

AACE
INTERNATIONAL
RECOMMENDED
PRACTICE

81R-13

**REQUIRED SKILLS AND KNOWLEDGE
OF EARNED VALUE MANAGEMENT**

SAMPLE

AACE
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AAACE® International Recommended Practice No. 81R-13

REQUIRED SKILLS AND KNOWLEDGE OF EARNED VALUE MANAGEMENT

TCM Framework: General Reference

8.1 – Project Control Plan Implementation

9.1 – Project Cost Accounting

9.2 – Progress and Performance Measurement

10.1 – Project Performance Assessment

10.3 – Change Management

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Note: As AAACE International Recommended Practices evolve over time, please refer to www.aacei.org for the latest revisions.

Contributors:

Disclaimer: The opinions expressed by the authors and contributors to this recommended practice are their own and do not necessarily reflect those of their employers, unless otherwise stated.

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AACE® International Recommended Practice No. 81R-13
**REQUIRED SKILLS AND KNOWLEDGE OF EARNED
VALUE MANAGEMENT**



TCM Framework: General Reference

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INTRODUCTION

This recommended practice (RP) is intended to serve as a guideline, not a standard. As a recommended practice of AACE International, the intent of the guideline is to define the required skills and knowledge to perform earned value management (EVM). It serves as an important foundation of the skills and knowledge of an AACE certified Earned Value Professional (EVP) and provides an outline for its study guide.

EVM integrates scope, schedule, and cost along with budget and performance measurement within a project framework. It is a method for project progress measurement analysis and control that combines work scope, schedule, and resource evaluation to enable objective comparison of the planned schedule of the project to the work completed along with its actual costs.

The RP highlights the necessary skills and knowledge of EVM. It identifies competencies for an EVM practitioner, across any industry, portfolio, program, or project. Detailed skills, knowledge and methodology, are excluded from this recommended practice.

This RP is aligned with RP 11R-88, *Required Skills and Knowledge of Cost Engineering* and the *Total Cost Management (TCM) Framework*, as well as the *American National Standards Institute (ANSI) Electronics Industries Alliance (EIA) - 748 Earned Value Management Systems (EVMS)* guidelines.

RECOMMENDED PRACTICE

The progress and performance measurement process defined in the *TCM Framework* requires a variety of processes in order to accurately monitor and control scope, schedule, and resources, in order to objectively compare the work performed to the actual cost and the planned schedule of the project.

This RP discusses the core competencies required for EVM. Specifically, EVM includes the following areas throughout the life-cycle of the project (or portfolio of projects):

- A. Organization;
- B. Planning, scheduling and budgeting;
- C. Accounting considerations;
- D. Analysis and management reports; and
- E. Revisions (change management) and data maintenance.

A. Organization:

The EVM practitioner assists the project management team to organize the work for planning the specific project or task, throughout its life-cycle. This includes providing a definition of all specific project activities and those responsible for these activities. The process to organize the work includes:

1. Define the project or task scope of work and the groups or individuals that will be responsible for the

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- various execution phases of any task or project.
2. Understand the work breakdown structure (WBS).
 3. Understand the organizational breakdown structure (OBS).
 4. Understand the dynamics of the organizational structure and how to develop and maintain the responsibility assignment matrix (RAM) describing the relationship between the OBS and the WBS.
 5. Determine control accounts (CAs) and the duties and functions of a control account manager.

B. Planning, Scheduling and Budgeting:

The EVM practitioner assists in the establishment of a valid schedule to monitor project progress for performance measurement – including:

- the initial plan and scope development
- identify objective indicators to measure work progress and track resources
- time phase the work and budget across the schedule; this becomes the performance measurement baseline (PMB)
- to organize activities at the control account level
- considerations for project or task uncertainties

A time phased budget is the PMB (or the plan) that is used to monitor and track project progress.

