing the cumulative resources budgeted across the project schedule. Figure 2-1 shows the **Planned Value S-Curve** for Project EZ.



What is Earned Value?

Earned Value (EV) is a snapshot of a project at a given point in time. Also known as the **Budgeted Cost for Work Performed (BCWP)**, it reflects the amount of work that has actually been accomplished, expressed as the planned value for that work. Figure 2.2 shows the **Earned Value** for Project EZ at the four-month mark, and indicates that less work than planned has been accomplished.



What is Actual Cost?

Actual Cost (AC), also known as the **Actual Cost of Work Performed (ACWP)**, is an indication of the level of resources that have been expended to achieve the actual work performed to date or in a time period. Figure 2-3 shows the **Actual Cost** for Project EZ at the four-month mark, and indicates that the organization has spent more than it planned to spend to achieve the work performed to date.

