



National Defense Industrial Association
Integrated Program Management Division

Earned Value Management Systems EIA-748-E Intent Guide

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Intent Guide Change History Log

Date	EIA Version	Change Summary/Notes
First Release Nov 2004	A	The content of this first release was the product of a joint working group effort between the NDIA PMSC, DCMA, and OSD.
January 2005	A	Revised the Purpose and Scope content with a new Appendix A.
December 2005	A	Update reflected a comprehensive review of the content and incorporated comments from industry and government throughout the document.
January 2006	A	Modified the copyright statement to conform to the GEIA copyright notice for reprinting the EIA-748 guidelines.
September 2006	A	Incorporated comments throughout the document from the intelligence community.
Second Release Nov 2006	A	This release was a culmination of comments from industry, DCMA, the intelligence community, and civilian agencies. It was formally recognized in a February 20, 2007 letter from Kenneth J. Krieg, Under Secretary of Defense, Acquisition, Technology and Logistics.
June 2009	B	Update reflected the EIA-748 reaffirmation process for Version B and minor text edits. EIA Standard Guidelines 19 and 21 revisions were incorporated. Text edits included: • Purpose and Scope section to clarify the purpose of the list of typical attributes and use of the appendix. Added a definition for critical path. • Guideline 5, Intent edits discussing one or more responsible organizations supporting a single WBS. Added Figure 1 to illustrate. • Guideline 10, Attribute 1 was deleted. • Guideline 16, Intent edits added text to note that actual costs are typically at the control account level. • Guideline 21, Intent, characteristics list, item 2 edits discussing material performance measurement, and edits for list items b. and c. • Guideline 27, Attribute bullet 4 edits to reiterate actual costs at the control account level in relation to the estimate to complete.
Third Release May 2011	B	This release reflected DCMA agreement for updates to Guidelines 5, 10, and 21. • Guideline 5, Intent, second paragraph. Text was added that read: "There also may be multiple control accounts within a responsible OBS element when the effort within a WBS element must be segregated for management control purposes driven by scope and exit criteria (i.e., completion of task scope). The establishment of multiple control accounts should be determined by the control account's scope of the management tasks and consideration for planning and control of budgets, schedules, work assignments, progress assessment, problem identification, and corrective actions." • Guideline 10, Typical Attributes. Added an attribute bullet (new first bullet) that discussed the control account plans (CAPs) representing the work assigned to one responsible organizational element on one program WBS element. This added the text previously deleted in the June 2009 back in with an additional sentence at the end that read:

Date	EIA Version	Change Summary/Notes
		“Under some circumstances additional levels of detail may be needed to segregate LOE versus Discrete effort, multiple elements of cost, and multi-functional elements.” Guideline 21, Typical Attributes, bullet 4. Corrected the algorithms for material price and usage variances. This release of the Intent Guide was formally recognized as being consistent with DoD EVM Policy in an April 20, 2011 letter from Gary R. Bliss, Director, Performance Assessments and Root Cause Analyses (PARCA). This was the last release formally recognized by the DoD.
August 2012	B	Made changes to Guidelines 8 and 30. - Guideline 8, Intent. Paragraphs were added at the end of the Intent section to discuss the option of establishing an internal operating budget should a customer not approve an OTB. - Guideline 30, Intent. Sentence was added that read “The cumulative values for BCWS and BCWP will not be adjusted for routine direct and/or indirect cost rate increases or decreases.”
April 2014	C	Update reflected the reaffirmation of the EIA-748 and comments received on the Intent Guide provided for public comment. - Incorporated updates from the EIA-748 reaffirmation process (Version C). This included changes incorporated into the standard text as well as addressing comments from the reaffirmation process that applied to the Intent Guide. - Made consistency and clarification edits throughout and applied the standard document style used for all IPMD guides as part of IPMD three year mandatory guide review cycle. - Removed specific references to named DID reports to use more generic terms as a result of DID updates and broader use of the Intent Guide. - Incorporated ease of use updates such as adding short guideline descriptions and including them in the Table of Contents. - Changed approach to Appendix A (compliance template) so it is a separate document that can be downloaded as a source MS Word file. - Incorporated comments from industry, the intelligence community, and the DOE on the draft provided for public comment. - Changed all NDIA PMSC references to IPMD. - Relabeled Section 1, Purpose and Scope to “Introduction” and split into three subsections: (1.1) Purpose and Scope, (1.2) Terms, and (1.3) Applying the Guidelines to the Program Phases (new content). Added a new Figure 1 in Section 1.3. - Added a new Figure 3 to Guideline 8. - Added an Intent Guide Change History Log.
January 2015	C	Changed all instances of ANSI/EIA-748 to EIA-748 and updated the copyright for the EVMS Standard on the first page to SAE International.
February 2015	C	The DoD Office of Performance Assessments and Root Cause Analyses (PARCA) issued the first edition of the Earned Value Management System Interpretation Guide (EVMSIG) for the EIA-748 32 Guidelines. For legal reasons, the DoD was required to produce their own guide for EVMS

Date	EIA Version	Change Summary/Notes
		compliance and surveillance instead of using the NDIA IPMD Intent Guide, an industry standard document.
August 2018	D	Updates reflect the reaffirmation of the EIA-748 and comments received on the Intent Guide provided for public comment. • Updated selected guideline short titles for the table of contents. • Replaced Figure 3 to reflect the same image used for the EIA-748 Standard with color added. • Edits to reflect current terms such as “integrated master schedule” instead of “network schedule.” Other consistency edits throughout the document. • Incorporated comments from industry, the DOE, NASA, and the civilian agencies. • The Introduction section was updated to include references to other IPMD guides and to clarify the purpose of the guide.
May 2026	E	Revision E guidelines were revised, merged, or deleted to create a streamline set of 27 Guidelines. Updates reflect this revised set of guidelines as well as current best practices. A brief summary of the purpose of each of the five guideline process categories has also been added. There are three new images and the three images in the previous revision have been updated.

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1 Introduction

1.1 Purpose and Scope

The National Defense Industrial Association (NDIA) Integrated Program Management Division (IPMD) created this Intent Guide to provide additional insight into the EIA-748 Standard for Earned Value Management Systems (EIA-748). It is applicable to government or industry for the purpose of documenting how an Earned Value Management System (EVMS) complies with the 27 guidelines listed in Section 2 of the EIA-748 Standard. This guide provides additional context to the EIA-748 Standard Section 3, EVMS Process Discussion, as an aid in understanding and applying earned value management (EVM) practices.

A contractor, subcontractor, or government agency that needs to demonstrate or wants assurance their system complies with the standard can use this Intent Guide to develop a compliance map documenting how their business processes conform to the EIA-748 EVMS Guidelines. The objective of the compliance map is to demonstrate that a contractor, subcontractor, or agency has thought through each guideline and can describe how their business process supports the guideline requirements.

Section 2 in this document provides the management value, intent, typical attributes, and objective evidence found in typical outputs for each of the guidelines listed in Section 2 of the EIA-748 Standard. **It is unnecessary for all of the typical attributes or all of the objective evidence found in a list of typical outputs to be present for the intent of the guideline to be met.** The use of the word “typical” is intended to convey examples of ways, but not the only ways, of demonstrating the intent of a guideline has been met. This guide should not be interpreted as adding additional requirements that must be met in conforming to the EIA-748 EVMS Guidelines.

To be most effective, compliant business process and system documentation should be implemented on an organizational basis instead of project by project. Different organizations must have the flexibility to establish and apply an integrated management system that suits their management needs and business practices.

The objective is to provide integrated program management information using the organization’s resources and an EVMS implementation scaled to meet the management needs of the project. A scaled EVMS applies the 27 guidelines in a way that reflects the size, complexity, and type of work effort that is necessary to successfully manage the project. This allows any project to realize the benefits of earned value management.

Other complementary systems such as Manufacturing/Enterprise Resource Planning (M/ERP), or methodologies such as Agile product development, may be integrated with the EVMS to deliver functionality and value to the customer. EVM provides a standard method for measuring progress and reporting project performance. The EVMS documentation should describe the interface content as well as the recurring control process to maintain data conformance and system compliance with the EIA-748 EVMS Guidelines. Risk and opportunity management is a complementary discipline that supports planning, scheduling, baseline establishment, performance analysis, and forecasting. This document references risk and opportunity considerations where they support integrated program management.

Section 3 in this document provides an example of a process description compliance map. The separate appendix document for this Intent Guide provides a template that can assist in the development of a compliance map.

In performing an assessment or verification that business processes and system documentation complies with the EIA-748 EVMS Guidelines, the NDIA IPMD recommends the following:

1. The process owner (a contractor or government agency) maps their business processes and system documentation to demonstrate they comply with the guideline intent, typical attributes, and typical objective evidence outputs described in this document. See Section 3 for an example.
2. A party independent from the documenting party verifies the compliance assessment.
3. The verifying party is versed in the EIA-748 EVMS Guidelines.
4. The customer recognizes this method (i.e., 1 above) as applicable for the compliance assessment verification to have meaning.
5. Customers should consider past acceptance of compliance to the EIA-748 EVMS Guidelines, business organization application policy, and surveillance activity before making a management decision to perform a compliance assessment.

This document is not a “how-to” guide. It is meant to explain the intent of each guideline regardless of the specific internal or contractual environment. Other complementary NDIA IPMD guides were produced to assist a contractor or government agency in applying EVM practices that support the EIA-748 EVMS Guideline requirements. For ongoing verification of continued compliance with the EIA-748 EVMS Guidelines, see the NDIA IPMD Surveillance Guide. Other related NDIA IPMD guides include the EVMS Application Guide, EVMS Acceptance Guide, and Integrated Baseline Review (IBR) Guide.

For additional discussion on schedule practices in an EVM environment, see the NDIA IPMD Planning and Scheduling Excellence Guide (PASEG). Additional discussion on applying earned value and other performance metrics can be found in the NDIA IPMD Guide to Managing Programs Using Predictive Measures. The NDIA IPMD Industry Practice Guide for Integrating Agile and EVM on Programs discusses best practices for integrating Agile performance data with the EVMS. These guides are available on the NDIA IPMD web site.

Submit recommended changes for this guide to the NDIA IPMD Chair or Vice Chair. Contact names can be found on the NDIA IPMD web site.

1.2 Terms

For definitions of common terms used in this intent guide, see Section 2.6 in the EIA-748 Standard or the Master Definitions List for IPMD Guides. This guide purposely spells out terms in lower case with limited use of acronyms for consistency with the wording style found in the EIA-748 Standard.

In most instances, this guide uses the term “project” to reference a contractual endeavor. The EIA-748 Guideline text uses the term “program” and is intended to be interchangeable with “project.” The term “work package and planning package (or lower-level activity/task)” is intended to provide implementation flexibility to schedule at either the work package or lower level activity/task.

An objective of this Intent Guide is the planning and performance measurement of project work scope in a manner that enables efficient integrated program management. As the management principles of planning and performance measurement are detailed throughout this document, the terms “effort,” “scope,” “work,” “work scope,” and “project work scope” are used interchangeably.

The EIA-748 Standard and this intent guide organize the 27 guidelines into five process categories:

1. Organization;
2. Planning, Scheduling, and Budgeting;
3. Progress Assessment and Data Collection;
4. Analysis and Management Reports; and
5. Revisions and Data Maintenance.

The flowchart is divided into two main sections by a vertical dashed line: the **Implementation Phase** on the left and the **Execution Phase** on the right.

Implementation Phase:

- Contract Award** (Starts with a diamond icon)
- Authorization to Proceed**
- Define and Organize the Work** (G/L 1, 2, 3, 4)
- Plan and Schedule the Work** (G/L 4, 5, 6)
- Budget and Authorize the Work** (G/L 3, 4, 7 to 13)
- Establish the Performance Measurement Baseline** (G/L 4, 7)
- Integrate and Manage Subcontractor Work Effort** (G/L 1, 2, 6, 7, 8, 9, 10, 14, 15, 17, 18, 20)

Execution Phase:

- Status the Schedule and Measure Performance** (G/L 4, 14)
- Calculate, Identify, and Analyze Variances** (G/L 4, 17 to 20)
- Produce Performance Reports for Management** (G/L 21)
- Implement Corrective Actions** (G/L 12, 22)
- Maintain Estimate at Completion** (G/L 20, 23)
- Manage Contract Changes** (G/L 12, 24 to 27)
- Maintain the Performance Measurement Baseline** (G/L 7, 12, 24 to 27)
- Record Direct and Indirect Costs** (G/L 4, 15)
- Manage Indirect Costs** (G/L 11, 19, 23)
- Manage Material** (G/L 6, 8, 9, 10, 14, 15, 16, 17, 18, 20)

Key Connections and Feedback Loops:

- Authorization to Proceed** leads to **Define and Organize the Work**.
- Define and Organize the Work** leads to **Plan and Schedule the Work**.
- Plan and Schedule the Work** leads to **Budget and Authorize the Work**.
- Budget and Authorize the Work** leads to **Establish the Performance Measurement Baseline**.
- Establish the Performance Measurement Baseline** leads to **Status the Schedule and Measure Performance**.
- Status the Schedule and Measure Performance** leads to **Calculate, Identify, and Analyze Variances**.
- Calculate, Identify, and Analyze Variances** leads to **Produce Performance Reports for Management**.
- Produce Performance Reports for Management** leads to **Implement Corrective Actions**.
- Implement Corrective Actions** leads to **Maintain Estimate at Completion**.
- Maintain Estimate at Completion** leads to **Identify, Analyze, and Manage Risks and Opportunities**.
- Identify, Analyze, and Manage Risks and Opportunities** (G/L 4, 6, 7, 12, 17, 18, 21, 22, 23) is a central hub that receives input from **Plan and Schedule the Work**, **Budget and Authorize the Work**, **Calculate, Identify, and Analyze Variances**, and **Maintain Estimate at Completion**. It also feeds back into **Plan and Schedule the Work** and **Budget and Authorize the Work**.
- Identify, Analyze, and Manage Risks and Opportunities** feeds into **Manage Contract Changes** (G/L 12, 24 to 27).
- Manage Contract Changes** feeds back into **Authorization to Proceed** and **Maintain the Performance Measurement Baseline**.
- Maintain the Performance Measurement Baseline** feeds into **Calculate, Identify, and Analyze Variances**.
- Record Direct and Indirect Costs** feeds into **Calculate, Identify, and Analyze Variances**.
- Manage Indirect Costs** feeds into **Calculate, Identify, and Analyze Variances**.
- Manage Material** feeds into **Calculate, Identify, and Analyze Variances**.