This requires the following skills and knowledge:

1. Understand basic principles of the critical path method for project schedules. This includes a familiarity with the analytical aspects for schedule analysis, including knowledge of how critical path is calculated and the schedule float management.
2. Explain the different types of activity float and their impact on the critical path.
3. Understand basic estimating approaches applicable to the type of work.
4. Develop time phased cost and schedule estimates.
5. Assign budgets to specific activities for schedule sequences of work.
6. Understand the list of deliverables and milestones for the task or project.
7. Understand that the PMB is developed through the assignment of budget and resources to work scope.
8. Understand that the PMB is comprised of CAs, summary level planning packages (SLPPs) and undistributed budget (UB).
9. Understand how cost and schedule risk are calculated and managed.
10. Understand how earned value is used to measure the performance of a project or task.
11. Understand various methods for measuring physical progress consistent with EVM.
12. Understand the work authorization process at the control account level.

In addition, the EVM practitioner will have to understand the work authorization process; required to assign and implement the approved work scope to various levels of the organization.

C. Accounting Considerations:

The EVM practitioner's duties for this area are to understand how the earned value management system (EVMS) applies generally accepted principles for accounting (e.g., GAAP (generally accepted accounting principles) in the United States) for recording actual costs for a project or activity.

This includes the following skills:

1. Have a basic understanding of the accounting system including elements of cost and primary direct cost elements.

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2. Understand cost accrual methods, including direct and indirect cost management methods.

D. Analysis and Management Reports:

The EVM practitioner's duties for this area are to understand and analyze information that is reported on a regular basis (typically monthly), using actual cost data from, or reconcilable with, the accounting system for management of a project or activity. These analyses are summarized as follows:

1. Comparison of the amount of work completed [earned value (EV)] with respect to the amount of planned work [planned value (PV)] for a given period of time in order to evaluate the task or project performance for that time period. This comparison provides the schedule variance (SV).
2. Comparison of the amount of the work completed amount of planned work completed (PV) and the amount of the actual cost (AC) for the same work. This comparison provides the cost variance (CV).
3. Division of the work completed (EV) by the planned value for a given period of time in order to evaluate task or project performance for that time period. This division provides the schedule performance index (SPI) a measure of the schedule efficiency to date.
4. Division of the EV by the AC for a given period of time in order to evaluate the task or project performance for that time period. This division provides the cost performance index (CPI) a measure of the cost efficiency to date.
5. Comparison of the budget at completion (BAC) and estimate at completion (EAC). This comparison provides the variance at completion (VAC). A positive number indicates an under-run at project completion. A negative number indicates an over-run at project completion.
6. Evaluate and identify schedule issues (SV), cost issues (CV). Identify the reason for the variance (including root cause, if possible), their potential impact to the project and a corrective action plan. Communicate these issues, including their potential impact and a corrective action plan effectively to executive level decision makers both verbally and in writing.

The ability to perform the aforementioned analyses includes the following abilities and knowledge:

1. Understand different methods for calculating EAC throughout the life-cycle of a project.
2. Understand the contribution of sub-contracts to total project costs.

E. Revisions (Change Management) and Data Maintenance:

Change management refers to the process of managing any change to the scope of work and/or any deviation, performance trend, or change to an approved or baseline project control plan.

The EVM practitioner's duties for this area are to understand how to properly document any and all changes to the project or task work documents. These documents become official records of the project and must be maintained throughout their lifecycle up to some finite end date. All related details should be contractually agreed upon before work begins. When an authorized change is received, all affected work documents are to be updated in a timely manner to reflect the change. These analyses are summarized as follows:

1. Know how to control and document changes to the baseline.
2. Understand all aspects of integration between work authorization, scheduling, accounting, indirect, cost, analysis, EAC, and revisions.

SKILLS AND KNOWLEDGE

EVM contains many elements of the project controls process as described in the *TCM Framework, Part III. PROJECT CONTROL PROCESS*. The TCM framework processes are consistent with EVM methods. This is illustrated by the TCM process map for project performance measurement (Section 9.2) shown in Figure 1 that includes general

measurement steps that apply to EVM, as well as the process map for project performance measurement (Section 10.1) shown in Figure 2 that includes general project assessment steps applicable to EVM. It should be noted that there are a number of other areas within TCM that are applicable in EVM (for example, but not limited to: 8.1 – *Project Control Plan Implementation*, 9.1 – *Project Cost Accounting*, and 10.3 – *Change Management*).

The intent of this section is to identify and define specific and related EVM skills within the framework of TCM. EVM broadly touches many functions that are required to effectively perform project controls.

