

AACE
INTERNATIONAL
**RECOMMENDED
PRACTICE**

82R-13

**EARNED VALUE MANAGEMENT
(EVM) OVERVIEW AND
RECOMMENDED PRACTICES
CONSISTENT WITH EIA-748-C**

AACE
INTERNATIONAL



AACE® International Recommended Practice No. 82R-13

EARNED VALUE MANAGEMENT (EVM) OVERVIEW AND RECOMMENDED PRACTICES CONSISTENT WITH EIA-748-C

TCM Framework: General Reference

7.1 – Project Scope and Execution Strategy Development

7.2 – Schedule Planning and Development

7.3 – Cost Estimating and Budgeting

7.4 – Resource Planning

7.6 – Risk Management

8.1 – Project Control Plan Implementation

9.1 – Project Cost Accounting

9.2 – Progress and Performance Measurement

10.1 – Project Performance Assessment

10.2 – Forecasting

10.3 – Change Management

Rev. May 4, 2017

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

Any terms found in AACE Recommended Practice 10S-90, *Cost Engineering Terminology*, supersede terms defined in other AACE work products, including but not limited to, other recommended practices, the *Total Cost Management Framework*, and *Skills & Knowledge of Cost Engineering*.

Contributors:

Disclaimer: The content provided by the contributors to this recommended practice is their own and does not necessarily reflect that of their employers, unless otherwise stated.

May 4, 2017 Revision:

Brian M. Evans, DRMP EVP PSP (Primary Contributor)
Dan Melamed, CCP EVP (Primary Contributor)

Ronald L. Clendendon, EVP

November 4, 2014 Revision:

Kimberly Meyer, EVP (Primary Contributor)
Robert Loop, EVP PSP (Technical Advisor)
Dan Melamed, CCP EVP

Richard C. Plumery, EVP
Brian M. Evans, DRMP EVP PSP

EARNED VALUE MANAGEMENT (EVM) OVERVIEW AND RECOMMENDED PRACTICES CONSISTENT WITH EIA-748-C



TCM Framework: General Reference

- 7.1 – Project Scope and Execution Strategy Development
- 7.2 – Schedule Planning and Development
- 7.3 – Cost Estimating and Budgeting
- 7.4 – Resource Planning
- 7.6 – Risk Management
- 8.1 – Project Control Plan Implementation
- 9.1 – Project Cost Accounting
- 9.2 – Progress and Performance Measurement
- 10.1 – Project Performance Assessment
- 10.2 – Forecasting
- 10.3 – Change Management

May 4, 2017

TABLE OF CONTENTS

Table of Contents	1
Introduction	1
Recommended Practice	2
Earned Value Unique Terminology	2
Structure of the Overview RP	2
1. EVM Within the TCM Framework	2
2. Brief Overview of the EIA-748-C EVMS Standard	3
3. Introduction to Earned Value Management	12
4. EIA-748-C Organization: Guidelines 1-5	12
5. EIA-748-C Planning, Scheduling, And Budgeting: Guidelines 6-15	14
6. EIA-748-C Accounting: Guidelines 16-21	17
7. EIA-748-C Analysis and Management Reports: Guidelines 22-27	17
8. EIA-748-C Revisions and Data Maintenance: Guidelines 28-32	18
References	20
Contributors	20

INTRODUCTION

This recommended practice (RP) applies to contracts employing the *Electronics Industries Alliance (EIA) - 748 Earned Value Management Systems (EVMS)*^[9] guidelines or the equivalent. It takes precedence over other *TCM Framework* guidance when EIA-748 is required. It provides an overview of the concept of earned value and its application in accordance with the EIA-748-C earned value management system (EVMS) standard. EIA-748-C contains 32 guidelines that are interrelated. This RP provides an overview of the EIA-748-C guidelines 1-32 and provides a comparison with the *Total Cost Management (TCM) Framework*.

May 4, 2017

RECOMMENDED PRACTICE

Earned Value Unique Terminology

Earned value has some unique definitions and terminology. These are listed in RP 10S-90, *Cost Engineering Terminology*^[7].

Structure of the Overview RP

This RP will first introduce and define the 32 EIA-748-C guidelines for the use of earned value management. These guidelines are used in total for many contracts, particularly within the US government community, as well as other commercial entities.

The structure of the RP will begin with the *TCM framework*, compare EVMS standards and then follow the general format of the *NDIA (National Defense Industrial Association) Earned Value Management Systems Intent Guide*^[1] into the following categories:

1. EVM within the TCM framework
2. Brief Overview of the EIA-748-C EVMS Standards
3. Introduction to Earned Value Management
4. EIA-748-C Organization: Guidelines 1-5
5. EIA-748-C Planning, Scheduling, and Budgeting: Guidelines 6-15
6. EIA-748-C Accounting: Guidelines 16-21
7. EIA-748-C Analysis and Management Reports: Guidelines 22-27
8. EIA-748-C Revisions and Data Maintenance: Guidelines 28-32

1. EVM WITHIN THE TCM FRAMEWORK

Total Cost Management (TCM) is defined as:^[8]

TOTAL COST MANAGEMENT (TCM) – The effective application of professional and technical expertise to plan and control resources, costs, profitability and risks. Simply stated, it is a systematic approach to managing cost throughout the life cycle of any enterprise, program, facility, project, product, or service. This is accomplished through the application of cost engineering and cost management principles, proven methodologies and the latest technology in support of the management process. It can also be considered the sum of the practices and processes that an enterprise uses to manage the total life cycle cost investment in its portfolio of strategic assets. (1/02)

Figure 1 shows an overview of the TCM process.