Figure 1 – Applying the guidelines to the project phases

2 Intent Guide to the EVMS Guidelines

2.1 Organization

The organization guidelines facilitate the development of a framework for decomposing a project's scope of work to a level where it is possible to establish a clear association of the work scope to management responsibility. This intersection of work scope and responsibility assignments creates the management control points where scope, schedule, and budget baselines are integrated and managed. The use of unique coding to identify these control points enables the ability to integrate the management subsystems and facilitates the performance management of technical, schedule, and cost parameters.

Guideline 1 – Decompose Scope Using a Work Breakdown Structure

- | |
|--|
| a) Define the authorized work elements for the program. A product-oriented work breakdown structure, tailored for effective internal management control, is commonly used in this process. |
|--|

Management Value

The primary goal of performance measurement is to provide an assessment of progress at any point in time. The key to achieving this goal is decomposing the project's work scope to a manageable level where there is a clear understanding of the technical requirements and completion criteria so that schedule and cost estimates can be developed. A product oriented work breakdown structure (WBS) is commonly used for this purpose.

Intent

The WBS is a direct representation of the work scope in the project. The WBS should be extended to the level necessary for management action and control. The level to which the WBS is extended may vary based upon the complexity of the work scope, as well as the needs for effective management control of the project's technical, schedule, and cost parameters. Following the 100% rule for WBS development, where the next level of decomposition of a WBS element (child level) represents 100% of the work applicable to the next higher level (parent level) of the WBS, facilitates the establishment of a well-defined framework for scope management. A WBS dictionary, when used, defines and communicates the technical requirements and work scope such as specifications, assumptions, dependencies, or what is included and excluded. Either a WBS dictionary or another cross-reference method reconciles the WBS to the statement of work.

As a project progresses from one phase to another, it is normal to reassess the WBS. For example, the product breakdown during the development phase for a project may be different from the product breakdown, or the assembly sequence, used for the project in the production phase. Should project requirements change, the WBS evolves with the project. When the work scope can only be defined in general terms such as when an exploratory phase is required to define the full extent of the work, it is necessary to understand the additional risks this creates because of the level of uncertainty. Flexible project plans and controls should be in place to account for these risks until the work scope and requirements can be further defined.

Typical Attributes:

- Only one WBS is used for management purposes for each project, and it contains all project work, including revisions for authorized changes and modifications.
- The WBS contains all contract line items and end items.
- The WBS identifies all WBS elements specified for external reporting.
- The WBS is extended at a minimum to the level(s) at which control accounts are established.
- The WBS elements should collectively provide a complete definition of work scope requirements and be documented in a WBS dictionary.
- The WBS may evolve as the project requirements change.

Objective evidence may be found in these typical outputs:

- WBS.
- Statement of work or equivalent.
- WBS dictionary (may or may not be used, but a method to reconcile the statement of work to the WBS elements must be demonstrated).

Guideline 2 – Identify Organizational Responsibilities for the Work

- b) Identify the program organizational structure, including the major subcontractors, responsible for accomplishing the authorized work and define the organizational elements where work will be planned and controlled.

Management Value

The project organizational breakdown structure (OBS) facilitates the assignment of responsibility, accountability, and authority for all the activities/tasks to be performed to complete the project's scope of work. This includes identifying the organizational elements, inclusive of subcontractors, providing resources as well as planning and performing the work.

Intent

Determine the organizational elements responsible for managing and staffing a project. This could be work teams, functional, inter-organizational, or other organizational units as well external organizations for subcontracted work effort. Assigning lower-level work elements to responsible managers provides key control points for managing the project. For subcontracted work effort, the subcontractor is identified and related to the applicable WBS elements or the organizational element responsible for acquiring the subcontracted item or services.

It is important to define the management and staffing requirements at the onset of the project to ensure work assignments are made and responsibilities are clear. A project's organizational structure is dynamic and may change as the project evolves.

Typical Attributes:

- All authorized work is assigned to organizational elements.
- Organization elements are work teams, functions, or whatever organization units are used by the company for execution of the project work efforts.
- Major subcontractor work efforts are integrated into the project structure.

Objective evidence may be found in these typical outputs:

- Project OBS.
- OBS intersections with the WBS.
- List of major subcontractors.

Guideline 3 – Integrate WBS/OBS to Create Control Accounts

- c) Integrate the program work breakdown structure and organizational structure to identify management control points where responsibility is assigned to specific work scope.

Management Value

Integrating the work breakdown structure (WBS) with the organizational breakdown structure (OBS) responsibility assignments creates the management control points, or control accounts, that facilitate schedule and cost performance measurement. Control accounts are where project scope, schedule, and budget requirements are integrated, planned, and managed. It represents defined work scope assigned to a single organizational element and a single manager for resource assignment and work performance. The control account manager has the responsibility, authority, and accountability to ensure the accomplishment of work in their control account and is the focal point for management control.

Intent

The size and duration of a control account depends upon what is necessary and reasonable for project planning and control. Control accounts facilitate work authorization, resource planning, performance measurement, and tracking the actual costs expended to perform the work. As illustrated in Figure 2, control accounts are broken down into work packages where work performance is measured and planning packages for future work that is not yet detail planned.

Control accounts should be established at the levels optimal for managing the project. There may be multiple control accounts within a WBS element depending on the number of organizational elements authorized to do work within the scope of that WBS element. When an organizational element is assigned work for another WBS element, it may be supporting multiple control accounts. A control account should not span multiple WBS elements.

There may be multiple control accounts within a responsible organizational element when the effort within a WBS element must be segregated for management control purposes. This is often driven by scope and exit criteria for completed work. The scope of management activities/tasks and consideration for planning and control of schedules, budgets, work assignments, progress assessment, problem identification, and corrective actions determines how control accounts are established. One of the benefits of multiple control accounts at the WBS and organizational element intersection is it simplifies variance analysis and management of the effort.

At a minimum, actual costs are collected at the control account level. Under some circumstances additional levels of detail may be needed to segregate the work into separate control accounts for discrete effort versus level of effort, different elements of cost, and multi-functional elements. Control account data is then collected and summarized for higher levels of visibility of project plans and performance. Since the control accounts were defined by integrating the WBS and organizational elements, project data can be summarized using either path.

Typical Attributes

- One or more control accounts are visible at the intersection of the WBS and responsible OBS (see Figure 2).
- One or more performing organizations can support a single WBS element.

- The control account clearly identifies any supporting activities.
- The estimated costs of work performance elements are evident.

Objective evidence may be found in these typical outputs:

- Control account authorization documents.
- Responsibility assignment matrix.
- Management performance reports.

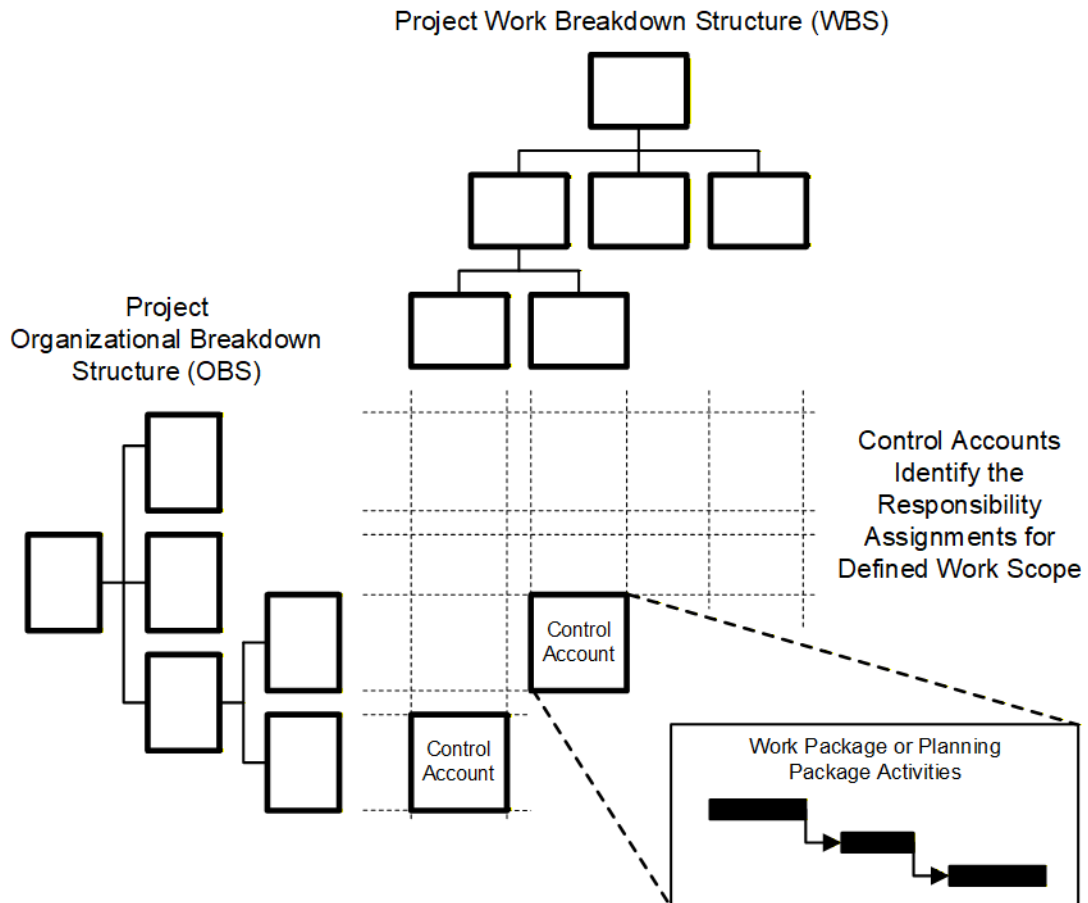


Figure 2 – Establishing control accounts

Guideline 4 – Integrate Management Processes Using the WBS and OBS

- d) Provide for the integration of the scheduling, budgeting, work authorization, and cost accumulation processes with each other and, as appropriate, the program work breakdown structure and organizational structure to enable cost and performance measurement by elements of either or both structures.

Management Value

The use of unique coding to identify these control points enables the ability to integrate the management subsystems and facilitates the performance management of technical, schedule, and cost parameters. The work breakdown structure (WBS) and organizational breakdown structure (OBS) allow summarization of cost data from the detail level through both the WBS and the OBS to the appropriate project level needed for management insight and control.

Intent

Establishing the project's control points with unique coding to identify the control accounts provides the means to integrate the EVMS subsystems as well as to integrate the EVMS with other business systems. This ensures the data in the EVMS and other business systems are traceable to the system of record and are consistent. The control account work scope is decomposed into work packages or planning packages with resource requirements by element of cost to complete the work scope. This process integrates the project's technical, schedule, and cost parameters to manage work performance. This framework of the WBS and organizational structure as well as other common data elements provides the traceability to integrate the EVMS scheduling, budgeting, resource planning, work authorization, cost accumulation, performance measurement, performance analysis, forecasting, change control, and risk/opportunity management processes. The same framework is used to integrate subcontractor and M/ERP data into the EVMS.

Typical Attributes:

- A logical framework that links the products of the management processes through common data elements.
- Cross-references between the statement of work and WBS, the integrated master schedule detail activities/tasks and performance measurement work packages as well as control account plans.

Objective evidence may be found in these typical outputs:

- Integrated master schedule.
- Manufacturing/Enterprise Resource Planning (M/ERP) operational schedules.
- Control account plans.
- Management performance reports by WBS and OBS.
- Responsibility assignment matrix.
- Statement of work.
- Work authorizations.
- WBS and OBS.

2.2 Planning, Scheduling, and Budgeting

The organization guidelines provide the framework for the planning, scheduling, and budgeting process required for effective integrated program management and to establish the performance measurement baseline. The performance measurement baseline provides a common reference point to measure work accomplished and to communicate the current status of the project.

The planning, scheduling, and budgeting guidelines focus on the integrated process of establishing the project's schedule, resource, and time-phased budget plan for accomplishing the technical work scope requirements within the project's schedule and cost objectives. The project's network schedule establishes the relationship between technical achievement and measuring work performed. Scheduling the planned sequence of activities/tasks and identifying the resource requirements to accomplish the work scope begins during the original project definition. This typically includes identifying and assessing the project's risks and opportunities so the schedule, resource, and budget plans can be adjusted to account for identified risk handling or opportunity capture plans. Initial schedule and resource plans are often established during project preplanning.

