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Earned Value Management (EVM) Implementation Handbook

National Aeronautics and Space Administration
NASA Headquarters
Washington, D.C. 20546

January 2018

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Preface

P.1 Purpose

The purpose of this handbook is to provide Earned Value Management (EVM) guidance for the effective application, implementation, and utilization of EVM on NASA programs, projects, major contracts and subcontracts in a consolidated reference document. EVM is a project management process that effectively integrates a project's scope of work with schedule and cost elements for optimum project planning and control. The goal is to achieve timely and accurate quantification of progress that will facilitate management by exception and enable early visibility into the nature and the magnitude of technical problems as well as the intended course and success of corrective actions.

It should be noted that NASA EVM policy not only applies to contractors, but to NASA projects (in-house activities) as well. Throughout this document, the term "contract" may be interpreted to apply to both contracts with industry to include universities as well as agreements with NASA projects and with intra-agency activities that meet the reporting thresholds unless specifically noted. Similarly, the term "contractor" may also refer to "supplier" entities within both industry and government. The following key components of NASA's EVM policy are addressed in this handbook:

- EVM implementation on NASA contracts
- EVM implementation on NASA in-house programs/projects
- EVM System (EVMS) acceptance and surveillance processes

The handbook addresses the application of EVM to NASA projects that meet the threshold for implementing EVM. The project effort may be primarily contract, in-house or a combination of both. Refer to the NASA EVM System Description located on the NASA Engineering Network (NEN), Program/Project Management, and EVM Community of Practice (CoP) at https://nen.nasa.gov/web/pm/evm for detailed information on implementation of the EVM capability processes, procedures, roles and responsibilities when EVM is required for NASA projects.

It is each program's responsibility to impose EVM requirements on its projects as required by NASA policy and summarized in section 1.2. In the Program Plan, the Program Manager will include his or her approach for integrating and managing program cost, schedule, and technical performance, including the flow down of EVM requirements to projects. When EVM is applied at the program level, the Program Manager will follow the same process as projects, including the use of the NASA EVM System Description.

This handbook was developed to serve as the central EVM guidance document for NASA personnel. The handbook is included in the document hierarchy (Figure P-1) along with the following complementary handbooks: NASA/SP 3705 Space Flight Program and Project Management Handbook, NASA/SP 3424, NASA Project Planning and Control Handbook, NASA/SP 3403, NASA Schedule Management Handbook (latest revision); NASA/SP 3404, NASA Work Breakdown Structure (WBS) Handbook (latest revision); NASA/SP 3406, NASA Integrated Baseline Review (IBR) Handbook (latest revision) and the NASA/SP 3704, NASA EVM System Description (latest revision). The dashed line indicates guidance and instruction rather than policy and procedures as contained in the NASA Directives and Procedures. Throughout this document, references are made to additional sources of information, such as

EVMS standards, requirements, and websites. These additional sources should be consulted as appropriate.