May 4, 2017

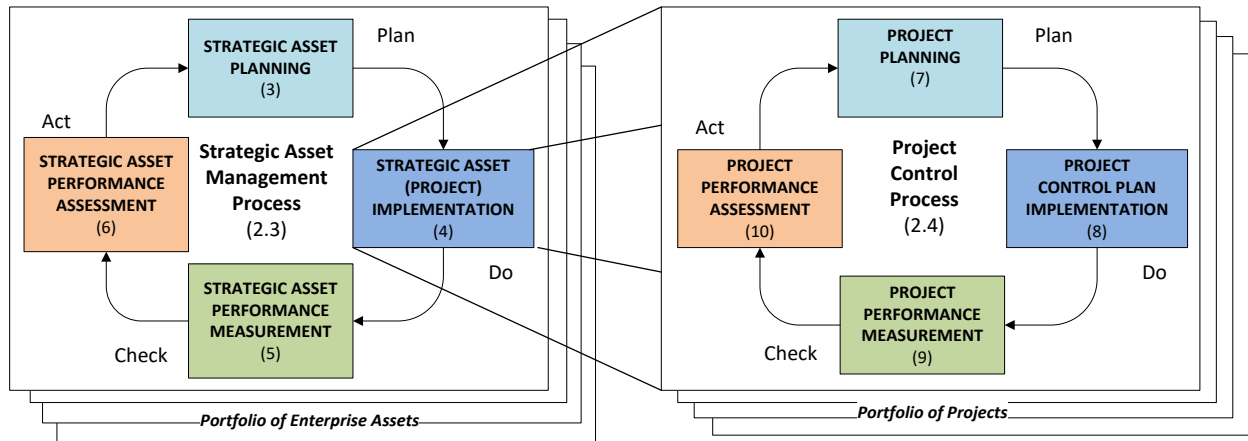


Figure 1 – (TCM Framework Figure 2.2-1) Total Cost Management Process Map

Earned value is focused on the project portfolio phase. Earned value integrates technical, schedule, and cost budgeting and performance measurement within a project framework, however many of the principles are found within the TCM framework. This RP will describe the earned value basics. The following table provides the framework of TCM as it relates to earned value and highlights areas of the EIA-748-C EVM standard that are not specifically addressed within the TCM framework.

2. BRIEF OVERVIEW OF THE EIA-748-C EVMS STANDARD

The following tables describes the 32 guidelines within the five categories of the EIA-748-C standard showing how they relate to specific section(s) of the TCM Framework.

December 13, 2016

EIA-748-C CATEGORY AND GUIDELINE #: ORGANIZATION				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
1	Define Work Breakdown Structure (WBS). Identify the work elements for the project scope. For this task, a work breakdown structure is often employed.	Define all elements of work for the project. This is typically done using a WBS. - The WBS is a product oriented description of activities describing the project work scope that allows for work authorization. - The WBS breaks down and organizes all work for budgeting, planning, scheduling, cost accounting, work authorization, tracking, measuring progress, management control, and reporting purposes.	- WBS - WBS dictionary - Statement of work (SOW) - Traceability matrix from requirements (e.g., SOW, build specifications) to WBS - Integrated program management report (IPMR) - Base contract and modifications	7.1 - <i>Project Scope and Execution Strategy Development</i>
2	Identify Organizations. Identify the program organization structure including major subcontractors responsible for accomplishing the work. In addition, define those in the organization who plan and control the work.	Identify and define the organization elements responsible for accomplishing the project work as well as those managing and controlling the work. - The organization breakdown structure (OBS) helps define the groups within the organization that provides the resources, plan, and budget to perform the work. - This includes subcontracted work.	- OBS - Matrix of OBS and WBS - IPMR	
3	Integrate Subsystems. Integrate planning, scheduling, cost accounting and work authorization activities including (where appropriate) the WBS and OBS.	Integrate the project technical cost and schedule elements through the appropriate project documents. Provide a logical framework for all project cost, schedule, budgeting, and work authorization activities.	- WBS and OBS - SOW - Control account (CA) plans - Performance reports - Schedules - Work authorization documents - Responsibility assignment matrix (RAM) - Integrated master schedule	7.1 - <i>Project Scope and Execution Strategy Development</i> 8.1 - <i>Project Control Plan Implementation</i>
4	Identify Overhead Control. Identify the program elements responsible for indirect costs	Define how overhead burdens are distributed across the organization.	- Cost accounting standards (CAS) disclosure statement - Organizational chart - Chart of accounts	9.1 - <i>Project Cost Accounting</i>
5	Integrate WBS and OBS. Integrate the OBS and WBS in a manner that permits the cost and schedule performance.	Allow for the integration of cost and schedule activities through the WBS and OBS in such a fashion that project performance can be accurately measured through either structure as needed. Only a single CA should be at the intersection of the WBS and OBS. The CA identifies all supporting activities. Estimated costs should be apparent.	- Appropriate IPMRs - RAM - List of CAs - Management reports from cost tool	8.1 - <i>Project Control Plan Implementation</i>

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: PLANNING, SCHEDULING AND BUDGETING				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
6	Schedule Work. Schedule the authorized work such that the sequence of tasks and their interdependencies are clearly defined according to the requirements for the project.	- Schedule all of the activities of the authorized work for the project - Identify significant task interdependencies Ensure there is vertical and horizontal integration between the scheduled activities for the work packages, planning work packages and the work breakdown structure (WBS) and organization breakdown structure (OBS).	- Integrated schedules - Control account (CA) plans - Work authorization documents (WADs) - Risk/opportunity Register	7.2 - <i>Schedule Planning and Development</i> 8.1 - <i>Project Control Plan Implementation</i>
7	Identify Products/Milestones. Identify products (e.g. milestones, deliverables, etc) that can be used to assess progress.	Maintain the ability to determine technical accomplishment while being able to status progress.	- Integrated schedules - CA plans - WADs - Contract and modifications	7.2 - <i>Schedule Planning and Development</i> 7.3 - <i>Cost Estimating and Budgeting</i> 7.4 - <i>Resource Planning</i> 8.1 - <i>Project Control Plan Implementation</i>
8	Set Time-Phased Budget. Establish and maintain a time-phased project baseline at the CA level.	The assignment of budgets to a scheduled sequence of work is the performance measurement baseline (PMB). This should be put into practice soon after the contract is awarded (it should definitely be in place after the authorization to proceed). - PMB is derived from the contract budget baseline through the separation of management reserve. - Care should be taken to ensure that resources are meted out in a controlled manner. - There should not be an inadvertent front-loading of the PMB. - Summary level planning packages (SLPPs) may need to be created in order to allow for work that will need to be finalized as the project progresses. - Care must be taken to avoid an over target baseline (OTB). Prior notice of an OTB needs to be made to the customer if it is to be used for performance reporting.	- CA plans - SLPPs - WADs - Undistributed budget (UB) log - Notification of OTB - PMB - Integrated program management report (IPMR)	7.2 - <i>Schedule Planning and Development</i> 7.3 - <i>Cost Estimating and Budgeting</i> 7.4 - <i>Resource Planning</i> 8.1 - <i>Project Control Plan Implementation</i>