Scheduling and budgeting the work is an iterative process where the budgets are time-phased consistent with the scheduled activities/tasks, activity/task durations, and activity/task resource requirements to accomplish all of the authorized project work scope within the project's contract budget base. The budgeting process includes distributing cost targets to the work breakdown structure (WBS) elements of work. Figure 3 illustrates this process.

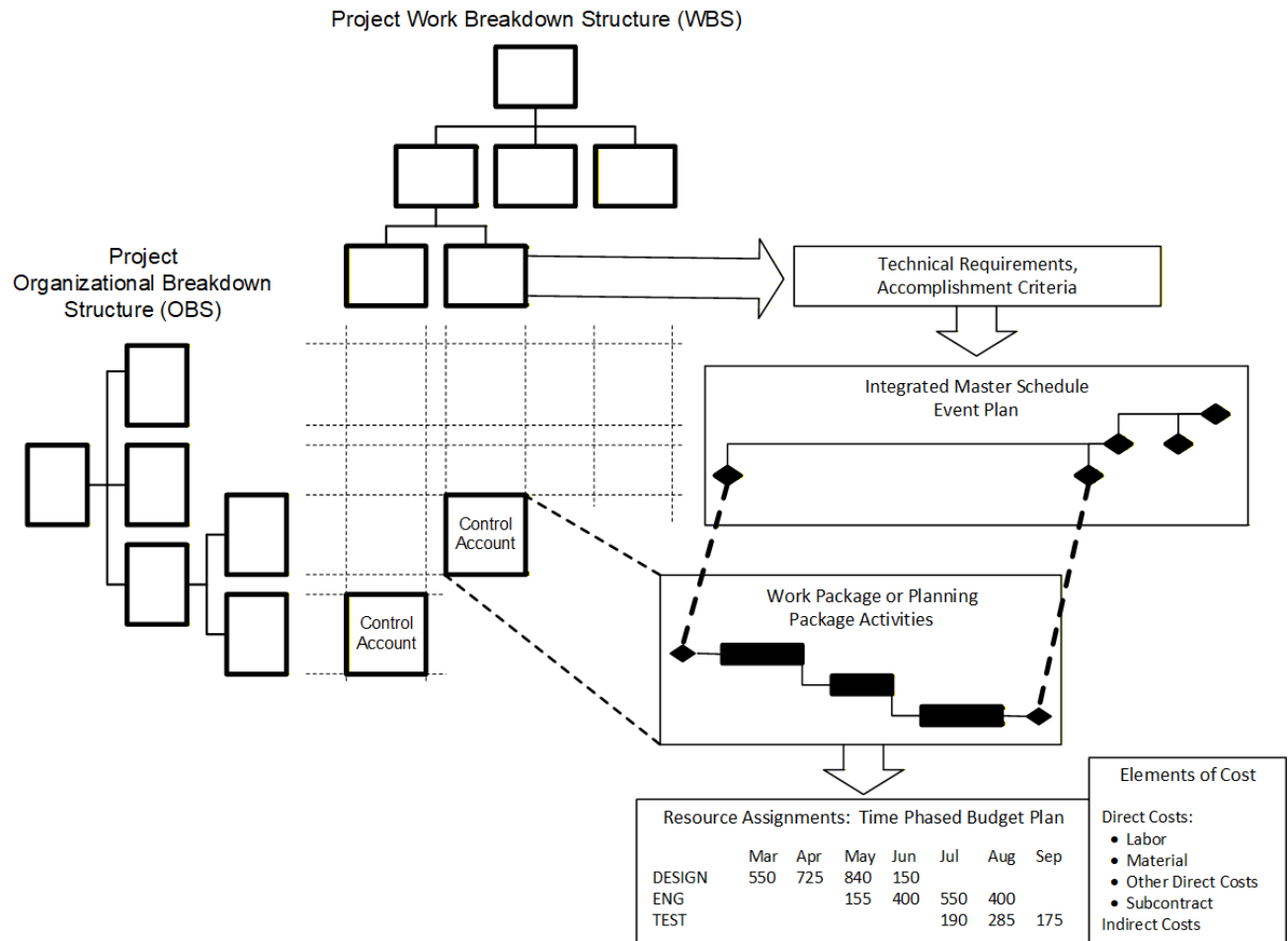


Figure 3 – Iterative scheduling and budgeting process

Guideline 5 – Identify Indicators to Measure Progress

- a) Identify, in the schedule, the physical products, milestones, technical performance goals, or other objective indicators that will be used to measure progress.

Management Value

Objective indicators throughout the plan provide for accurate assessment of the work accomplished in comparison to the required technical objectives. Meaningful performance metrics enable better management insight into performance, risk identification, mitigation and decision-making, ensuring that maximum time is allowed for management action to keep the project on plan.

Intent

Identifying indicators, completion criteria, or other means to objectively measure progress is one aspect of an integrated program management system and complements other processes that control the quality and technical content of the work performed. Development of a strategic plan or roadmap that documents and prioritizes the technical objectives necessary to complete the project scope supports the interim assessment of progress. The plan defines the major events or completion criteria that are vertically integrated with the detailed schedule activities/tasks. Assessing incremental progress in conjunction with the technical performance plan generates objective indicators for early identification of performance challenges as well as technical risk realization and mitigation.

Regularly measuring progress that supports assessment of higher level technical performance goals provides additional and timely insight into the project. Since the project schedule includes key project and contractual requirements, it can be used to predict when milestones, events, and project decision points are expected to occur based on the performance to date and anticipated future conditions. The assessment of interim performance measures against the established criteria at these milestones helps to maintain insight into project execution and technical risk enabling early mitigation to minimize the impact to technical, schedule, or cost objectives.

Typical Attributes:

- Objective completion criteria are determined in advance and used to measure progress to determine achievement of milestones or other indicators.
- Interim milestones and higher level technical goals serve as indicators of progress against which the project manager monitors progress.
- Identification of risks and schedule margin aligned with key programmatic goals.

Objective evidence may be found in these typical outputs:

- Integrated master plan or roadmap.
- Integrated master schedule that identifies contract milestones and key events.
- Manufacturing/Enterprise Resource Planning (M/ERP) production planned order reports.
- Control account plans.
- Risk register.

Guideline 6 – Schedule the Authorized Work

- b) Schedule the authorized work in a manner that describes the sequence of work and identifies task interdependencies required to meet the requirements of the program.

Management Value

The schedule is the foundation for planning and executing the work, managing the resources required to complete the work, measuring work accomplished, and forecasting completion dates. The project schedule provides the ability to evaluate status and implement actions designed to complete the project effort within the contractual parameters.

Intent

The scheduling process establishes an integrated master schedule, a network schedule that models the logical sequence of all authorized discrete work including subcontracted work scope. Scheduling and budgeting the work is an iterative process to establish the schedule and budget baseline. The schedule is comprised of activities/tasks with durations based on the complexity of the work and resources required to accomplish the authorized scope of work. While no specific scheduling software is required, there must be horizontal and vertical integration of the schedule through the framework of the work breakdown structure (WBS) and organizational breakdown structure (OBS). Vertical integration is the means by which an integrated master schedule summarizes data from detailed schedules to any intermediate schedules and up to a summary master project schedule.

The level of detail in the integrated master schedule depends upon project management needs and is extended to a level of detail required to effectively plan and manage the work. When level of effort activities/tasks are included in the integrated master schedule, they should not impact discrete work or be part of the calculation of the critical or driving paths through the project. The integrated master schedule provides the activity/task baseline start/finish dates and forecast/actual start/finish dates. The schedule activities/tasks, start/finish dates, along with resource requirements are the basis for the time-phased work package or planning package budgets and estimate to complete cost data. Statusing schedule activities/tasks supports the measurement of work accomplished. The integrated master schedule aligns to the contractual period of performance except when an over-target schedule has been approved for implementation (see Guideline 27).

The schedule activities/tasks are linked through logical predecessors and successors to establish dependencies for a horizontally integrated schedule. Identifying the interdependencies between activities/tasks, as well as external dependencies, is necessary to determine the critical and driving paths through the project's schedule. Logic and schedule structure must provide for the decomposition of work scope into control accounts and then into work packages or planning packages. There may be a one-to-one or many-to-one relationship between a schedule activity/task and a work package or planning package. There must be a clear definition of what constitutes commencement and completion of each work package and any lower-level activities/tasks. These activities/tasks should also provide vertical integration using dependencies to key milestones, events, or decision points required to ensure completion of the project's objectives.

Production projects often use Manufacturing/Enterprise Resource Planning (M/ERP) systems to detail plan manufacturing effort and manage the build sequence, procurement and assembly of material, and planning for labor resources. The detailed data from these systems are

summarized through vertical integration and are used as the basis for establishing the project's integrated master schedule activities/tasks. Horizontal and vertical traceability must be maintained between the M/ERP system and the integrated master schedule to preserve the underlying sequence of work as well as timing of material and labor resource requirements.

The schedule must align with the project objectives, include all key events, and reflect a logical sequence of events, taking into account identified risks and opportunities. Ensuring all team members are working to the same project schedule is essential for monitoring progress, analyzing variances, tracking corrective actions, and forecasting.

Typical Attributes:

The scheduling system has the following characteristics:

- Distinct activities/tasks can be summarized up through the WBS and OBS to track progress and measure performance.
- The schedule reflects all the time-phased discrete work to be accomplished that is traceable to the WBS and the statement of work. For certain material activities, including low and full-rate production related activities, not all discrete activities are planned in the integrated master schedule as they are managed through an M/ERP system or other material management system.
- Critical target dates, project milestones, contractual events, accomplishment criteria, and project decision points are identified and are being used to plan, status, and monitor progress of the work.
- The schedule describes the sequence of work and should consider the significant interdependencies that are indicative of the actual way the work is to be accomplished. The schedule links key detail work packages and planning packages (or lower-level activities/tasks) with summary activities and milestones.
- Significant interdependences should be defined at a consistent level of detail to support development of a critical path. The minimum level linkage is at the work package and planning package level. The schedule should be designed for effective integrated program management purposes and contain a critical path for the entire contractual period of performance.
- The integrated master schedule critical path that is comprised of the longest continuous sequence of activities/tasks driving project completion.
- Each key project milestone (for example, System Design Review, Preliminary Design Review, Critical Design Review, Proof of Concept, or Construction Complete) must be logically linked within the integrated master schedule.
- Resource estimates from the budget plan are reasonable and resources are available to support the schedule.
- The schedule is reasonable as a baseline for achieving project requirements as demonstrated through schedule analysis techniques.
- The schedule provides baseline, forecast, and actual start and completion dates for all discrete authorized work.
- The schedule should include risk mitigation activities, as appropriate.

Objective evidence may be found in these typical outputs:

- Integrated master schedule.
- M/ERP schedules, or planned order reports.
- Control account plans.
- Work authorization documents.

Guideline 7 – Establish and Maintain a Time-Phased Budget Baseline

- | | |
|----|---|
| c) | Establish and maintain a time-phased budget baseline comprised of scope, schedule, and budget at the control account level. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement are based on either internal management goals or the external customer-negotiated target cost, including estimates for authorized but undefinitized work. |
|----|---|

Management Value

The time-phased performance measurement baseline represents the planned scope, schedule, and budget for all authorized work. The assignment of budgets to scheduled segments of work produces a plan against which actual performance can be compared. The performance measurement baseline is a key component of earned value management.

Intent

The sequence of schedule activities/tasks and resource requirements is the basis for determining the time-phased budget required to accomplish the project's scope of work within the project's defined period of performance. Budgeting is the process of distributing the project's cost targets from the total project level down to the individual segments of work. The hierarchy of budget elements is illustrated in Figure 4. Strict budget element relationships must exist at all times to assure the sum of the parts is equal to the whole.

The contract budget base represents the value of all authorized work. This includes the negotiated contract cost plus the estimated cost of any authorized unpriced work (see Guideline 24). This contract budget base value is the basis for project budgeting and is sometimes referred to as the total allocated budget. The total allocated budget is equal to the contract budget base except when an over-target baseline has been approved for implementation (see Guideline 27).

Project managers often set aside a budget amount for management reserve to handle realized risks within the scope of the work for the contract (see Guideline 12). Subtracting management reserve set aside from the contract budget base is the amount of budget available for distribution to scheduled segments of work producing a plan against which actual performance can be compared. This budget distribution is typically accomplished through the process of determining the time-phased resources required to accomplish the control account scope of work that is decomposed into work packages or planning packages. This is called the performance measurement baseline. The performance measurement baseline represents the formal plan for the control account managers to accomplish the authorized work assigned to them within the time constraints defined by the project schedule and within the budget authorized. The establishment, maintenance, and use of the performance measurement baseline is indispensable to effective performance measurement. The performance measurement baseline should be in place as early as possible after contract award or authorization to proceed.

The performance measurement baseline is the time-phased plan representing the scope, schedule, and associated budget through the end of the contract. It is the sum of the control account budgets, summary level planning package budgets, and undistributed budget. Undistributed budget is a transient account for work scope and budget that is distributed to control accounts or summary level planning packages as soon as practical after definitization, or as contractually directed (see Guideline 12).

As the control account schedules and budgets also establish the constraints required for baseline control, care must be exercised when establishing control account budgets to ensure a viable scope of work correlation and to prevent inadvertent front-loading of the budget baseline. When planning control accounts, factors to consider include the:

- Natural flow of work within the control account and interdependencies across the project.
- Significant project events supported by completion of the effort within the control account.
- Segmentation of required resources in accordance with rate structures and nature of the work.