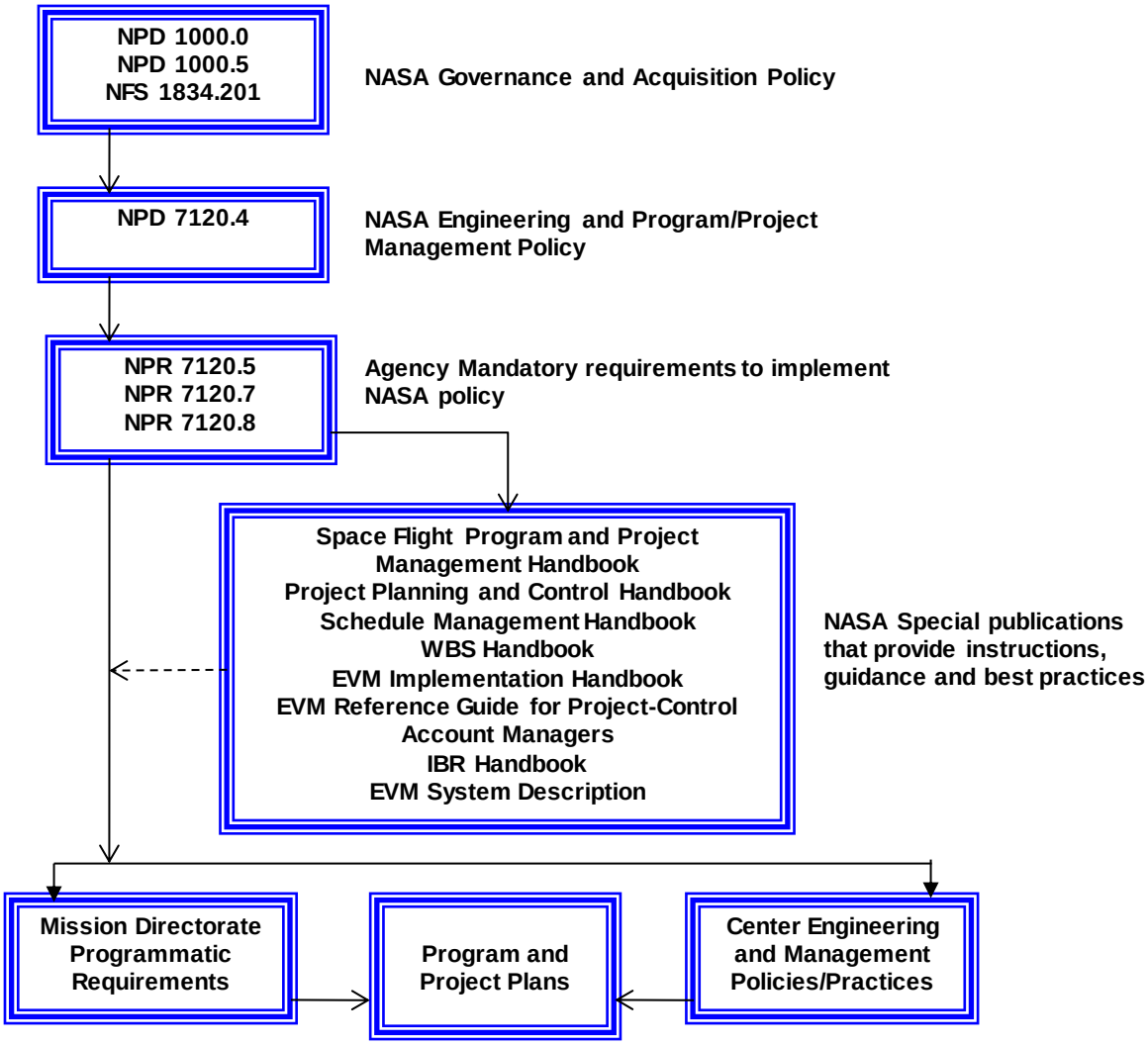


Figure P-1. NASA Program/Project Management Requirements Hierarchy

The EVM Implementation Handbook will be updated as needed to enhance efficient and effective EVM implementation and use across NASA (the Agency). There are two primary repositories of NASA EVM information and documents. The NASA EVM Website, https://evm.nasa.gov/, is a public website that consists of all publicly available NASA EVM related policy and requirements, handbooks, links to other websites, etc. The NEN EVM CoP, https://nen.nasa.gov/web/pm/evm, is for NASA internal use and contains EVM capability documents such as the NASA EVM System Description, EVMS training, Empower access and training, etc. Both are maintained by the by the point of contact for this document (see P.5 below).

P.2 Applicability

This handbook provides EVM guidance for NASA Headquarters and NASA Centers.

P.3 Policy and Procedures

- NASA Federal Acquisition Regulation (FAR) Supplement (NFS) Subpart 1834.2, Earned Value Management System (current revision); Procurement Class Deviation (PCD) 15-05 Class Deviation to NFS 1834.2, 1834.203-70, 1852.234-1 and 1852.234-2 – EARNED VALUE MANAGEMENT SYSTEM THRESHOLD, dated November 10, 2015; Procurement Information Circular (PIC) 15-06, GUIDANCE ON THE INTEGRATED PROGRAM MANAGEMENT REPORT (IPMR) FOR EARNED VALUE MANAGEMENT, dated April, 28, 2015; at https://www.hq.nasa.gov/office/procurement/regs/nfstoc.htm
- NASA Memorandum for the Record: MSC Approval of Budget BSA Decision #6 Memo: Raise EVM Thresholds to $250M, dated December 11, 2017
- NASA Policy Directive (NPD) 1000.0, NASA Governance and Strategic Management Handbook (current revision)
- NPD 1000.5, Policy for NASA Acquisition (current revision)
- NPD 7120.4, NASA Engineering and Program/Project Management Policy (current revision)
- NASA Procedural Requirements (NPR) 7120.5, NASA Space Flight Program and Project Management Requirements (current revision)
- NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Requirements (current revision)
- NPR 7120.8, NASA Research and Technology Program and Project Management Requirements (current revision)

P.4 References

- Defense Contract Management Agency (DCMA)-INST 208 Earned Value Management System Compliance Reviews (current revision), DCMA-INST 210 Earned Value Management System (EVMS) Standard Surveillance (current revision) at http://www.dcma.mil/Portals/31/Documents/Policy/DCMA-INST-210.pdf?ver=2016-12-21-130222-180
- Department of Defense (DoD) Earned Value Management System Interpretation Guide (EVMSIG) (current revision), and the Electronic Industries Alliance (EIA)-748 Earned Value Management Systems Standard (current revision) at https://www.acq.osd.mil/evm/resources/policies-guidance.shtml
- Government Accountability Office (GAO), GAO Cost Estimating and Assessment Guide, GAO-09-3SP, https://www.gao.gov/products/GAO-09-3SP
- NASA EVM Website, https://evm.nasa.gov/
- NASA Engineering Network (NEN), Program/Project Management, EVM Community of Practice (CoP), https://nen.nasa.gov/web/pm/evm
- NASA Special Publication, NASA/SP 3705 Space Flight Program and Project Management Handbook (current revision)
- NASA/SP 3403, NASA Schedule Management Handbook (current revision)
- NASA/SP 3404, NASA Work Breakdown Structure (WBS) Handbook (current revision)
- NASA/SP 3406, NASA Integrated Baseline Review (IBR) Handbook (current revision)
- NASA/SP 3704, Earned Value Management (EVM) System Description (current revision)