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: PLANNING, SCHEDULING AND BUDGETING				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
9	Significant Cost Elements. Establish budgets for authorized work identifying specified activities (elements of cost) (labor, materials, etc) that allow for the management of the activities or subcontractors.	CAs should list the budgets of material (listed according to category, e.g. materials, labor, subcontractor activity, etc). - In general, budgets should be listed in accordance with the organizations planning the work. - This includes budgets for direct costs. - It also includes budgets for indirect costs which should be assigned (as available). - Contract costs should be time-phased in accordance with schedule requirements.	- Dollarized RAM (responsibility assignment matrix) (\$RAM) - Resource-loaded schedules - WADs - UB log - Bills of material - Subcontractor schedules and spend plans - Materials requirements documents - PMB	7.2 - <i>Schedule Planning and Development</i> 7.3 - <i>Cost Estimating and Budgeting</i> 7.4 - <i>Resource Planning</i>
10	Discrete Work Packages. To the extent practical, divide all work into work packages using dollars, hours, or other measurable unit. If this is not feasible for far term activities, create planning packages for budget and scheduling purposes.	- Work packages assigned to a single organizational element. - Have distinct start or finish dates (also interim milestones if needed) for a relatively short period of time. - Have a budget or assigned value such as labor hours or other measureable unit. - Planning packages are for future work—they should have some description of how the work will be performed.	- CA plans [divided into work packages] - CA schedules - CA budgets [scheduled]	7.1 - <i>Project Scope and Execution Strategy Development</i> 8.1 - <i>Project Control Plan Implementation</i> 9.1 - <i>Project Cost Accounting</i>
11	Summary Work/Planning Packages. Ensure that the sum of the budgets for all work packages and planning packages sum up to the CA package.	Ensure that the sum of the budgets for all work packages and planning packages sum up to the CA budget.	- Work package budget - Planning package budget - CA budgets - WADs	7.2 - <i>Schedule Planning and Development</i> 8.1 - <i>Project Control Plan Implementation</i>
12	Identify Level of Effort (LOE) Activities. Identify and minimize LOE activities.	Only activities that cannot be measured in any other fashion should be listed as LOE.	CA plans	9.1 – <i>Project Cost Accounting</i> 9.2 - <i>Progress and Performance Measurement</i>
13	Set Overhead for Organizations. Establish overhead budgets to those organization elements that can be assigned as indirect costs for the CAs.	Overhead costs need to be distributed across the various CAs.	- Documented reports and policy reports for indirect costs. - Performance reports.	9.1 - <i>Project Cost Accounting</i>

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: PLANNING, SCHEDULING AND BUDGETING				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
14	Identify Management Reserve (MR) and UB. Identify MR and UB.	MR is used by the project manager to adjust for uncertainties. MR budget and its use should always be accounted for at the total project level. MR is not a contingency which can be eliminated from contract price during subsequent negotiations or used to absorb the cost of contract changes. Contractor should not be required to use existing MR to provide budgets for authorized but undefined work or other modifications to authorized contractual actions. Establish and track UB: Budgets applicable to contract effort that cannot be specifically identified to a CA in a timely manner are referred to as UB. The budget should be distributed to an appropriate WBS or organizational element and CA as quickly as possible.	• IPMRs • Budget logs (MR, UB, CAs)	7.6 - Risk Management
15	Target Costs and Budgets. Provide that the program target cost is reconciled with the budgets for all of the program budgets and MR.	Reconcile budget values to contract costs. After contract negotiations are completed, the total allocated budget (TAB) used to report project performance must always represent the contract budget base value (or OTB if approved). TAB (the PMB plus MR) equals the authorized contract target cost plus the estimated cost of authorized but unpriced work. UB should be distributed as soon as it is feasible.	• IPMRs • Budget logs (MR, UB, CAs)	7.3 - Cost Estimating and Budgeting 9.1 - Project Cost Accounting

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: ACCOUNTING				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
16	Record Direct Costs. Record direct costs consistent with project budgets according to generally accepted accounting procedures (GAAP).	This should be done according to GAAP.	- Control account (CA) budgets and actual costs reviewed by the accounting system. - Internal and external performance reports for subcontractors	<i>8.1 - Project Control Plan Implementation</i> <i>9.1 - Project Cost Accounting</i>
17	Summarize into Work Breakdown Structure (WBS). When a WBS is used, summarize the direct costs from the CA, without allocation of a single CA, into two or more WBS elements.	Cost collections, taken at the CA level, need to be mapped down to the WBS and WBS roll-up structures. Direct costs for parallel activities (for the same activities and/or materials) are allocated into the appropriate CAs (and their subordinate work packages) for each project. Actual costs collected at the control account level may not be summarized to multiple higher level WBS elements.	- Cost collection account structure - WBS structure (roll up scheme) - WBS/cost collection mapping - Monthly performance reports	
18	Summarize into Organization Breakdown Structure (OBS). Summarize direct costs from the CAs into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.	Cost collections, taken at the CA level, need to be mapped down to the OBS and OBS roll-up structures. Direct costs for parallel activities (for the same activities and/or materials) are allocated into the appropriate CAs (and their subordinate work packages) for each project. Actual costs collected at the CA level may not be summarized to multiple higher level OBS elements.	- Responsibility assignment matrix - OBS structure (roll-up scheme) - Monthly performance reports. (Format 2) - Program organizational chart	
19	Record Indirect Costs. Record all indirect costs which will be allocated to the project.	Record all indirect costs for the project in the accounting system. Document the records for this cost through well-documented procedures to assure that those benefitting from the activities paid through indirect costs receive their fair share.	- Cost collection account structure - WBS structure (roll-up scheme) - WBS/cost collection mapping - Cost accounting standards disclosure statement	<i>9.1 - Project Cost Accounting</i>
20	Identify Equivalent/Lot Costs. Identify unit costs, equivalent unit costs, or lot costs when needed.	When using equivalent units or lot cost budgeting, ensure that the accounting system measures the cost performance appropriately	- Manufacturing requirements planning project cost collection - Enterprise resource planning	<i>9.1 - Project Cost Accounting</i>

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: ACCOUNTING				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
21	Material Accounting. Provide a material accounting system for: • Accurate cost accumulation consistent with the budgets • Cost performance measurement at a suitable point • Full accountability of material purchases for the project	For earned value management systems (EVMS), the material accounting system will provide for the following: 1. Accurate cost accumulation and assignment to CAs consistent with the budgets 2. Cost performance measurement at the point in time most suitable for the material involved, but no earlier than the time of payments or actual receipt of material 3. Full accountability of material purchases for the project including residual inventory	• Performance reports • CA plans • Material system reports	