For future effort that cannot practically be identified to a control account, it is permissible to establish a temporary summary level planning package above the control account level that identifies scope, schedule, and associated budget to the end of the contract. All summary level planning packages are scheduled in the integrated master schedule. The budget for this effort must be identified specifically to the work for which it is intended, by element of cost, time-phased based on the schedule requirements, periodically reviewed for validity, and not used to perform other work scope. These summary efforts should be subdivided into control accounts at the earliest opportunity. Planning horizons or rolling wave planning may be used to determine the appropriate time period to convert summary level planning packages into control accounts. Maintaining realistic budgets, directly tied to an established scope of work, is essential for the organizational elements responsible for performing project effort. Eventually, all the work is planned to the control account level and decomposed into work packages.

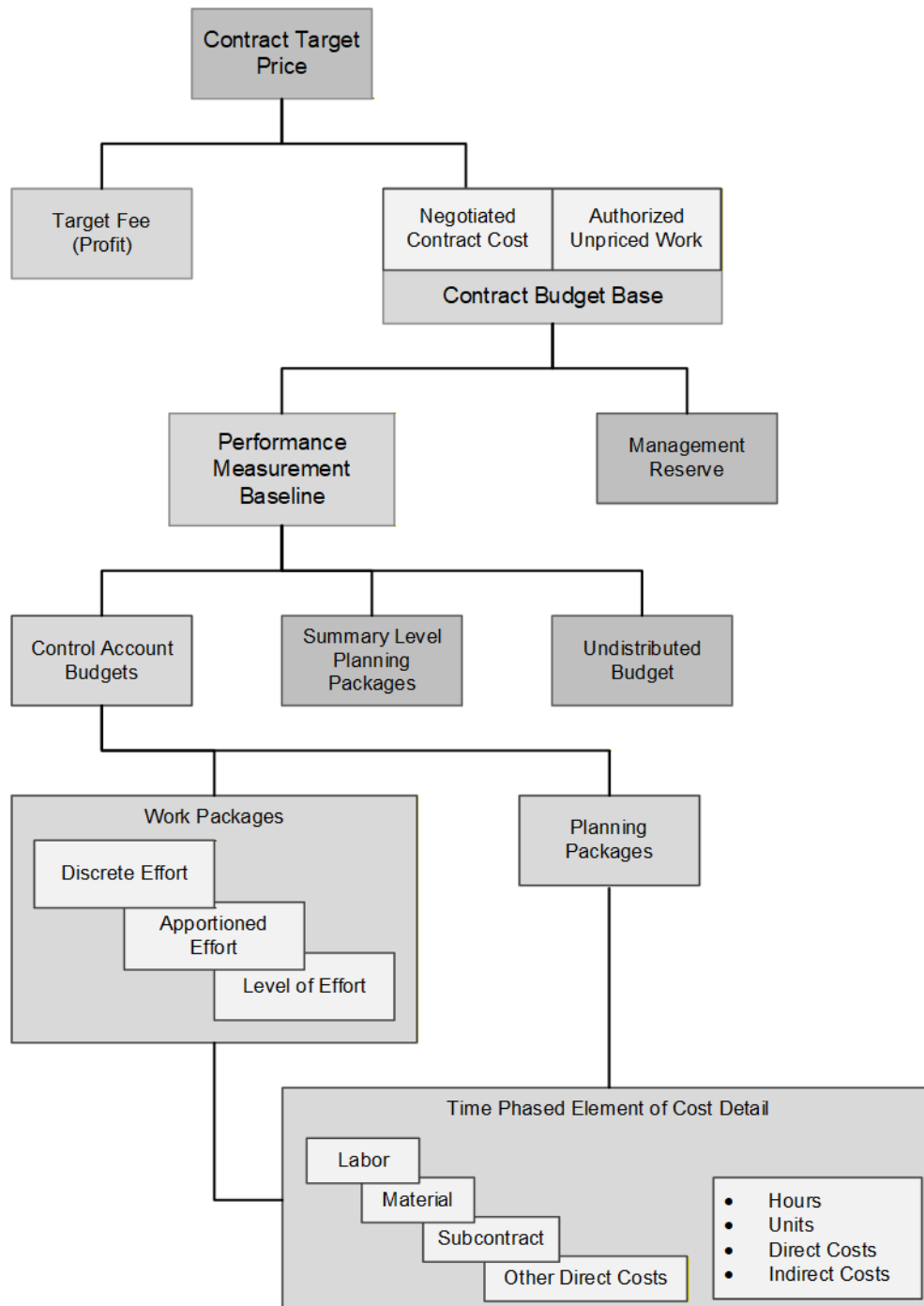


Figure 4 – Budget element hierarchy

Typical Attributes:

- The performance measurement baseline reflects the work scope, time-phased consistent with the integrated master schedule.
- The performance measurement baseline reflects the budget value for the work scope in all control accounts, summary level planning packages, and undistributed budget.

- Control account budgets reflect the resources planned to perform the work and can only exceed the contract budget base when an over-target baseline is employed.

Objective evidence may be found in these typical outputs:

- Control account plans.
- Summary level planning packages.
- Integrated master schedule.
- Undistributed budget logs.
- Notification to the customer of an over-target baseline or over-target schedule.
- Work authorization documents.
- Monthly performance reports.

Guideline 8 – Authorize Scope, Schedule, and Budget by Cost Elements

- d) Authorize control account scope, schedule, and budget comprised of elements of cost (labor, material, subcontractors, etc.) required to complete the effort.

Management Value

An essential part of project planning and establishing a performance measurement baseline is the authorization of budgets for all of the decomposed work scope. Identification and authorization of time-phased budgets by elements of cost (EOC) documents the integration of scope, schedule, and distributed budgets with the performing organization.

Intent

Through a work authorization process, establish budgets for all authorized work to be done by the responsible organizational elements. No work can begin before the effort is formally authorized with a work authorization. As budgets and schedules are established and approved for all the authorized work at the control account level, the work authorization is updated as required. The work authorization process provides the approval to begin work. The control account work authorization documentation represents the formal agreement between the project manager and the control account manager regarding the control account scope of work, period of performance, and budget. This is the culmination of the scheduling and budgeting processes. The control account work authorization identifies the period of performance and budget for all cost elements (labor, material, subcontract, and other direct costs) as well as indirect costs required to perform the agreed upon control account scope of work.

The control account work authorization reflects the decomposition of the control account scope, schedule, and budget into work packages or planning packages (see Guideline 9). The work package or planning package activities/tasks are scheduled with resource requirements by elements of cost to determine the overall control account period of performance and time-phased budgets.

Typical Attributes:

- Work authorization documentation that reflects budgets by elements of cost (labor, material, subcontract, and other direct costs) stated in dollars, hours, or other measurable units along with the period of performance.
- Control account/work package plans with budgets identified by element of cost (i.e., direct labor dollars/hours, material or subcontract dollars, and other direct costs).
- Responsibility assignment matrix (dollarized). Represents the complete project plan and budget. The budget is based on detailed estimates of the amount of labor, materials, and other resources required to complete the work associated with each control account.
- Resource plan. Identifies the resources needed to accomplish the work and assign resources to activities/tasks in the integrated master schedule.
- Internal reports. Identifies control account budgets that can be summarized to organizational elements. Differentiation is made between direct cost budgets and those that include indirect costs.

Objective evidence may be found in these typical outputs:

- Control account plans by element of cost.
- Work authorization documents.

- Undistributed budget logs.
- Responsibility assignment matrix (dollarized).
- Schedules, if resourced.
- Resource plan.
- Bills of materials.
- Material requirements documentation identifying when the material is expected to be used.
- Subcontractor schedules.

Guideline 9 – Plan Authorized Scope, Schedule, and Budget into Work Packages and Planning Packages

- e) Plan the authorized scope, schedule, and budget into work packages and/or planning packages. Determine budgets in terms of dollars, hours, or other measurable units such that the sum of all work package and planning package budgets equal the control account budget.

Management Value

Budgets, established at the work package level identifying specific resource requirements in dollars, hours, or other measurable units, provide the detail for effective execution of the baseline plan. The resources are time-phased to support the way the detail work is to be accomplished. Where a control account's work scope cannot be planned in the near term, the work scope, schedule, and budget requirements are held in future planning packages. The conversion of a future planning package into work package detail occurs within a disciplined planning process that supports a stable baseline.

Intent

Effort contained within a control account (scope, schedule, and distributed budget) is decomposed into either work packages or planning packages with scope, schedule, and budget. The work package or planning package activities/tasks are scheduled with resource requirements to determine the period of performance and time-phased budgets. The budget distributed to the work packages or planning packages may be stated in hours, dollars, or other measurable units and is time-phased. The proper direct and indirect rates are applied to the base time-phased budget values to provide a valid performance measurement baseline (sum of direct budgets and indirect budgets to determine the total budget). The sum of the work package or planning package time-phased budgets for a given control account always equal the control account budget.

A work package is a natural subdivision of control account effort. Each work package has the following characteristics.

- It represents units of work at the level where work is performed.
- It is clearly distinguishable from all other work packages.
- It is assigned to a single organizational element, or in an integrated product team environment, to a single integrated product team responsible for multiple functional disciplines performing the scope of work.
- It has scheduled start and completion dates and, as applicable for discrete effort, interim milestones or subordinate activities/tasks, all of which are representative of physical accomplishment of the technical scope.
- It has a time-phased budget that reflects how the work is expected to be accomplished.
- It has resources planned by element of cost (labor, material, subcontract, or other direct costs).
- It has material costs segregated from other elements of cost. The material budget time phasing is consistent with when the material is expected to be received, consumed, or paid (see Guideline 14).

- It is assigned a single earned value technique during the planning process (see Guideline 10). A given work package is either: 1) discrete work effort with measurable outputs, 2) apportioned work (effort earned based on performance of other discrete work effort), or 3) level of effort.
- Its duration is limited to a relatively short span of time. Longer duration work packages require objective intermediate measures to enable accurate performance assessments.
- It is consistent with detailed engineering, manufacturing, construction, or other schedules when applicable.
- It includes subcontract effort consistent with subcontractor project schedule and budget plans when applicable. Subcontractor and the organization's plans are directly reconcilable.

Control account work scope that cannot be planned to the work package level of detail is placed into planning packages. Planning packages are aggregates of future activities/tasks and budgets, beyond those planned in detail that are divided into work packages at the earliest practical time. Each planning package has the following characteristics:

- It represents a summary of future work effort within the control account scope of work. Since it represents a summary of future work effort, it is not assigned an earned value technique.
- It has scheduled start and completion dates.
- It has a time-phased budget based on the required resources planned by elements of cost and this relationship must be maintained when detailed planning of the effort occurs.
- Work cannot begin until the planning package is converted into one or more detail planned work packages with an assigned earned value technique.

Typical Attributes:

- Control account plans represent the work assigned to one responsible organizational element on one project WBS element. This is the lowest level in the structure at which the comparison of actual costs to planned budgets and earned value is normally required. It is also the cost collection point that identifies the cost elements with the factors contributing to cost or schedule variances. Under some circumstances additional levels of detail may be needed to segregate level of effort from discrete effort, multiple elements of cost, and multi-functional elements.
- Work packages represent detailed jobs, except for those that are for material items. They are units of work at levels where work is performed and are clearly distinguishable from all other work packages. They are:
 - o Assigned to a single organizational element.
 - o Have scheduled start and completion dates and, as applicable, interim milestones.
 - o Have a budget or assigned value expressed in terms of dollars, labor hours, or other measurable units.
 - o Have duration limited to a relatively short span of time or are subdivided by discrete value milestones to facilitate the objective measurement techniques of

work performed, or are level of effort work packages integrated with detailed engineering, manufacturing, construction, or other schedules.

- A planning package is the logical aggregation of work within a control account, normally the far-term effort, that can be identified and budgeted in early baseline planning, but cannot yet be defined into discrete, apportioned, or level of effort work packages. Planning package plans must reflect the manner in which the work is to be performed.

Objective evidence may be found in these typical outputs:

- Control account plans decomposed into work packages and planning packages.
- Control account schedules.
- Control account time-phased budgets.

Guideline 10 – Establish Work Package Performance Measurement Criteria

- f) Establish objective performance measurement criteria for each work package consistent with the way work is expected to be accomplished. Only that effort which is not measurable is identified as level of effort.

Management Value

Establishing objective performance measurement to compare against the time-phased resources ensures the management team has insight into meaningful product-related or management-oriented events for performance measurement. Valid performance measurement forms the basis for assessing progress to support successful execution of the project. The integrated master schedule may have more detail below the work package/planning package level to add insight into performance measurement and support the development of a realistic critical path, as applicable.

Intent

Performance (the budgeted cost for work performed or BCWP) is measured at the work package level. This is done through the selection of a single earned value technique for the work package that provides the most objective assessment of accomplishment for the planned work scope. The earned value technique is selected based on type of work effort, how the work is planned (the budgeted cost for work scheduled or BCWS), and the criteria that will be used to claim performance (earned value). Performance must be claimed in the same manner that it was planned. The work package may be discrete work effort, apportioned effort, or level of effort.

Discrete work effort has defined outputs, completion criteria, or other definable products that can be measured objectively as work is completed and used to claim performance. To the extent possible, control accounts are decomposed into discrete work packages with a short duration comprised of all measurable efforts. When longer duration work packages are defined, interim milestones with accomplishment criteria are defined to objectively measure performance. For discrete work effort, performance measurement should focus on the completion of technical requirements and not resource expenditure.

Apportioned effort is work that cannot be readily measured or divided into discretely planned work packages, however, there is a direct proportional relationship to other discretely planned work. The apportioned effort schedule period of performance and budget reflects the directly related discretely planned work. There is also a direct relationship to the discretely planned work when performance is claimed for the related apportioned effort.