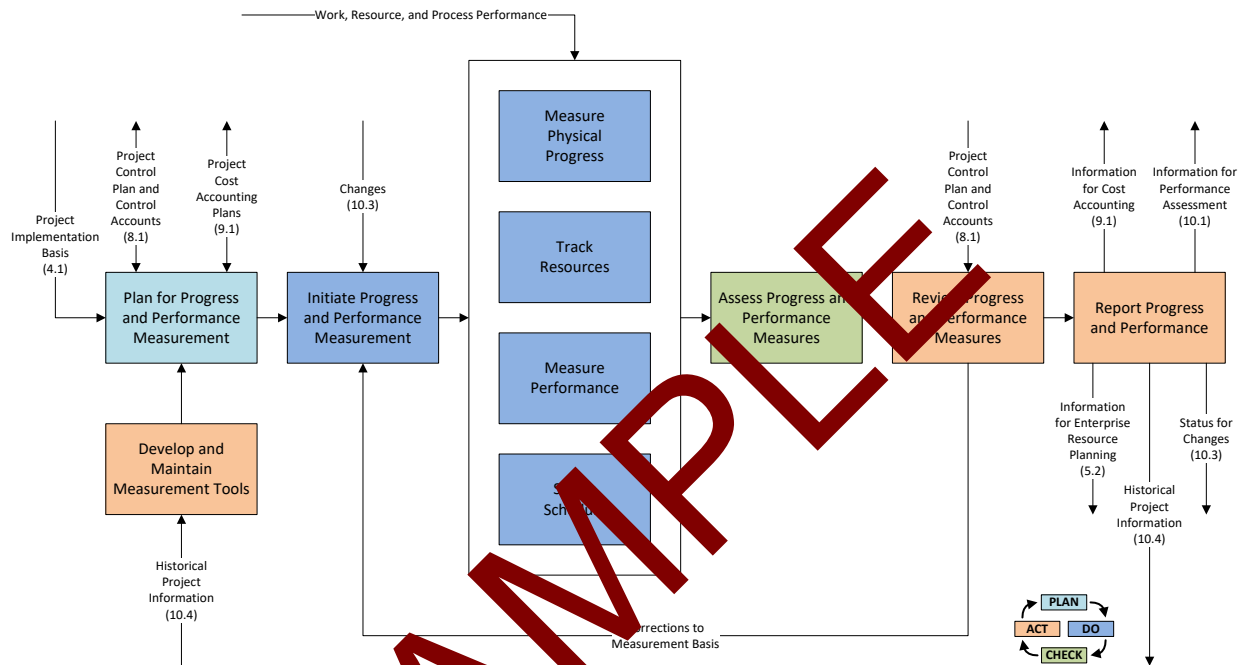


Figure 1 — (TCM Figure 9.2-1) Process Map for Performance Measurement

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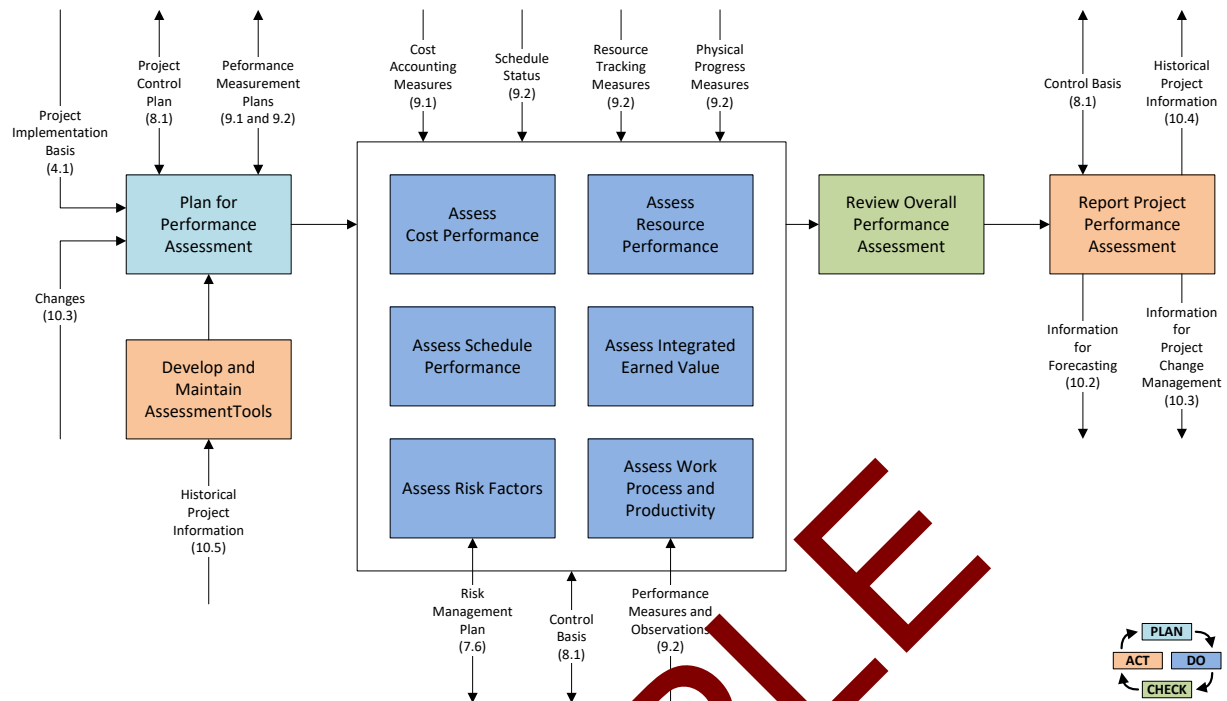