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: ANALYSIS AND MANAGEMENT REPORTS				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
22	Periodic Control Account (CA) Sums. Monthly reporting of required planned value, earned value, actual costs in sufficient detail to provide a monthly cost and schedule variance	At least monthly, generate the following information at the CA level (and other levels as necessary) for management control using actual cost data (or data reconciled and acceptable with the accounting system): 1. Schedule variance 2. Cost variance	- Monthly performance report listing (cost variance, schedule variance, and variance at completion) - Variance analysis data and discussions	9.2 - Progress and Performance Measurement 10.1 - Project Performance Assessment
23	Determine Variances. Identify, at least monthly, significant cost and schedule variances including the reasons for the variances.	Both cost and schedule variances are good indicators of a project's final outcome (if future performance does not change). Detailed schedule analyses provide valuable information on the CA as well as details for lower level work packages and activities.	- Project schedules and schedule analysis outputs - Management action plans - Variance analyses	9.1 - Project Cost Accounting 9.2 - Progress and Performance Measurement
24	Budget/Actual Indirects. Identify budgeted and applied (or actual) indirect costs, along with analyses for any significant variances.	Monthly indirect cost analysis is required. Indirect budgeted costs are to be compared to indirect actual costs. Any cost variances are to be analyzed.	- Indirect cost variance analyses - Indirect cost management action plans	
25	Summarize Data and Variances. Summarize the data elements and associated variances through the program organization breakdown structure (OBS) and/or work breakdown structure (WBS) to support management needs and any customer reporting on the project	The same information should be used for internal management needs and reporting to the customer. Since the OBS and WBS are required for the system the reports should be structured utilizing this framework.	- Variance analyses - Schedule and cost performance reports - Management action plans - Updated schedule and cost forecasts	9.1 - Project Cost Accounting 9.2 - Progress and Performance Measurement
26	Manager Action Plans. Implement management actions taken as the result of earned value information.	Management actions to correct variances in the project's schedule and cost should be identified and then tracked to resolution and closure.	- Independent completion estimates - Risk management documentation - Management action plans and review briefings - Variance analyses	10.2 - Forecasting
27	Estimate at Completion (EAC) Revisions. Calculate differences between the revised EACs and the EAC for the performance measurement baseline. Report these differences (variances) as well as any information on future funding requirements.	Develop revised estimates for the cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare these estimates to the current baseline and identify the variances at completion. Report these variances to the management and the customer. Include any statements for future funding requirements.	- CA plans - Documented processes for determining the EAC - Basis of estimates - Risk management plans - Material/subcontractor performance - Internal and external management reports, such as integrated project management reports (IPMRs)	10.2 - Forecasting

May 4, 2017

EIA-748-C CATEGORY AND GUIDELINE #: REVISIONS AND DATA MAINTENANCE				
#	General Title	General Description	Demonstrated in the following products:	Related to the TCM areas:
28	Incorporate Change. Incorporate authorized changes in a timely manner, recording the effects of these changes on budgets and schedules.	All authorized changes to work scope should be incorporated into the performance baseline in a documented, transparent, and timely manner.	- Contract change documents - Change control logs (management reserve (MR), undistributed budget (UB), performance measurement baseline (PMB), and contract budget base (CBB)) - Control account (CA), work package, planning package plans - Master schedules - Work authorization documents (WADs) - Management reports	10.3 - <i>Change Management</i>
29	Reconcile Budgets. Reconcile current budgets to prior budgets with respect to changes to the authorized work and internal replanning in the detail required by management.	Budget changes are traceable to authorized contractual changes and CA budgets. MR may also be applied to future activities when in-scope work has been identified.	- Contract change documents - Change control logs (MR, UB, PMB, and CBB)	10.3 - <i>Change Management</i>
30	Control Retroactive Change. Control retroactive changes	Retroactive changes should be made only for: - Correction of errors, - Routine accounting adjustments, - Effects of customer or management directed changes, or - To improve the baseline integrity and accuracy of performance measurement data	Change control logs	10.3 - <i>Change Management</i>
31	Only Authorized Change. Prevent revisions to the program budget except for authorized changes	Prevent unauthorized revisions to the PMB. Any changes to the project must be approved and implemented following the baseline management control process.	- Contract change documents - Change control logs - CA, work package, planning package plans - Master schedules - WADs - Management reports	9.1 - <i>Project Cost Accounting</i> 10.3 - <i>Change Management</i>
32	Document PMB Change. Document changes to the PMB.	The PMB should always reflect the most current plan for accomplishing the effort. Authorized changes must be promptly recorded in the system and incorporated into all relevant planning. Planning and authorization documents must be updated accordingly, prior to the start of work.	- Contract change documents - Change control logs - CA, work package, planning package plans - Master schedules - WADs - Management reports	10.3 - <i>Change Management</i>

May 4, 2017

3. INTRODUCTION TO EARNED VALUE MANAGEMENT

Earned value management (EVM) has been utilized formally since the 1960s and has been a requirement for many US government projects over the past several decades. For example, the US Department of Energy and the Department of Defense requires the application of EVM in accordance with the EIA-748-C standard on contracts greater than or equal to \$20M.

Industry has no specific dollar thresholds for application of EVM but the use of the standard is a business decision—if using the tool to positively impact the bottom line and profit through enhanced management then companies will decide to implement EVM. The reason companies implement EVM even though it is not required is because EVM is an effective integrator of the work scope, schedule, resources, and risk. It should be applied by organizations based on the characteristics of each program—type, complexity, and size.

In addition, the *NDIA Earned Value Management System Application Guide* dated 4 May 2011, says that “ANSI EIA-748 provides a scalable EVM approach that can be adapted to any size project, program, or enterprise”^[3]. For this reason, some organizations prescribe full-up implementation of all 32 guidelines (i.e. Department of Defense and Department of Energy for projects > \$20M) and some organizations will implement a tailored EVM system to meet their specific management needs.

In consideration of when EVMS is applicable, the *NDIA PMSC Application Guide* states that “EVM is recommended for all programs where delivery of a product or other measurable outcome is intended. In such programs, successful execution of performance objectives depends to a large degree on the quality of the planning effort for the application of EVM”^[3]. There are two key concepts: 1) measurable work progress; and 2) a focus on planning to establish the performance measurement baseline (PMB) against which performance will be tracked and evaluated. This can be accomplished through establishing a solid baseline based on valid schedules, clear-cut cost/budget estimates, and objective ways to measure the accomplishment of work allows managers to use the resulting data to accurately monitor project progress and make informed decisions.

EVM provides a structured planning process leading to data and information required within the project management cycle of initiating, planning, executing, controlling, and closing out the project.