Level of effort has no measurable output or product. Level of effort activities/tasks are typically administrative or supportive in nature and may include work effort such as project management, contract administration, financial management, security, clerical support, or other support services. Level of effort work packages should be separately identified from discrete and apportioned effort work packages because earned value always equals the time-phased budget as work is performed. Level of effort activities/tasks are used only when discrete or apportioned measurement is impractical, and are planned and reported in a manner that does not obscure performance trends on discrete work. Level of effort work package scope, period of performance, resource requirements, and time-phased budget should be actively maintained to ensure they continue to accurately reflect when the work will occur and what resources are required.

Typical Attributes:

- Work package progress is determined by a single earned value technique established at the work package level.
- Discrete work package progress is objectively measured based on technical completion of the defined scope and not resource consumption.
- Longer duration discrete work packages are supported with quantifiable backup data or a pre-determined methodology for earning incremental progress.
- Level of effort work packages contain activities/tasks of a general or supportive nature that do not produce definite end products, must be separately evaluated from discrete work packages within the control account, and contain time-phased budgets for planning and control.
- The amount of level of effort activity will vary among performing organizations, but it must be held to the lowest practical level.
- Level of effort budgets should be separately substantiated and planned as direct labor, material, subcontract, or other direct costs. Level of effort should be budgeted on a time-phased basis for control and reporting purposes.
- Level of effort work package baseline scope, period of performance, and budgets are proactively managed to ensure appropriate performance measurement.
- If level of effort and discrete work packages are ever mixed within the same control account, the control account manager must ensure visibility into the earned value technique for measuring performance of the discrete effort portion.
- The earned value for level of effort work packages equals the time-phased budget.

Objective evidence may be found in these typical outputs:

- Integrated master schedule activities/tasks with assigned earned value techniques.
- Quantifiable backup data.
- Control account plans showing work package budgets and earned value techniques.

Guideline 11 – Develop/Apply Indirect Rates to Determine Indirect Budgets

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| <p>g) Apply indirect rates, developed by the responsible organizations, to the program's direct resource budgets, at the applicable level, to determine the indirect budgets that support the establishment of the performance measurement baseline.</p> |
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Management Value

Indirect budgets comprise a significant percentage of the performance measurement baseline. Accurate assignment of indirect budgets to the project baseline, through the application of indirect rates to the direct budgets, ensure the baseline plan accurately reflects the total cost of completing the assigned work. Throughout project execution, the indirect rates are critical for understanding and communicating the project estimate at completion.

Intent

Project indirect budgets are planned using the planned direct budgets consistent with the allocation method of indirect costs ultimately made to the project. This allocation methodology is normally described in the organization's accounting procedures. These procedures describe the process the organization follows to establish the indirect budgets at the appropriate organizational level for each pool and cost sub-element which determines the indirect rates applied to the direct budgets. It is important to have an indirect budgeting and forecasting process because indirect costs can account for a major portion of the cost of any project. Control and management of the indirect budgets is essential for determining a project's total time-phased budget and forecasting the estimate at completion.

Typical Attributes:

- Organization charts are established that identify the personnel or organizations responsible for maintaining the indirect costs.
- The organization's indirect cost policies and procedures are documented and represent a rational, traceable process.
- Cost Accounting Standards (CAS) established by the Cost Accounting Standards Board (CASB) ensures consistent and proper accounting for direct and indirect costs that are applied to government contracts. Direct costs are any cost that may be identified specifically with a particular cost objective; indirect costs are costs that, because of their incurrence for common or joint objectives, are not readily subject to treatment as direct costs.
- CAS disclosure statement defines the content and processes of the organization's management of indirect costs and generally includes a definition of indirect expenses and indirect cost pools.
- Indirect budgets are established and projected based on published rates for each organization.
- Forward pricing forecasts identify projected indirect cost rates beyond the current year.

Objective evidence may be found in these typical outputs:

- Documented process for managing indirect costs.
- Organizational structure identifying ownership responsibility and authority levels.

- Indirect cost policies and procedures.
- Chart of accounts.
- Organizational charts.
- Forward pricing forecast (including sales forecast and business base projections).
- CAS disclosure statement, if applicable.
- Indirect budget and performance reports.

Guideline 12 – Identify Any Undistributed Budget and Management Reserve

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| h) Identify any undistributed budget or management reserve. |
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Management Value

Undistributed budget functions as the short-term holding account to ensure that budget for newly authorized efforts remains tied to the associated scope during the initial planning process. Once the WBS and responsible organizational element has been identified, the budget should transfer from undistributed budget to the appropriate control account.

An effective performance measurement baseline planning process identifies risks and opportunities and should set aside a management reserve budget allocation to accommodate unplanned activity within the project scope. Unexpected work scope growth within the contract statement of work, rate changes, or customer driven schedule slips are examples of situations that may make the amount of budget assigned to an individual control account manager inadequate. Management reserve facilitates maintaining realistic budgets for contract work and enables effective performance management data for management.

Intent

Any undistributed budget or management reserve must be identified, tracked, and managed for the duration of the project.

Undistributed budget is budget for specific project work effort that has not yet been distributed to control accounts or to summary level planning packages. Once it is distributed to either control accounts or to summary level planning packages, it ceases to be undistributed budget. Since it is tied to work scope, it is part of the performance measurement baseline. Undistributed budget is often used at the beginning of a project to manage the distribution of authorized budget. It is also used when the customer modifies work scope to a project (authorized unpriced work) that needs to be definitized and negotiated (see Guideline 24). Undistributed budget (and associated scope) may also be used for budget associated with scope that is being removed from a contract (e.g., a de-scope). The budget/scope is removed from the control account in the performance measurement baseline, and placed in undistributed budget, before being formally removed from the contract (negotiated contract cost).

Undistributed budget (and associated scope) should be finalized and distributed to control accounts or to summary level planning packages within a reasonable length of time subsequent to contract definitization or the project value finalization. Some circumstances can affect the timely distribution of undistributed budget to control accounts such as when there are delays in customer direction.

In instances where the work scope is not fully defined, distributing the budget authority for the work scope into control accounts or summary level planning packages may not be practical. For example, technology insertions or study efforts may require the budget authority for the work scope to reside in undistributed budget for a sustained period until negotiations occur and the work scope can be defined.

Management reserve is budget set aside for handling realized risks within the project's scope of work. Management reserve budget is not tied to work scope and thus is not part of the performance measurement baseline. The management reserve budget should be commensurate with the level of identified project risks and opportunities or withheld for management control purposes. Management reserve must not be used as a source for added work scope which is outside of the contract.

Typical Attributes:

- Project control logs including:
 - o Management reserve (showing month end values; monthly sources and applications to control accounts; current value).
 - o Undistributed budget (showing month end values; monthly sources and applications to control accounts; current value).
 - o Performance measurement baseline (showing month end values; monthly changes from/to management reserve and undistributed budget; current value).
 - o Contract budget base (showing month end values; monthly changes identifying contract modifications; current value).
- Monthly performance reports to verify that starting and ending values are consistent with various logs.

Objective evidence may be found in these typical outputs:

- Project control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).
- Management performance reports.

Guideline 13 – Reconcile to Target Cost Goals

- i) Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserve.

Management Value

Reconciling the project target cost to the performance measurement baseline and management reserve ensures the project baseline reflects the common agreement between the two parties, for example a customer and contractor, and provides a common reference point for progress assessment.

Intent

Verify the project's cost targets distributed from the total project level down to the individual segments of work reconcile. This budget hierarchy is illustrated in Figure 4. The sum of the parts must always equal the whole. Starting at the detail level, the sum of the budgets for control account work packages and planning packages must equal the control account budget. The sum of the control account budgets, summary level planning package budgets, and any undistributed budget must equal the total for the performance measurement baseline. The sum of the performance measurement baseline plus any management reserve must equal the contract budget base (target cost plus any authorized unpriced work).

Typical Attributes:

- Project control logs including:
 - o Management reserve (showing month end values; monthly sources and applications to control accounts; current value).
 - o Undistributed budget (showing month end values; monthly sources and applications to control accounts; current value).
 - o Performance measurement baseline (showing month end values; monthly changes from/to management reserve and undistributed budget; current value).
 - o Contract budget base (showing month end values; monthly changes identifying contract modifications; current value) reconciled to project target cost.
 - o Total allocated budget reconciled to the contract budget base and any recognized over-target baseline.
- Contract and modification control logs identifying authorized target cost.

Objective evidence may be found in these typical outputs:

- Project control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base) reconciled to project target cost.
- Management performance reports.
- Internal report showing the summarization from cost account to the performance measurement baseline.

2.3 Progress Assessment and Data Collection

The guidelines for progress assessment and data collection outline the recurring processes for determining project progress throughout the execution of the project and communicating current status. Data is collected in alignment with the control account or lower level unique coding. This ensures alignment of schedule progress and performance claimed (earned value) with the budgets planned and scheduled within the performance measurement baseline. Data is collected continuously throughout project execution to support an iterative process of assessment, analysis, and corrective actions.

The progress assessment that results from a sound data collection process provides the project team with the current and cumulative to date cost and schedule status against the plan and enables analysis for successful risk mitigation and project execution. Determining schedule status, technical accomplishment, actual costs, and earned value aligned with the performance measurement baseline provides the data necessary for the project team to successfully manage the project.

Guideline 14 – Measure Progress and Determine Earned Value

- a) Using predefined performance measurement criteria, status the schedule and assess physical progress to determine budget earned. Earned value for material items may not be credited earlier than the actual receipt of the material nor later than the consumption of the item.

Management Value

Accurate and objective performance measurement provides project management visibility into project status and situational awareness of project execution. Insights into schedule execution and technical progress allow proactive resolution of issues impacting the achievement of project technical, schedule, and cost objectives and enables the project manager to focus resources on those areas in need of attention.

Intent

At least monthly, status the physical progress for the in-process work packages and determine the earned value based on the earned value technique selected for the work package. Performance must be claimed in the same manner it was planned (see Guideline 10).

The need for accurate comparison of material costs to material budgets and earned value requires that the appropriate point of performance measurement for material is established. The generally acceptable points for measuring material progress are:

- a. Point of receipt (acceptance),
- b. Point of stock (inventory), and
- c. Point of issue to work in process (consumption).

High value stock and critical items may require special considerations for planning and measuring progress to ensure the requisite insight for successful project completion. The approach for planning and measuring progress for material should be developed to manage risk and facilitate effective project management.

For organizations using a Manufacturing/Enterprise Resource Planning (M/ERP) system, the M/ERP must support the determination of physical progress at the work package level. However, it is often more economical and effective to establish control accounts and work

packages for production at higher level work breakdown structure (WBS) elements than would be the case for development effort. The M/ERP master production schedule should be traceable to the integrated master schedule through summarization of the production or M/ERP process, at the level needed for management control.

Evaluate and update the project schedule to reflect the current progress assessing the work required to complete the effort. Based on the technical completion of work, remaining activities/tasks as well as resource requirements, and the impact of project risks on the schedule, update the estimated start and completion dates for the remaining work in support of a revised estimate for the project completion date. This updated schedule is also the basis for maintaining the control account estimate to complete (see Guidelines 20 and 23).

Typical Attributes:

- An updated integrated master schedule reflecting technical completion status and forecast dates as of the status date.
- Performance reports showing labor, material, subcontract, and other direct cost cost/schedule variances.
- Performance for material earned value claimed in the same accounting period as actual costs.
- Material performance recorded no earlier than material receipt or acceptance, issue from inventory, or material consumption.
- Control account plans showing time-phased material budgets and earned value techniques, which could include making a distinction between high value and low value material.

Objective evidence may be found in these typical outputs:

- Management performance reports.
- Control account plans.
- Material system reports.
- Subcontractor performance reports.

Guideline 15 – Collect Actual Costs by Elements of Cost for Work Performed

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| b) | Collect actual costs (direct and indirect), by elements of cost, from a formal system controlled by the general books of account for comparison to corresponding budgets in the EVMS. Where actual costs are not available for comparison, estimated costs will be entered into the EVMS. |
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Management Value

Direct and indirect costs must be assigned to a project consistent with the pertinent budgets to achieve effective performance management. A project's cost-charging structure established in the accounting system should help ensure that actual costs collected are directly compared with associated budgets for that work.

Actual costs need to be available at all levels of the work breakdown structure (WBS), down to the control account at a minimum, to support project management with performance measurement data. The visibility into both direct and indirect cost components are essential for successful management of a project.

Intent

The organization's accounting system provides for the accumulation of all direct costs (i.e., labor, material, subcontract, and other direct costs) incurred in accomplishing the authorized work scope. The accounting system also provides for collection of indirect costs through application of burdens to the direct costs incurred. The organization must define a charging structure to apply both the direct and indirect costs incurred to the control accounts (at a minimum) for the work performed. The accurate assignment of direct and indirect costs facilitates the comparison of actual cost of work performed (ACWP) to the budgeted cost for work performed (BCWP) for performance measurement and variance analysis.

In accounting for material (i.e., point of receipt or acceptance, point of stock or inventory, or point of issuance to work in process or consumption) the project team must account for material costs in a manner consistent with the way in which materials are planned and budgeted. The use of estimated costs (estimated actuals) or adjustments may be required to ensure actual costs and performance are recorded in the same accounting period in the EVMS, thereby addressing timing issues between costs recorded in the accounting system, material transfers, and performance reporting.