Figure 2 – (TCM Figure 10.1-1) Process Map for Project Performance Assessment

Figure 3 illustrates the hierarchical structure of the required skills and knowledge of EVM. The first level of the structure differentiates between general supporting knowledge used in more than one practice or process, and specific practice knowledge used in particular practices or process steps. Succeeding levels further break down the content to whatever level is appropriate for each skills and knowledge area. The location of a skill or knowledge element in the level of the outline does not reflect on its relative importance.

The structure is organized in accordance with the plan, do, check, and assess (PDCA) process model that serves as the basis for the *TCM Framework* through which all the skills and knowledge of cost engineering are applied. TCM is not structured by a practitioner's work function. For example, earned value practitioners will not find all of their required skills and knowledge under one heading.

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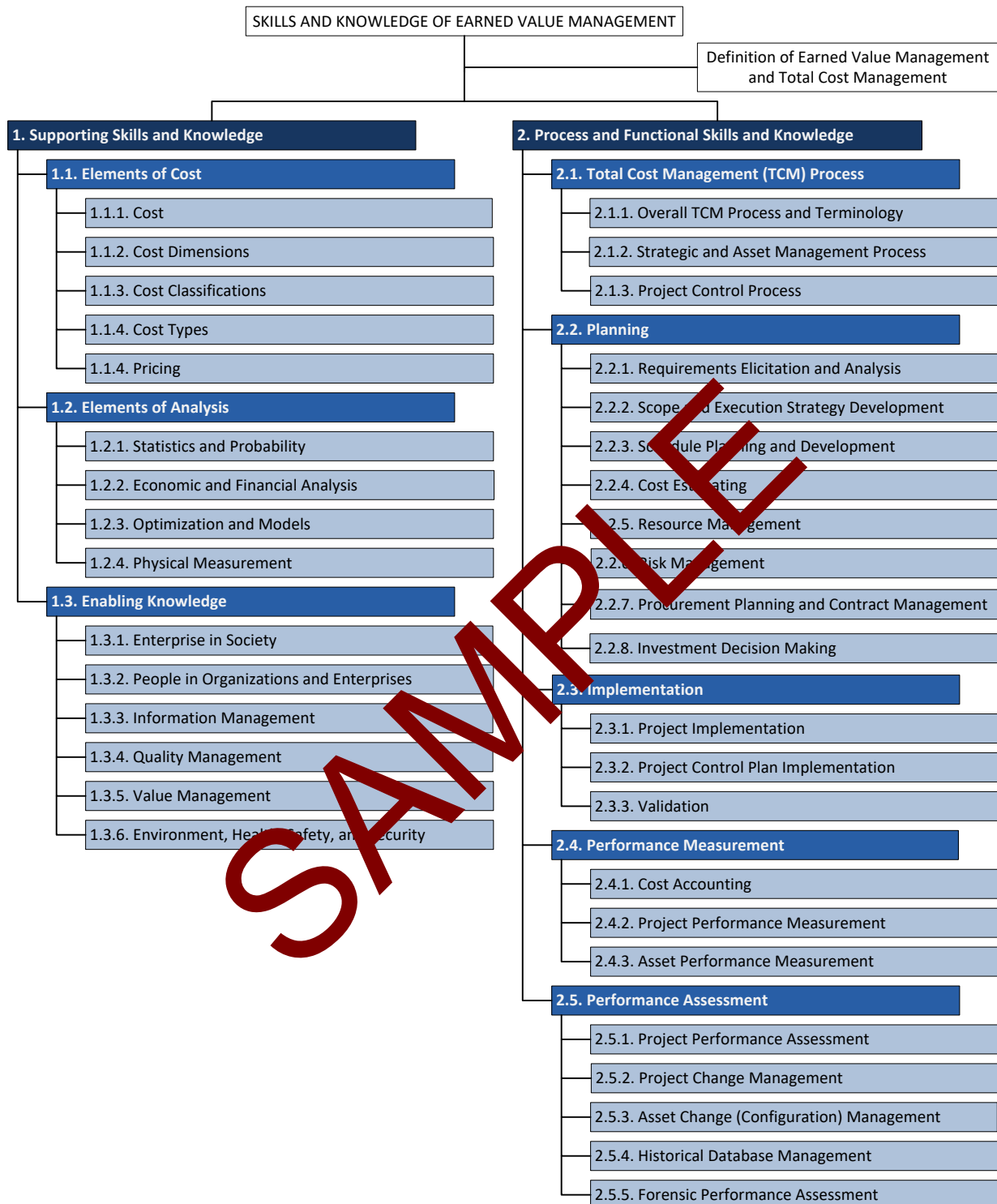