4. EIA-748-C ORGANIZATION: GUIDELINES 1-5

The first five guidelines (see Figure 4) form the foundation for the quality planning process identified as one of the two key concepts of EVM. The intent of this set of guidelines is to identify program and organizational responsibilities and the specific individual responsible for each portion of the work.

ORGANIZATION	1. Define WBS 2. Identify Organizations 3. Integrate Subsystems 4. Identify Overhead Control 5. Integrate WBS and OBS
--------------	---

Figure 4 – Guidelines Under The Organization Category

During the planning process, the project team must consider all the work that must be performed to accomplish the end objective. A work breakdown structure (WBS) is the mechanism most commonly used to organize the work into a hierarchical relationship of tasks encompassing the entire scope of the project. The WBS is used to link

May 4, 2017

cost, schedule, and scope and aids in tracking and reporting. Typically both a hierarchical WBS “tree” and a WBS dictionary are required. Figure 4 provides an example of a WBS as a tree hierarchy.

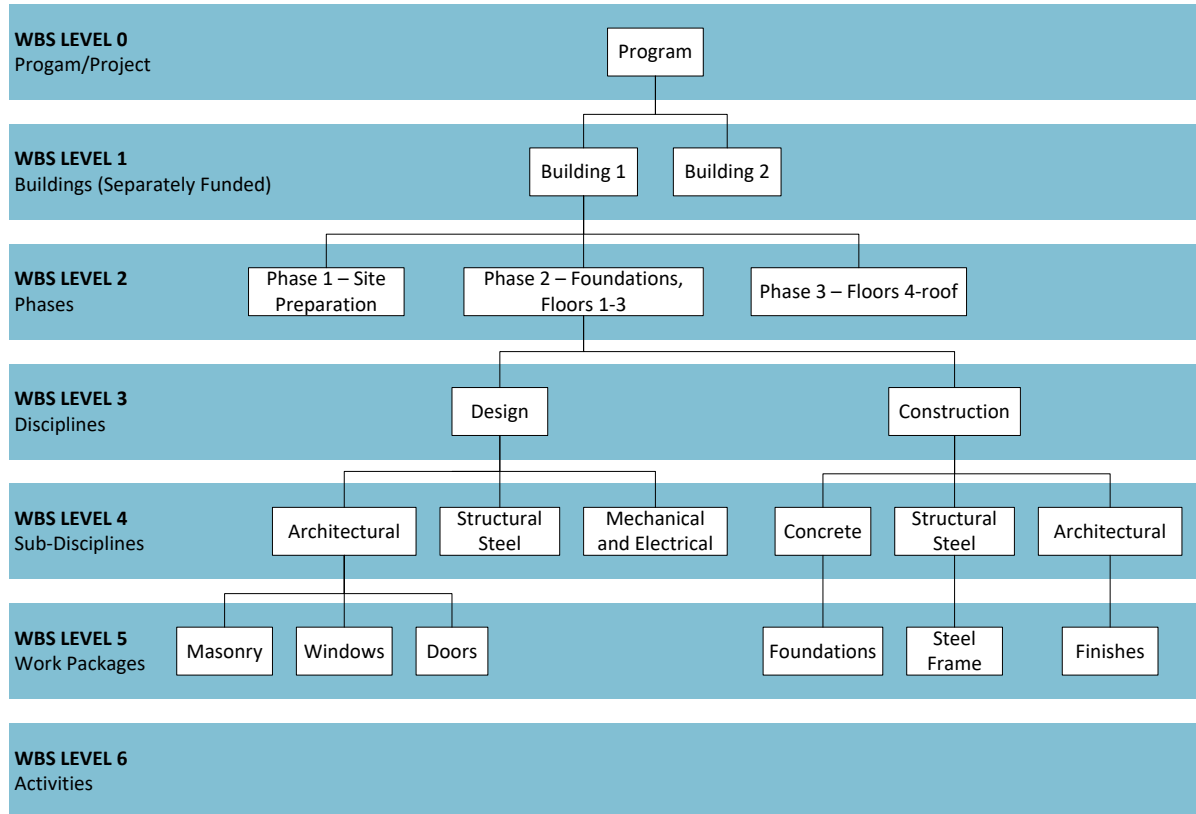


Figure 4 – Example of a partial Work Breakdown Structure as a Tree Hierarchy

Once all the work has been identified, the project manager must identify who in the organization is responsible for the accomplishment of each task—this is the person who has the authority, accountability and responsibility for each task assigned. The assignment of organizational responsibility is accomplished through an organizational breakdown structure (OBS). These structures, the WBS and OBS, are used to tie the work (“the what”) to the areas responsible for it (“the who”). The intersection of one WBS element with the OBS is a control account which is where a single functional organization is responsible for the work defined in a single WBS element—the person responsible in the organization for the accomplishment of the work is called the control account manager (CAM). As part of organizing under EVM, planning, scheduling, budgeting, work authorization, and cost collection processes should all be integrated. One of the tools used to integrate these aspects is the responsibility assignment matrix (RAM).

Guideline 4 addresses indirect or overhead costs. Because these costs make up such a significant portion of program costs, they are typically budgeted and controlled separately and managers responsible for controlling these costs must be identified. The magnitude is why clear identification of managers responsible for indirect costs is so important—you may see indirect managers in each division (for example, engineering or manufacturing) and at the corporate level for general and administrative (G&A) costs. In addition, to identification of responsible indirect managers, processes to manage and control indirect (overhead) costs must be in place and clearly define how overhead resources are assigned, how these budgets are established and how these costs are controlled.

May 4, 2017

Guideline 4 does not address the level or accountability for indirect cost management within the PMB. Typically indirect costs may be distributed along with direct costs within work packages and planning packages. Although the CAMs may be responsible for the effects of indirect costs within their assigned control accounts this does not change the requirement for management of remaining indirect costs above the project level.

5. EIA-748-C PLANNING, SCHEDULING, AND BUDGETING: GUIDELINES 6-15

This category contains guidelines 6-15 (see Figure 5) and cover the tasks necessary to establish the performance measurement baseline (PMB)—these tasks are the initial plan and scope development; identifying the physical products and milestones that will be used to measure progress; time phasing the work across the schedule to set the baseline at the control account level; and establishing the budgeted amount that will be in management reserve.