Costs associated with subcontracted effort may be recorded upon payment of invoices, which may lag the completion of work effort, earned value for the flow down effort should be claimed in the same period the work is completed. Estimates for the actual costs should be used in the EVMS to ensure actual costs and performance are recorded in the same accounting period for performance measurement reports until such time that the invoice payment is recorded in the accounting system.

Purchased services are typically processed through the procurement system when contract labor is used to perform work otherwise performed by in-house labor. The same earned value approach for purchased services is usually consistent with the earned value approach for in-house labor. In situations where earned value is claimed, and corresponding actual costs have not been recorded in the accounting system, estimates for the actual costs should be used in the EVMS to ensure actual costs and performance are recorded in the same accounting period for performance measurement reports.

The actual cost of work performed reported in the performance reports must reconcile with direct and indirect costs recorded in the formal accounting system adjusted through estimated costs or transfers.

Typical Attributes:

- Contractor's accounting manual/procedures identifying the methodology of handling various actual costs.
- Contractor's Cost Accounting Standards (CAS) disclosure statement identifying treatment of direct costs (labor, material, subcontract and other direct costs), indirect costs, depreciation and capitalization, and other costs and credits.
- Control account actual costs/general ledger reconciliation.
- Contractor's process to ensure actual costs and performance are recorded in the same accounting period.
- Contractor's process to use estimated actuals in the EVMS to account for the costs of work accomplished when the actual direct costs have yet to be recorded in the accounting system.
- Established project charge numbers to ensure actual costs are collected so that direct comparison with associated budgets can be made at the appropriate WBS level(s) and organizational level(s).

Objective evidence may be found in these typical outputs:

- Reconciliation of project costs with the accounting system.
- Actual costs are reported at the control account level at a minimum.
- Reconciliation of subcontract reported actual costs to subcontract payments.
- Internal and external performance reports for subcontractors.
- Estimated actuals log.
- Cost collection account structure or charge number methodology.
- WBS/cost collection mapping showing the relationship between charge numbers and control accounts or work packages.
- Management and subcontractor performance reports.

Guideline 16 – Account for Purchased Material

- c) Account for all purchased material for which earned value has been calculated, including material residual to the program.

Management Value

The establishment of a valid comparison of planned material costs for completed work with the actual material costs for that work provides the basis for realistic evaluation of cost deviations and ultimately facilitates cost at completion projections. Residual inventory provides visibility into excess material for the current deliverables available for replacement of failures in the current project or future projects having similar deliverables.

High value or critical material items may require special considerations for planning and measuring progress. Contracting methods should be considered that support objectives and promote the use of progress methods to facilitate insight into project execution and meet the needs of integrated program management.

Intent

Organizations must establish a system to identify, manage, and track all materials purchased for use on a project including all residual material. Material requirements must be associated with a specific scope of work. These requirements should be planned and scheduled with a budget that reflects when the material is required. An appropriate point of performance measurement must also be established to ensure an accurate comparison of material costs to material budgets and earned value can be made (see Guideline 14). The material authorization and acquisition process must provide adequate controls to ensure procurements are valid and follow the organization's procedures.

Typical Attributes:

- The material accounting system provides full accountability for all material (including residual inventory) purchased for the project.
- The material system needs to account for various methods of charging material cost from inventory in accordance with cost accounting standards inventory costing methods; i.e., First-In, First-Out (FIFO); moving average; weighted average; standard cost; and Last-In, First-Out (LIFO). Identify accountability for all material purchased for the project including material issues to control accounts, return of unused material, scrap quantity and disposition, and residual inventory.

Objective evidence may be found in these typical outputs:

- Management performance reports.
- Control account plans.
- Bills of material.
- Material system reports.

2.4 Analysis and Management Reports

The analysis and management reports guidelines facilitate the analysis and use of the performance data to manage the project. The EVMS generates variance data once the project has been statused. Using management defined variance thresholds helps control account managers and project managers focus on areas that are not performing to plan. The variances must be assessed against the technical scope to understand both the root cause and the impact of the variance, as well as related risks or opportunities to complete the remaining effort. This analysis provides the control account managers with the information they need to develop corrective actions to get back on plan. Using this analysis and creating an estimate to complete for each control account generates a variance at completion. The variance data is summarized up through the work breakdown structure (WBS) and organizational breakdown structure (OBS) to the total project level for management analysis so that corrective actions can be defined and implemented to achieve the project's objectives. Through the analysis of control account variances and the impact of any changes to indirect budgets and rates, as well as any identified and assessed risks or opportunities, the project manager develops a project level estimate at completion.

Guideline 17 – Generate Schedule and Cost Variances

- | | |
|----|---|
| a) | At least on a monthly basis, generate the following information for the control account and higher levels, as necessary for management control, using actual cost data from or reconcilable with the accounting system: |
| 1) | Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance. |
| 2) | Comparison of the amount of the budget earned and the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance. |

Management Value

The EVMS provides performance data for management control. Visibility into project performance helps the project manager to focus resources on those areas in need of attention. Calculating cost and schedule variances allows the project manager to assess the impact of deviations from the performance measurement baseline and to determine the necessity for corrective action(s) to achieve project objectives.

Intent

Variance data is generated to direct management attention on any performance issues to date. The use of variance thresholds establishes the parameters to identify what is considered a significant variance and helps to focus management attention on areas that are deviating from the plan. To be effective, technical, schedule, and cost risk must be considered when developing thresholds to ensure that variance drivers are identified for potential corrective action before the situation is no longer recoverable.

The cost and schedule variances generated from the budget (budgeted cost for work scheduled (BCWS)), earned value (budgeted cost for work performed (BCWP)), actual costs (actual cost of work performed (ACWP)), estimate to complete (ETC), budget at completion (BAC), and estimate at completion (EAC) data are illustrated in Figure 5.

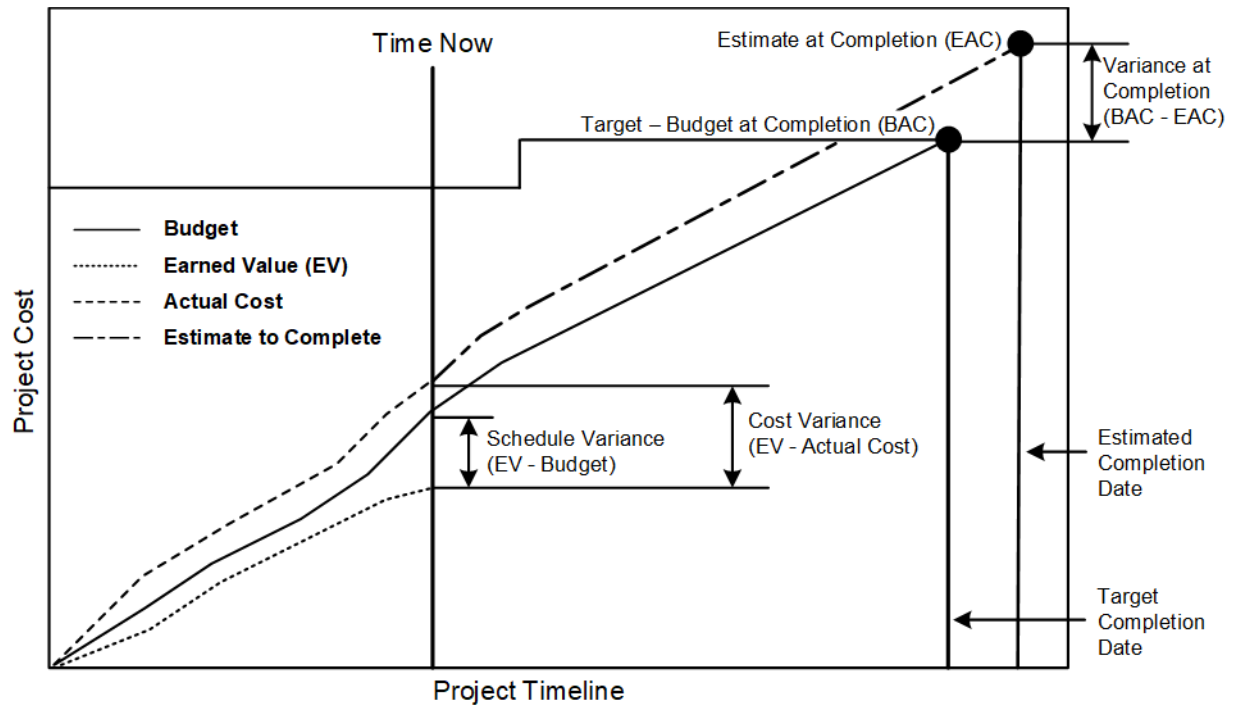


Figure 5 – Performance metrics

The typical variances generated include:

- Cost Variance (CV). It is the difference between earned value and actual cost (EV - Actual Cost).
- Schedule Variance (SV). It is the difference between earned value and the budget (EV - Budget).
- Variance at Completion (VAC). It is the difference between the budget at completion and the estimate at completion (BAC - EAC).

The generation of rate/volume variances for labor and price/usage variances for material provide additional insight to assess resource utilization for remaining work. The calculations for rate and volume variances are:

Rate Variance: $(\text{Earned Rate} - \text{Actual Rate}) \times \text{Actual Hours}$

Volume Variance: $(\text{Earned Hours} - \text{Actual Hours}) \times \text{Budgeted Rate}$

Total Labor Cost Variance: Volume Variance + Rate Variance

The calculations for material price and usage variances are:

Price Variance: $(\text{Earned Unit Price} - \text{Actual Unit Price}) \times \text{Actual Quantity}$

Usage Variance: $(\text{Earned Quantity} - \text{Actual Quantity}) \times \text{Earned Unit Price}$

Material Cost Variance: Price Variance + Usage Variance

Typical Attributes:

- Monthly performance report:
 - o Budget, earned value, and actual costs.

- o Cost variance.
 - o Schedule variance.
 - o Variance at completion.
- Rate and volume labor variance analysis.
- Price and usage material variance analysis.
- Summarized performance measurement data from control account (minimum) up through the work breakdown structure (WBS) and/or organization breakdown structure (OBS) hierarchy to the total project level.

Objective evidence may be found in these typical outputs:

- Monthly performance reports (cost variance, schedule variance, and variance at completion analysis).
- Variance analysis data.

Guideline 18 – Identify and Evaluate Significant Variances

- b) Identify and evaluate, at least monthly for each control account, the significant differences between both planned and actual schedule performance and planned and actual cost performance; and analyze and provide the reasons for the variances in the detail needed by program management.

Management Value

The ability to analyze deviations from the established plan permits management at all levels to rapidly and effectively implement corrective actions in an effort to regain project/contract objectives. Without this visibility into and the understanding of plan deviations, the success of the project can be jeopardized. Additionally, the variance analysis facilitates insight into future cost and schedule performance.

Intent

The control account manager is responsible for analyzing their control account variances. This analysis must include identifying the root cause of the cost and schedule variances in performance of the technical scope. Identification of the root cause helps the control account manager gain an understanding of the impact to their scope of work as well as to the project. The analysis may also identify risks or opportunities to the scope, schedule, and budget baseline that allow the project team to proactively manage risk.

When analyzing the root cause of a cost variance, the control account manager should consider the factors that are driving the cost variance (e.g., resource utilization, technical complexity, etc.). This helps to determine the impact of technical performance on cost objectives, as well as provide insight for the project team to understand whether resources or the technical approach need to change to meet the project objectives.

Since the schedule variance is a dollarized value, the control account manager should evaluate the schedule to understand activities/tasks driving late or ahead of schedule conditions. Having an understanding of the remaining duration to complete future and in-progress effort provides the control account manager with an understanding of the time component of completing the technical scope. This root cause should yield an impact analysis focused on days gained or eroded, typically through total float assessment, in performance to date.

Typical Attributes:

- Schedule (time-based) and cost (budget-based) variances are identified at an actionable level.
- Variance causes and impacts are identified in sufficient detail needed for project management.
- Corrective actions are implemented in a timely manner and tracked to closure.
- Rate and volume analysis for labor variance analysis.
- Price and usage material variance analysis.

Objective evidence may be found in these typical outputs:

- Variance analyses (budget-based schedule variances and cost variances).
- Management action plans.
- Updated schedule activity/task completion and cost at completion forecasts.

- Project schedules and schedule analysis outputs.

Guideline 19 – Evaluate Indirect Cost Variances

- c) Evaluate indirect cost variances and the impact of indirect cost performance on individual program performance.

Management Value

Ongoing indirect cost analysis provides visibility into potential indirect cost overruns and the opportunity to develop and implement management action plans to meet project objectives.

Intent

Indirect costs comprise a large part of the performance measurement baseline. Variances to indirect budgets are managed by the responsible organization assigned with indirect cost management. When indirect performance varies by a significant value that necessitates a rate update, the impact of the rate changes to the project must be understood by the project manager and control account managers. This requires an analysis of rate impacts on the entire project, as well as an understanding of the impacts of any rate changes within each control account manager's control accounts.

Typical Attributes:

- When indirect rates are revised, the responsible indirect cost organization provides the indirect rate change information to the project team for use in evaluating the impact on the project cost performance and estimates at completion.
- The project manager uses the indirect cost analysis for incorporating mitigation strategies to compensate for ongoing project variances as a result of indirect rate changes.

Objective evidence may be found in these typical outputs:

- Analysis of rate impacts at the project level.

Guideline 20 – Update Control Account Estimates at Completion

- d) Using the results of control account variance analysis and indirect performance evaluations, update the control account estimates at completion to reflect future resource requirements to complete the remaining authorized work and, by comparing to budgets, calculate the variance at completion.