Figure 3 — High Level Outline of the Skills and Knowledge of Earned Value Management

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In the following detailed outline, a “P” in the leftmost column indicates key concepts that form the major emphasis for the AACE International Earned Value Professional (EVP) certification examination; while an “S” identifies concepts with less emphasis in the examination (although not necessarily of less importance).

OUTLINE OF THE SKILLS AND KNOWLEDGE OF EARNED VALUE MANAGEMENT (P = Primary, S= Secondary)	
P/S	1. Supporting Skills and Knowledge
P	1.1. Elements of Cost
P	1.1.1. Cost: be able to define/explain these general concepts in relation to each other and to assets and/or activities.
P	Resources
P	Time
P	Cost
P/S	1.1.2. Cost Dimensions:
P	Lifecycle: be able to describe this term and differentiate the life cycle of an asset and a project
S	Process (product vs. project): be able to describe and differentiate the cost characteristics and types (see cost types below) that make up product and project costs.
S	Be able to distinguish among products, co-products, and byproducts.
P	Responsibility: be able to describe and differentiate the cost perspectives of an owner and a contractor/supplier
S	Valuation: be able to describe and differentiate cost from cash/monetary versus economic/opportunity costs (also see economic analysis) perspectives.
	Influence: be able to explain the concept of the cost influence curve
S	Legal:
S	Be able to explain how cost and schedule analysis practices might differ when applied for forensic versus traditional planning and control purposes.
S	Be able to describe some potential legal consequences that may result from using poor or unethical cost management practices (e.g., anti-trust, claims, Sarbanes-Oxley, etc)
P/S	1.1.3. Cost Classifications: for the following classifications, be able to:
P	Explain the general differences between the ways costs are classified for various cost management purposes
P/S	Given a problem with appropriate cost classification inputs (e.g., indirect cost using ABC classification method), be able to calculate how the cost would be accounted for in a project or product estimate
S	Operational (Production, Manufacturing, Maintenance, etc.) vs. Capital
S	Capital vs. Expense
S	Depreciation
S	Amortization
S	Accrual
P	Fixed vs. Variable
P	Direct vs. Indirect
P	Activity-Based Costing (ABC)
P	Job Costing
P	1.1.4. Cost Types: for the following cost types, given cost type and classification inputs, be able to apply them in a project or manufacturing estimating application (i.e., for project or product cost)
P	Materials:
P	Materials types: be able to describe the types and their cost drivers:
P	Raw
P	Bulk
P	Fabricated
P	Engineered or designed
P	Consumables