PLANNING, SCHEDULING AND BUDGETING	6. Schedule Work 7. Identify Products/Milestones 8. Set Time-Phased Budget 9. Significant Cost Elements 10. Discrete Work Packages 11. Summary Work/Planning Package 12. Identify LOE Activities 13. Set Overhead for Organizations 14. Identify MR and UB 15. Target Costs and Budgets
---------------------------------------	--

Figure 5 – Guidelines Under the Planning, Scheduling and Budgeting Category

The first two guidelines in this category address scheduling. The intent of these two guidelines is to establish a valid schedule to monitor project progress—a valid schedule includes the work to be accomplished laid out in sequence with task interdependencies identified. Schedules should be vertically and horizontally integrated and traceable.

In broad terms, traceability refers to the coding necessary in the schedule to show integration with work authorization, budgeting, accounting, and other earned value management components which demonstrates the completeness of the schedule. In earned value, schedule traceability consists of two required relationships: 1) Horizontal traceability – The logic links in the schedule that insure that discrete work is linked to tasks that impact project completion; and 2) Vertical traceability – A scheduling term indicating that tasks at lower levels will be shown consistent with higher levels. All tasks at the lowest schedule level should be consistent with the higher level schedule timeframes.^[7]

The guidelines advocate developing a schedule using a process that is repeatable and consistent across the organization. A key component of this process is to identify objective indicators to measure work progress. These indicators could include the production of physical products (or the design and/or fabrication of these products), milestones, technical performance goals or other objective measures tailored to the specific work and industry.

The remaining guidelines deal with establishing the budget (all elements to include direct and indirect costs) and time phasing the budget across the project. This time phased budget is the PMB or plan used to monitor and track

May 4, 2017

project progress. The PMB is the level at which scope, schedule, and budget must be integrated. Figure 7 provides a graphical representation of the breakout of an effort utilizing EVM into its key budget components.

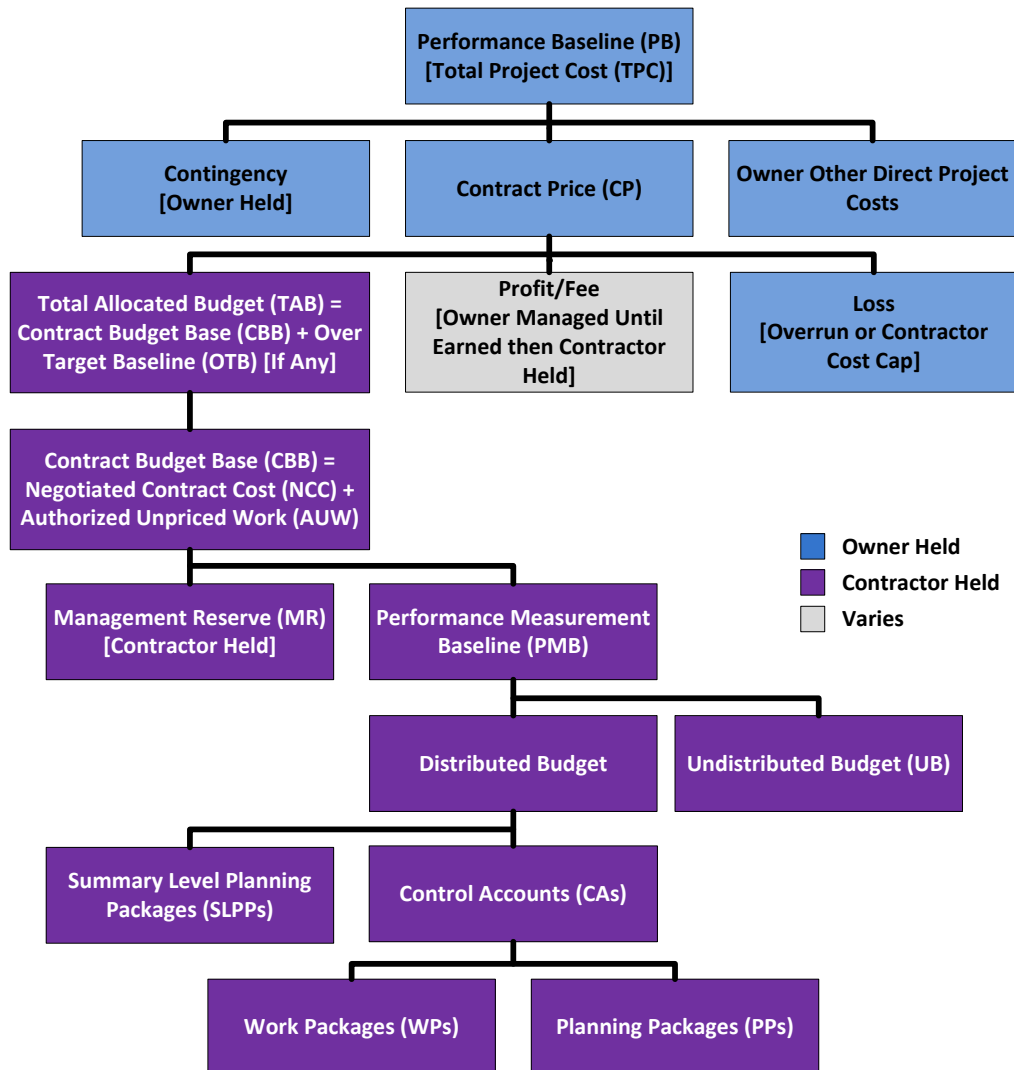


Figure 7 – An Illustration of a Typical Project Cost and Price Structure for a Project Performance Baseline, Based Upon the EIA-748-C Standard as Well as the United States Government¹

Progress is reported at the control account level with the control accounts typically sub-divided into smaller tasks for actual work accomplishment. Budgets for near term discrete work will be included work packages in terms of monetary amounts or hours with far term effort included in planning packages. The sum of the work packages and

¹ Note: Authorized unpriced work (AUW) should follow a not to exceed (NTE) value. The amount of AUW depends on the authorized scope rather than the NTE value. The cost of its scope is often greater than the NTE value, which is a reflection of the original planned work and does not reflect current funding restrictions.

May 4, 2017

planning packages within a control account must equal the overall approved control account budget. Before work commences, it should be authorized through a clearly defined process identifying the responsible manager, the time frame of the work package/control account, and the resources necessary to complete the work. This authorization is typically done via a work authorization document (WAD) or similar document. Figure 8 provides an example of a work authorization document. WADs will be formatted per the organization’s guidance and operating instructions.