Management Value

The control account estimate at completion enables the calculation of the variance at completion for the technical scope at the level which it is managed. Understanding the relationship among scope, schedule, budget, and risk at the level where work is controlled and executed is critical to successful project execution. The control account variances provide an understanding of project conditions, allowing the project manager to properly address technical issues, risks, and opportunities. The control account estimate at completion forms the basis for the overall project estimate at completion and resource needs such as labor or material for the remaining work.

Intent

The control account estimate at completion is the control account manager's estimate of the cost to complete their assigned scope. This is generated through assessing performance to date and estimating resources required to complete in progress and future work packages. The control account manager's estimate at completion should take into consideration the current assessment of emerging and existing risks or opportunities for their scope of work. The variance at completion provides for an understanding of root causes of performance variances against the approved control account budgets. Comparison of performance to date to the estimate to complete of the remaining work provides the control account manager and project manager with an assessment of the achievability of the estimate at completion.

Typical Attributes:

- Schedule and cost performance reports. Schedule variance, cost variance, and variance at completion from control account up through the work breakdown structure (WBS) and/or organization breakdown structure (OBS) hierarchy to the total project level.
- Management action plans. Corrective action plan/mitigation plan, activity/task, milestones, exit criteria, and schedules.
- Timely and thorough assessments of the effort required for completing all work packages and planning packages in the control account plan.
- Control account manager updates the estimate at completion to reflect significant changes in the budget or schedule.
- Time-phased estimate to complete based on an analysis of remaining activities/tasks in the integrated master schedule and projected resource plan.
- Control account manager should develop, analyze, and document the estimate to complete at the work package and planning package level. The sum of the control account manager's work package and planning package estimates to complete are added to the control account actual costs to develop the control account estimate at completion. Control account estimates at completion are summarized up through the WBS and/or OBS to the total project level.

- Management performance report totals for the estimate at completion should reconcile with the corresponding time-phased resource plan.

Objective evidence may be found in these typical outputs:

- Variance analyses.
- Schedule and cost performance reports.
- Management action plans.
- Resource plans.
- Updated schedule and cost forecasts.
- Risk and opportunity management plans (identification, analysis, and handling).

Guideline 21 – Summarize, Review and Evaluate Performance Data and Variances

- e) Summarize, review, and evaluate the data elements and associated variances through the program work breakdown structure and/or organizational structure to support management needs and any customer reporting specified in the contract.

Management Value

Earned value management information provides management with early identification and insight into risks, opportunities, and performance issues. The information allows the customer and contractor to make management decisions based on the same data derived from the contractor's management system and focuses management attention on areas of concerns throughout all levels of the project.

Intent

The use of common coding structures provides for the summarization of data from the detail level work packages and planning packages up to their related control accounts, as well as up through the work breakdown structure (WBS) and organizational breakdown structure (OBS) to the total project level. This summarization allows for variance analysis at any level of the management chain as well as at summarized levels of work scope.

Typical Attributes:

- Variance analyses. Internal/external reporting thresholds and narrative analysis providing root cause, impact, and corrective action.
- Schedule and cost performance reports. Schedule variance, cost variance, and variance at completion from control account up through the WBS and/or OBS reporting structure hierarchy to the total project level.
- Management action plans. Corrective action plan/mitigation plan, activity/task, milestones, exit criteria, and schedules.

Objective evidence may be found in these typical outputs:

- Project management reports.
- To complete performance index.
- Independent completion estimates.
- Risk and opportunity management data and similar metrics.
- Management action plans and review briefings.
- Variance analyses.

Guideline 22 – Implement Management Actions in Response to EVM Data

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| f) Implement managerial actions taken as the result of earned value information. |
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Management Value

Early identification of technical, schedule, and cost risks permit project management to implement corrective action plans in a timely manner to improve project execution. A formal approach to analysis, corrective action, and tracking to closure facilitates this process.

Intent

The objective of performance management is to use the data to improve project performance. With an understanding of root cause of the issues that are impacting technical, schedule, and cost performance, the control account managers and project managers must take corrective actions to remediate issues as they arise to ensure project objectives are met. Corrective actions must be logged, actively managed, and tracked to closure. This process is critical to a robust risk and opportunity process, where probability and impacts can be modeled with schedule risk assessments and in the project level estimate at completion development.

Typical Attributes:

- Follow-up of the implementation to verify what was planned was implemented.
- Reasonableness of the corrective action.
- Validity of the problem identified.
- All emerging risks and opportunities identified in the project's risk register (or other similar database) impacting the schedule or resource plan for the remaining work should be considered in the estimate at completion updates.
- Funding requirements resulting from estimate at completion changes are communicated to the customer as required by contract.

Objective evidence may be found in these typical outputs:

- Risk and opportunity management data and similar metrics.
- Management action plans and review briefings.
- Variance analyses.
- Control account plans.

Guideline 23 – Develop Revised Program Estimate at Completion

- g) Develop a revised estimate of cost at completion for all authorized work based on performance to date, estimates of future resource requirements, and an evaluation of program risks and opportunities. Compare this estimate with the contract budget base to identify variances at completion to support internal management needs, applicable customer reporting, and funding requirements.

Management Value

A properly established and maintained project estimate at completion ensures continuing visibility into the overall schedule, cost, risks, and opportunities on the project. Accurate estimates support the customer's ability to provide sufficient funding to the project and enhance internal management's visibility into critical issues and resource requirements.

Intent

Once corrective actions are identified and project level risks and opportunities are assessed for probability and impact, the project manager must develop the project's estimate at completion. The project manager's estimate at completion takes into consideration potential rate impacts or changes to overall conditions that may impact the project's performance. This is the formal estimate at completion for the project and represents the project manager's most likely assessment of the cost of the project at completion.

Periodically, a comprehensive or bottom-up estimate at completion should be prepared using all available information to arrive at the best possible estimate at completion. For the comprehensive estimate at completion, many of the same factors included in the monthly evaluation at the control account level are considered as well as:

- Evaluating both direct and indirect performance to date efficiency achieved by performing organizations for completed work and comparing it to remaining budgets and the scope of work.
- Assessing commitment values for material to complete the remaining work.
- Evaluation of subcontractor assessments of cost to complete their efforts.
- Estimating future conditions to derive the most accurate estimate at completion such as projected rate changes, process improvements that may result in reduced costs, or other economic factors that may impact future costs.

Typical Attributes:

- Updated project risk analysis, including probability and impact, included in project estimate at completion.
- Documented process for developing estimates at completion, including subcontractor estimate at completion integration.
- Supporting documentation for the estimates to complete, including undistributed budget and summary level planning packages (as applicable).
- Risk and opportunity management plans (identification, analysis, and handling plans).
- Earned value metrics.
- Updated schedule activity/task completion and cost at completion forecasts.

- Material and subcontractor performance data.
- Bill of materials or equivalent.
- Schedule forecast dates.

Objective evidence may be found in these typical outputs:

- Project management reports.
- Resourcing plans.
- To complete performance index.
- Independent completion estimates.
- Risk and opportunity management data and similar metrics.
- Management action plans and review briefings.
- Variance analyses.

2.5 Revisions and Data Maintenance

The revisions and data maintenance guidelines focus on maintaining an accurate and reliable performance measurement baseline to effectively manage the remaining work. Use of a controlled process to document, authorize, trace, and manage revisions to the project's scope, schedule, and budget is essential for maintaining the integrity of the performance measurement baseline for the duration of the project. This controlled process prevents unauthorized revisions to the performance measurement baseline to avoid the inadvertent implementation of a budget baseline greater than the project budget. This also controls retroactive changes related to work performed to maintain the validity of the performance measurement baseline. Incorporating authorized and approved changes into the performance measurement baseline as soon as possible ensures the performance measurement baseline reflects the most current plan for accomplishing project objectives. Incorporating authorized and approved changes must not arbitrarily eliminate existing cost and schedule variances. Rate changes and economic price adjustments may be applied to authorized changes as appropriate.

Documenting what changed when, and why the change was required, ensures historical traceability and enables the ability to reconcile the effects of the changes. Baseline change request documentation and change logs are often used for this purpose. This historical information is often useful when developing and substantiating the basis of estimate for another project with a similar scope of work. Combined with the historical and current performance data that accurately conveys project progress to date, maintaining a credible performance measurement baseline for the remaining work is essential for management visibility and control.

The use of project budget logs assist in reconciling the project's cost targets from the total project level down to the individual segments of work, as well as tracking authorized and approved changes incorporated into the performance measurement baseline. The ability to track budget values for internal and external changes help to maintain the validity of the performance measurement baseline from project start to completion. See Guideline 13 for more discussion on reconciling the project's target cost goals.

Guideline 24 – Incorporate Customer Directed Changes

- a) Incorporate customer directed changes in a timely manner, documenting and reconciling the effects of such changes in scope, schedule, and budget. When incorporating a customer directed change prior to negotiation, plan the work based on the estimated value of the scope.

Management Value

A properly maintained performance measurement baseline is crucial to effective project management. The timely and accurate incorporation of authorized changes to the performance measurement baseline ensures that the information generated from the execution of the baseline plan provides an accurate picture of progress and facilitates correct management actions and decisions.

Intent

Incorporate customer directed and authorized changes into the performance measurement baseline in a documented, controlled, and timely manner. Customer directed changes may modify the scope of work, period of performance, contract budget base, or funding profile that impact the performance measurement baseline. The timely and accurate incorporation of authorized and negotiated changes into the performance measurement baseline ensures that valid performance measurement information is generated for new work scope being executed or for work scope that has been removed. This also helps to ensure the work scope, schedule, and budget remain coupled.

For unpriced contract actions or change orders, the project manager and/or control account managers develop an estimate for planning and budgeting purposes to incorporate into the performance measurement baseline. Near term effort should be planned and have budget distributed to control accounts. Far term effort that cannot be reasonably planned in the near term may be planned in summary level planning packages or maintained in undistributed budget. Until contractual definitization, the near-term work is continually planned through a rolling wave process. After definitization, any budgeted scope remaining in undistributed budget is distributed to control accounts or summary level planning packages as soon as practical. Any budget remaining after the definitized scope is planned is moved to management reserve.

Typical Attributes:

- Contractual change documents (external). May take various forms such as a contract modification, letter to proceed from contracts office or legal office, not-to-exceed letter, change order, engineering change order, delivery order, or basic ordering agreement, that transmit and authorize the change or addition to work, budget, and schedule.
- Contractor's internal documentation such as a change request form or project directive facilitating the change. It should provide the rationale/justification, approval process, work scope additions or deletions by integrated product team or work breakdown structure (WBS), dollars, changes to schedules, estimate at completion, and other details.
- Supporting documentation for the estimates.
- Change control logs describing the change transactions to management reserve, undistributed budget, performance measurement baseline, and contract budget base total.

- Statement of work (amendments or revisions), WBS (changes if applicable), and WBS dictionary (additions or deletions to scope).
- Work authorization documents authorizing new work scope, schedule, budget and authorization to proceed, if not already changed by the internal change request process.
- Control account/work package/planning package plans showing revised work scope, duration, and budget.
- Integrated master schedule showing revised work scope and duration, changes to linkages, and other schedule related details.
- Management reports showing timely incorporation of new work scope.

Objective evidence may be found in these typical outputs:

- Contractual change documents.
- Baseline change documents.
- Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).
- Control account/work package/planning package plans.
- Integrated master schedule.
- Statement of work, WBS, and WBS dictionary.
- Updated work authorization documents.

Guideline 25 – Document and Reconcile Internal Replanning Changes

- b) Document and reconcile changes to current scope, schedule, and budgets as a result of internal replanning.

Management Value

By ensuring that schedule and budget revisions are documented and traceable, the integrity of the performance measurement baseline is maintained and can be verified. This provides control account managers with valid control account plans against which to execute and measure performance. The reconciliation of current budgets to prior budgets ensures the baseline integrity is maintained and reconciles to the contract value.

Intent

Internal adjustments to plans and budgets for future work effort are a normal management process as the project team adjusts technical plans and resource assignments to meet the contractual objectives. These changes are documented, authorized, and managed to ensure the overall project technical, schedule, and cost objectives are supported and the effects of the changes can be reconciled for historical traceability. Work authorizations are updated to reflect authorized and approved changes to the scope of work, schedule, or associated budget. This ensures the work scope, schedule, budget, and work authorizations are aligned.

Budget changes are controlled and understood in terms of scope, schedule, and budgets. Budgets reflect current authorized work. Budget revisions are traceable from authorized contract target costs to the control account budgets, or from the application of management reserve or undistributed budget. The use of project budget logs assist in this reconciliation process. Management reserve may be used for authorized work that is in-scope to the contract, but out of scope to a control account. Management reserve may not be applied to, or recovered from, completed work packages. Internal replanning must be performed within the contract cost and schedule targets. See Guideline 27 when a replan exceeds schedule or budget targets.

Typical Attributes:

- Contractor's internal documentation such as a change request form or project directive facilitating the change. It should provide the rationale/justification, approval process, work scope additions or deletions by integrated product team or work breakdown structure (WBS), dollars, changes to schedules, estimate at completion, and other details.
- Current and previous period dollarized, time-phased baseline plan. Compare the plans to identify any differences and to verify that all changes have been identified.
- Scheduling system reflects schedule inputs concerning times, dates, durations, percentage complete, and other schedule related details.
- Change control logs describing the change transactions to management reserve, undistributed budget, performance measurement baseline, and contract budget base total.
- Statement of work (amendments or revisions), WBS (changes if applicable), and WBS dictionary (additions or deletions to scope).
- Work authorization documents authorizing new work scope, schedule, budget and authorization to proceed, if not already changed by the internal change request process.