WORK AUTHORIZATION DOCUMENT	
Project:	WBS No.:
WBS Title:	Task No.:
Project Manager:	Issue Date:
Responsible Individual (RI) Organization:	
STATEMENT OF WORK	
BUDGET	
Total Labor Hours:	Total Amount:
SCHEDULE	
Planned Start Date:	Planned Completion Date:
APPROVALS	
Project Manager:	Date:
Responsible Individual (RI):	Date:
RI Manager:	Date:

Figure 8 – Example of a Work Authorization Document

Level of effort activity should be identified. This work within a project is not considered discrete or measurable and should be minimized because it can mask the performance of discrete work tasks and distort the project’s overall EVM metrics. This reduces the management value of the information provided by EVM. A typical example of this kind of work is project management. The project manager works full time but may not be able to plan from day to day what specific tasks they will carry out (unlike a worker in a manufacturing environment who knows the specific tasks they will need to accomplish to produce an item).

Within the control account, establish the required budgets for indirect costs. Indirect costs are not directly attributable to the completion of an activity (e.g., power, water, and insurance). However, these costs are necessary to maintain the organization and support the project. Indirect costs need to be accounted for and managed as overhead budgets, planned, organized along with the established direct budgets.

Another component discussed in this category’s guidelines is management reserve. Management reserve, as described in EIA-748-C, is a part of the contract budget base (CBB) that is held outside the PMB to address unknown project risks that are within the scope of the project. Management reserve is part of a contractor’s strategy for managing overall project cost and schedule risk. The terms *management reserve* and *contingency* (as shown in Figure 7) are used in different context in different communities and industries. This can create significant confusion in discussion of ownership and use. This RP uses the terminology in the context of the EIA-748-C standard [7]. This is described fully in RP 75R-13, *Schedule and Cost Reserves within the Framework of EIA-748*.^[10]

As shown in figure 7, the costs of the PMB plus those allocated for MR equals the authorized contract target cost plus any authorized contract changes. This ensures that the project baseline reflects the contractual requirements and prevents unauthorized changes to the performance measurement baseline.

May 4, 2017

6. EIA-748-C ACCOUNTING: GUIDELINES 16-21

This category of the guidelines is primarily concerned with accurately collecting actual costs.

ACCOUNTING	16. Record Direct Costs 17. Summarize into WBS 18. Summarize into OBS 19. Record Indirect Costs 20. Identify Equivalent/Lot Costs 21. Material Accounting
------------	--

Figure 9 – Guidelines Under the Accounting Category

For private industry, accounting processes and procedures are governed by generally accepted principles for accounting [e.g., GAAP (generally accepted accounting principles) in the United States]; for the U.S. federal government, accounting processes and procedures are augmented by the Cost Accounting Standards (CAS). These processes and procedures must be formal and record direct and indirect costs appropriately—direct costs must be accurately assigned to the particular project that incurred the costs while indirect costs are allocated consistent with overhead budgets.

For accurate performance measurement data, it is important that lower level costs only roll up to one WBS and one OBS element. This is different from the allocation of indirect costs to direct costs that are made in accordance with the company's methods for deriving indirect/overhead rates.

The accounting system should be able to calculate unit costs, equivalent unit costs or lot costs in order to measure performance. Actual material costs must be recorded in a manner consistent with the manner in which the material budgets were created. The typical method in which actual costs are captured is through the use of a work order or charge code structure that uniquely identifies costs at the control account level for accumulation and summarization. These charge codes will map to a particular WBS and OBS element ensuring actual costs are recorded accurately to the correct project and work task.

7. EIA-748-C ANALYSIS AND MANAGEMENT REPORTS: GUIDELINES 22-27

This category of guidelines governs how programs will use the data generated from the processes included in the preceding 21 guidelines. The intent of EVM is to provide information to support decision-making. Few projects will come in exactly on cost and schedule so analysis will be required to identify any performance/cost/schedule issues and options for recovery.

ANALYSIS AND MANAGEMENT REPORTS	22. Periodic CA Sums 23. Determine Variances 24. Budget/Actual Indirects 25. Summarize Data and Variances 26. Manager Action Plans 27. EAC Revisions
------------------------------------	---

Figure 10 – Guidelines Under the Analysis and Management Reports Category

May 4, 2017

To be able to use EVM information, it must be generated and analyzed on a routine basis. The EIA-748-C guidelines specify at least monthly reporting although some programs receive reports and perform analysis more frequently. As part of the analysis, the team should evaluate the planned value (PV) with the earned value (EV) to identify schedule issues (e.g. schedule variances) and earned value (EV) with actual costs (AC) to identify cost issues (e.g. cost variances). This analysis is performed for both direct and indirect costs. By identifying those areas that have the largest and most significant variances, attention can be focused on those issues with the most impact on project performance.

Part of variance analysis is to identify its reason (root cause) and a corrective action plan. The analysis and corrective actions will then be reported, both internally and externally, to keep key stakeholders apprised of project performance. Management action may be taken as a result of the earned value information generated. One of the potential actions may be to revise the forecast of the estimates resources required to complete the project (estimate to complete or ETC). If the project is behind schedule, additional time may be required; if the project is overrunning cost, then additional funding may be required. In any of these situations, coordination with the owner may be required that may result in contract modification.

8. EIA-748-C REVISIONS AND DATA MAINTENANCE: GUIDELINES 28-32

It is very rare that a project will be completed with no changes to the work scope or baseline. For this reason, it is critical to have a formal change control process in place to preserve the integrity of the performance measurement baseline.

REVISIONS AND DATA MAINTENANCE	28. Incorporate Change 29. Reconcile Budgets 30. Control Retroactive Change 31. Only Authorized Change 32. Document PMB Change
-----------------------------------	--

Figure 11 – Guidelines under the Revisions and Data Maintenance Category

A formal process will:

- Define conditions under which change control may occur;
- Ensure scope, schedule and cost remain integrated;
- Identify the controlling authority, thresholds and limits on authority; and
- Establish a process for documenting and managing changes to baseline documents.

This process should identify the approval levels for change and document the scope, cost and schedule impact of any proposed change that meets defined thresholds. The primary steps of a change control process are: identify the proposed change (could be generated internally or by the customer); evaluate the impacts of the change; develop and document the change; obtain approval for the change; and incorporate the change into the approved baseline. Changes may be reviewed and approved by a baseline change control board or similar entity. Changes to the baseline must be submitted, evaluated and approved or disapproved in a timely manner in order to maintain baseline integrity. If the changes are approved, the cost and schedule impacts become part of the official PMB and is tracked via change control logs. These logs help ensure budgets are reconciled and changes are auditable.

The process should be flexible enough to accommodate emergency changes and control retroactive changes. Retroactive changes (changes to prior PMB) are not allowed except to make accounting adjustments, to correct

May 4, 2017

data errors, to incorporate client-directed changes or to improve the baseline integrity and accuracy of the PMB. Changes that would eliminate existing cost and schedule variances are not allowed; however, rate changes and economic price adjustments are normal exceptions. In addition, accepted practice is that cumulative values for PV and EV will not be adjusted for routine direct and/or indirect cost rate increases or decreases. This allows visibility into the variance for future estimating purposes (it is part of the historical record).

Figure 12 provides an example of the work flow diagram of a formal change control process.

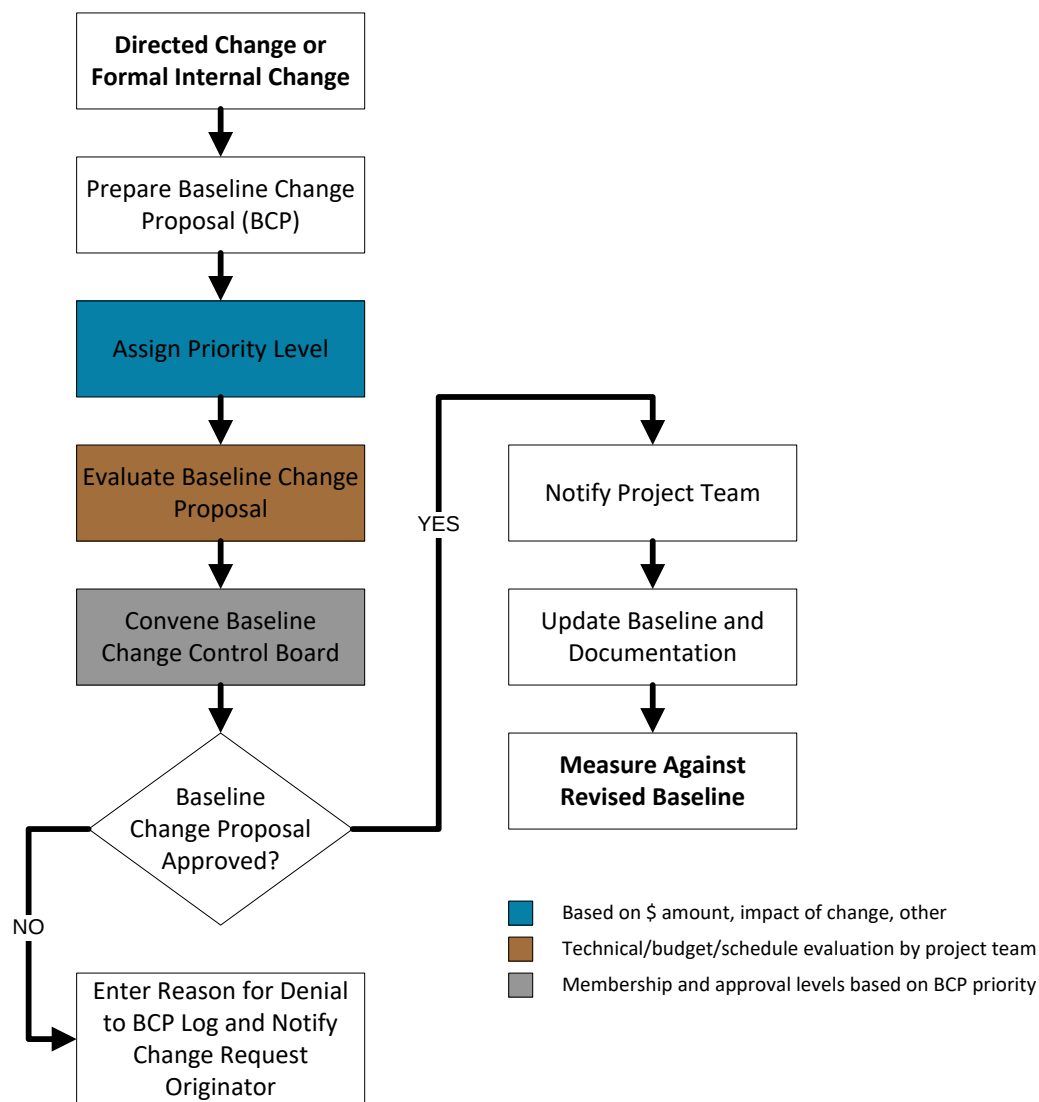


Figure 12 – Simplified Example of the Work Flow Diagram of a Formal Change Control Process

May 4, 2017

REFERENCES

1. *NDIA PMSC Earned Value Management Systems Intent Guide April 29, 2014 Edition*, National Defense Industrial Association.
2. Steeno, R., *NDIA Program Management Systems Committee (PMSC) ANSI-748 Reaffirmation Update (Briefing)*, January 2013.
3. *NDIA PMSC Earned Value Management System Application Guide, Revision 1. 4 May 2011*, National Defense Industrial Association.
4. *AS 4817-2006 Project Performance Measurement Using Earned Value*, Standards Australia, Sydney, Australia, 2006.
5. *ANSI/EIA-748-A-1998 Earned Value Management Systems and PMI Practice Standard for Earned Value Management*, Paul E Harris, Eastwood Harris, July 3, 2006.
6. *EVM 201 Intermediate Earned Value Management, Lesson 4*, Defense Acquisition University, 2013.
7. AACE International, Recommended Practice 10S-90, *Cost Engineering Terminology*, AACE International, Morgantown, WV. (latest revision)
8. H. L. Stephenson, Ed., *Total Cost Management Framework: An Integrated Approach to Portfolio, Program and Project Management*, 2nd ed., Morgantown, WV: AACE International, Latest revision.
9. *Department of Defense Earned Value Management System Interpretation Guide* Dated Feb 18, 2015.
10. *Cost and Schedule Reserves in a Project Baseline, an Owners and Contactor's Perspective*, Dan Melamed, CCP EVP and Robert Loop, EVP PSP, AACE International Transactions, EVM-1649, AACE International, Morgantown, WV, 2014.

CONTRIBUTORS

Disclaimer: The content provided by the contributors to this recommended practice is their own and does not necessarily reflect that of their employers, unless otherwise stated.

May 4, 2017 Revision:

Brian M. Evans, DRMP EVP PSP (Primary Contributor)
Dan Melamed, CCP EVP (Primary Contributor)
Ronald L. Clendendon, EVP

November 4, 2014 Revision:

Kimberly Meyer, EVP (Primary Contributor)
Robert Loop, EVP PSP (Technical Advisor)
Dan Melamed, CCP EVP
Richard C. Plumery, EVP
Brian M. Evans, DRMP EVP PSP