- Control account/work package/planning package plans showing revised work scope, duration, and budget.
- Integrated master schedule showing revised work scope and duration, changes to linkages, and other schedule related details.

Objective evidence may be found in these typical outputs:

- Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).
- Baseline change documents.
- Management reports.

Guideline 26 – Control Retroactive Changes

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| c) | Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments are made only for correction of errors, routine accounting adjustments, or effects of customer or management directed changes, including implementation of a single point adjustment. |
|----|---|

Management Value

Changes made outside the authorized baseline control processes compromise the integrity of performance trend data and delay visibility into overall project variance from plan, thus reducing the alternatives available to managers for project redirection or revisions. Retroactive changes to the baseline may mask variance trends and prevent use of the performance data to forecast estimates of schedule and cost at completion.

Intent

The documented and controlled process used to manage changes to the performance measurement baseline should prevent arbitrary retroactive changes to the performance to date data for work performed. This ensures baseline integrity and accuracy of performance measurement data as well as the performance metrics such as schedule and cost variances. A stable performance measurement baseline and related performance data enables the ability to conduct predictive analysis and to proactively manage the remaining work.

Retroactive changes may be allowed in certain circumstances as documented in the organization's change control process. Adjustments may be allowed to correct data input errors, to process routine accounting adjustments, rate changes, economic price adjustments, or incorporation of customer directed changes such as definitization of contract actions. Adjustments resulting from the definitization of contract actions should be limited to affected work scope budgets. The organization's documented change control process may require certain cumulative to date adjustments be made in the current period data to maintain the historical data traceability.

The organization's change control process may allow a single point adjustment to eliminate schedule or cost variances when it is necessary to replan the project's remaining effort with the intent to complete the project within the contract period of performance and contract budget base or total allocated budget (also see Guideline 27 when a replan exceeds the schedule or budget targets). When this occurs, the performance measurement baseline is revised to complete the remaining work within the budget targets for the scope. The customer should be informed prior to performing a single point adjustment intended to eliminate variances and establish a revised performance measurement baseline. Depending on contractual requirements, customer approval may be required.

Typical Attributes:

- Change control process defines policy regarding retroactive changes that include conditions for use; prohibitions, approvals, and justifications; and evidence of discipline and control.
- Current and previous period dollarized, time-phased baseline plan. Compare the plans to identify any differences and to verify that all changes have been identified.
- Scheduling system reflects schedule inputs concerning times, dates, durations, percentage complete, and other schedule related details.

- Negative journal entries. When not a result of error corrections or routine accounting adjustments, they have appropriate explanations.
- Earned value input source documents. Negative or inappropriate amounts have appropriate explanations.
- Management performance reports or other management reports. Current period data on the performance reports reflect any retroactive changes with related explanations.
- Control account/work package/planning package plans reflect only approved budget changes.
- Work authorization documents reflect authorized changes to budget.

Objective evidence may be found in these typical outputs:

- Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).
- Control account/work package/planning package plans.
- Integrated master schedule.
- Retroactive change control process including approval.
- Management performance reports or other management reports explaining retroactive changes.

Guideline 27 – Over-Target Baseline or Over-Target Schedule

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| d) | When necessary, propose, document, and establish a total program budget greater than the contract budget base (over-target baseline) and/or a total program schedule exceeding the contractual period of performance (over-target schedule) to support management of the remaining authorized work. Advance notification must be provided to the customer prior to implementation. |
|----|--|

Management Value

Formal reprogramming with an over-target baseline and/or over-target schedule can restore much needed control to a contract that is forecasting performance outside the contractual parameters of the contract budget base and/or the contractual finish date. Whether the contract has experienced poor execution or significant changes or has an unrealistic plan for the remaining work, formal reprogramming re-establishes an executable and achievable baseline plan, renewed buy-in from the project team, meaningful performance indicators, and restored confidence.

Intent

During the life of a project, situations may arise where an organization determines that current project conditions have rendered the existing schedule and budget plans to be unrealistic or inadequate to complete the project's remaining work within the contract period of performance or contract budget base. A project manager, in conjunction with the customer, may conclude the current performance measurement baseline is insufficient to perform the remaining work and hinders the ability to adequately assess project performance or produce meaningful performance measurement data. This conclusion may be the result of a major event or project review or following a comprehensive estimate at completion assessment. To remedy this situation, the project manager may determine the best option is to reprogram the remaining work and establish an achievable, extended performance measurement baseline that more accurately reflects how the remaining work will be accomplished, regardless of contractual limits.

When the available budget for the remaining work is insufficient to ensure valid performance measurement, and the estimate at completion is significantly higher than the contract budget base, it may be necessary to establish a total allocated budget that exceeds the contract budget base. The resulting increase in budget value is referred to as an over-target baseline. This is illustrated in Figure 6.

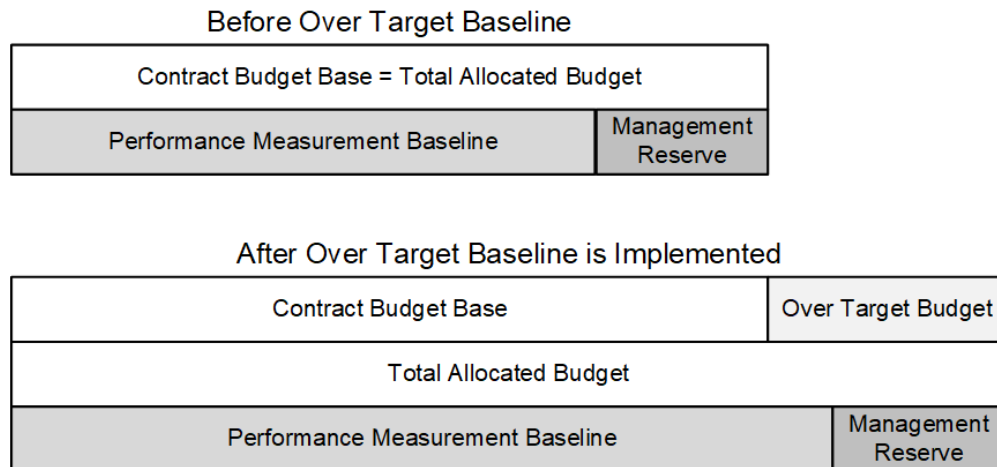


Figure 6 – Over-target baseline

When the estimated completion date extends beyond the contract completion date, it may be prudent to extend the planned completion date beyond the contractual period of performance. The result of this extension is referred to as an over-target schedule. An over-target schedule often contributes to an over-target baseline.

Before implementing an over-target baseline or over-target schedule, a thorough analysis of project status is necessary to decide whether this is the best option to improve management visibility and control. The organization should perform a detailed assessment of the schedule activities/tasks, project remaining duration, resource requirements, and cost estimates necessary to complete the remaining effort. There may be situations or circumstances where a partial over-target baseline is appropriate for selected work elements.

When considering an over-target baseline or over-target schedule, the contract should be reviewed for implementation requirements. Advance notification to the appropriate parties is essential before implementing an over-target baseline or over-target schedule. Internal management and the customer must have a common understanding of the impact on the performance measurement metrics, and customer approval prior to implementation is typically required. The intent of reprogramming is to re-establish a realistic plan to complete the remaining work and improve management visibility into monthly performance. It does not affect or change contract value or provide relief from any contractual obligations concerning schedule deliveries, contractual events, or any incentive loss or penalties.

Typical Attributes:

- Contractual budget values (the contract budget base or total allocated budget) are only revised through contractual authorization such as a contract modification or over-target baseline authorization.
- Official request and customer approval for over-target baseline and/or over-target schedule, including a comprehensive estimate at completion supporting plan.
- Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base) reflect changes from the original contract budget base and performance measurement baseline.
- Control account/work package/planning package plans reflect updated schedule and budget plans for all authorized changes.
- Schedule risk assessment.

- Integrated master schedule reflects incorporation of latest authorized changes.
- Time-phased budget reflects authorized changes to the budget.
- Statement of work, work breakdown structure (WBS), and WBS dictionary (if used) reflect incorporation of all authorized changes.
- Work authorization documents reflect incorporation of all authorized changes.
- Management performance reports or other management reports reflect incorporation of all authorized changes.

Objective evidence may be found in these typical outputs:

- Change control logs (management reserve, undistributed budget, performance measurement baseline, and contract budget base).
- Baseline change documents.
- Control account/work package/planning package plans.
- Integrated master schedule.
- Statement of work, WBS, and WBS dictionary.
- Work authorization documents.
- Management performance reports or other management reports.
- Over-target baseline request and customer approval letter.

3 Example Process Description Compliance Map

3.1 Developing a Compliance Map to the EVMS Guidelines

The purpose of this section and the separate appendix document to this intent guide is to provide an example and template that can be used as a starting point for a contractor, subcontractor, or government agency that needs to develop a compliance map to the EIA-748 EVMS Guidelines for their business process.

The example in this section uses guideline 1 to provide a sample description of how a company's business process complies with the requirements of a given guideline.

The separate appendix document provides a compliance map template for the 27 guidelines that can be tailored to a given business environment. The compliance section for each guideline must be completed based on how the company or agency does business.

3.2 Example Compliance Map

The ACME Corporation EARNED VALUE MANAGEMENT SYSTEM PROCESS DESCRIPTION COMPLIANCE TO THE EIA-748 STANDARD	
Guideline 1 – Decompose Scope Using a Work Breakdown Structure (WBS)	
2.1	Organization
a)	Define the authorized work elements for the program. A product-oriented work breakdown structure, tailored for effective internal management control, is commonly used in this process.
Intent The WBS is a direct representation of the work scope in the project. The WBS should be extended to the level necessary for management action and control. The level to which the WBS is extended may vary based upon the complexity of the work scope, as well as the needs for effective management control of the project's technical, schedule, and cost parameters. Following the 100% rule for WBS development, where the next level of decomposition of a WBS element (child level) represents 100% of the work applicable to the next higher level (parent level) of the WBS, facilitates the establishment of a well-defined framework for scope management. A WBS dictionary, when used, defines and communicates the technical requirements and work scope such as specifications, assumptions, dependencies, or what is included and excluded. Either a WBS dictionary or another cross-reference method reconciles the WBS to the statement of work. As a project progresses from one phase to another, it is normal to reassess the WBS. For example, the product breakdown during the development phase for a project may be different from the product breakdown, or the assembly sequence, used for the project in the production phase. Should project requirements change, the WBS evolves with the project. When the work scope can only be defined in general terms such as when an exploratory phase is required to define the full extent of the work, it is necessary to understand the additional risks this creates because of the level of uncertainty. Flexible project plans and controls should be in place to account for these risks until the work scope and requirements can be further defined. Typical Attributes: • Only one WBS is used for management purposes for each project, and it contains all project work, including revisions for authorized changes and modifications. • The WBS contains all contract line items and end items. • The WBS identifies all WBS elements specified for external reporting. • The WBS is extended at a minimum to the level(s) at which control accounts are established. • The WBS elements should collectively provide a complete definition of work scope requirements and be documented in a WBS dictionary. • The WBS may evolve as the project requirements change. Objective evidence may be found in these typical outputs: • WBS. • Statement of work or equivalent.	

- WBS dictionary (may or may not be used, but a method to reconcile the statement of work to the WBS elements must be demonstrated).

Earned Value Management System Description Compliance

The development and maintenance of the WBS for each project is described in Section 2 of ACME corporation EVM System Description. Each project must comply with the requirements described in Section 2. In summary, the requirements are as follows.

- The WBS must be created and maintained in ACME's corporate EVMS.
- A single project WBS structure must be developed and maintained for the entire life of the project.
- The WBS includes fields to identify and include such details as a:
 - o Unique WBS number for each WBS element.
 - o Short description.
 - o Parent element identification (with the exception of the top WBS element).
 - o Contract line item number for cross-reference to the statement of work.
 - o Reporting level required for internal management and customer reporting purposes.
 - o The lowest level in the WBS is the control account level (typically level 4 or 5 in the WBS structure, depending on the needs of the project).
- The WBS Dictionary document is used to describe the scope of work for all WBS elements. This description should include, but is not limited to, specific details such as:
 - o End result or expected work product.
 - o Related work to identify dependencies between elements of work.
 - o Risk and opportunity factors.
 - o Assumptions or limitations.
 - o Technical specifications.
 - o Related documents or other materials that are required for the work team to successfully complete their scope of work.

Applicable process documents and desktop instructions are listed below. Who is responsible for what is also noted.

- **WBS Validation.** The project control team uses this process and related checklist to verify the WBS is complete as well as the cross references between the WBS elements and the statement of work. It is also used to verify that all WBS elements have an entry in the WBS Dictionary and that the work scope details are clear and specific. This validation check is conducted as part of the initial WBS development process before the performance measurement baseline is set or when any contract modifications impact the scope of work.
- **Maintaining the WBS.** Desktop instructions used by the project control team for entering and maintaining the WBS data in the ACME EVMS. Only the project control team members have the authorization to create or modify the WBS data.
- **Maintaining the WBS Dictionary.** Desktop instructions used by the control account managers and IPT team members to enter and maintain the WBS Dictionary data.
- **Maintaining Control Accounts.** Desktop instructions for entering and maintaining the control account data in the ACME EVMS. Only the project control team members and the assigned control account manager have the authorization to modify the control accounts in the system.

Outputs available from the ACME EVMS for each project include:

- The WBS.
- WBS Dictionary.