- NASA/SP 3708, EVM Reference Guide for Project-Control Account Mangers (current revision)
- NASA Integrated Program Management Report (IPMR) Data Requirements Description (DRD) Implementation Guide (current revision)
- National Defense Industrial Association (NDIA) Integrated Program Management Division (IPMD), Earned Value Management Systems Intent Guide, (current revision), http://www.ndia.org/divisions/ipmd/division-guides-and-resources (Note: The following NDIA IPMD Guides are also located at this site)
- NDIA IPMD Earned Value Management Systems Application Guide (current revision)
- NDIA IPMD Earned Value Management System Acceptance Guide (current revision)
- NDIA IPMD Surveillance Guide (current revision)
- NDIA IPMD Earned Value Management System Guideline Scalability Guide (current revision)
- NDIA IPMD A Guide for Managing Programs Using Predictive Measures (current revision)
- Office of Management and Budget (OMB) Circular A-11, Part 7, Planning, Budgeting, Acquisition and Management of Capital Assets; and the Capital Programming Guide (https://www.whitehouse.gov/omb/circulars/)

P.5 Point of Contact

Primary point of contact for this handbook is NASA's Program Executive (PE) for EVM (EVM PE) who also serves as the Chair of the EVM Focal Point Working Group (FPWG). NASA EVM Focal Points (FPs) may also be consulted for assistance with the guidance contained in this handbook. The EVM FPWG Chair and a listing of applicable EVM FPs is located on the NASA EVM website at https://evm.nasa.gov/council.html.

1 EVM REQUIREMENTS

1.1 Background

The Office of Management and Budget (OMB) Circular A-11 and supplement, Capital Programming Guide, set forth the policy, guidance, budget justification, and reporting requirements that apply to all agencies of the Executive Branch of the government that are subject to Executive Branch review for major capital asset acquisitions. It requires an Earned Value Management System (EVMS) be applied on major acquisitions for developmental efforts for both government and contractor work and that the EVMS be consistent with the guidelines in the Electronic Industries Alliance Standard (EIA)-748 Earned Value Management Systems. While a Project Plan or Intra-Agency Work Agreement replaces the contract for NASA in-house work, the other requirements for good project management, including the use of an EVMS that complies with the EIA-748 standard, are applicable for developmental efforts.

NASA has an Agency-wide EVM capability that will facilitate compliance with OMB EVM requirements and provide for the effective and consistent implementation of EVM across NASA programs/projects. The NASA EVM capability consists of processes and procedures documented in the NASA EVM System Description, selected tools, and training. NASA's EVM capability can be found on the NASA Engineering Network (NEN) Program/Project Management/EVM Community of Practice (CoP), Document Repository at https://nen.nasa.gov/web/pm/evm. Use of the Agency EVMS will ensure projects meet their EVM requirements. Project Plans should include their EVM implementation approach, milestones and use. See Appendix F of this handbook for more information.

1.2 Policy and Requirements for the Application of EVM

EVM is a project management process that effectively integrates the project scope of work with cost, schedule, and performance elements for optimum project planning and control. The goal is to achieve timely and accurate quantification of progress that will facilitate management by exception and allow early visibility into the nature and the magnitude of problems as well as the intended course and success of corrective actions.

NASA EVM requirements are found in NASA Procedural Requirements (NPR) 7120.5, NASA Program and Project Management Processes and Requirements, NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements, and NPR 7120.8, NASA Research and Technology Program and Project Management Requirements. Policy for contracts is contained in NASA NFS 1834.201.

NASA procedural requirements require projects that meet the criteria for applying EVM to use an EVMS that complies with the guidelines in the EIA-748 standard for EVMS. The EVMS guidelines are shown in Figure E-1, Appendix E, of this handbook. In late 2017, NASA raised the EVM project threshold from $20 million (M) to $250M Life Cycle Cost (LCC) for in-house work (reference NASA Memorandum for the Record: MSC Approval of Budget BSA Decision#6 Memo: Raise EVM Thresholds to $250M at https://evm.nasa.gov/regulations.html). Contracts will continue to follow requirements outlined in the NASA FAR Supplement (NFS). An overview of the NASA EVM requirements criteria is provided below (Figure 1-1).

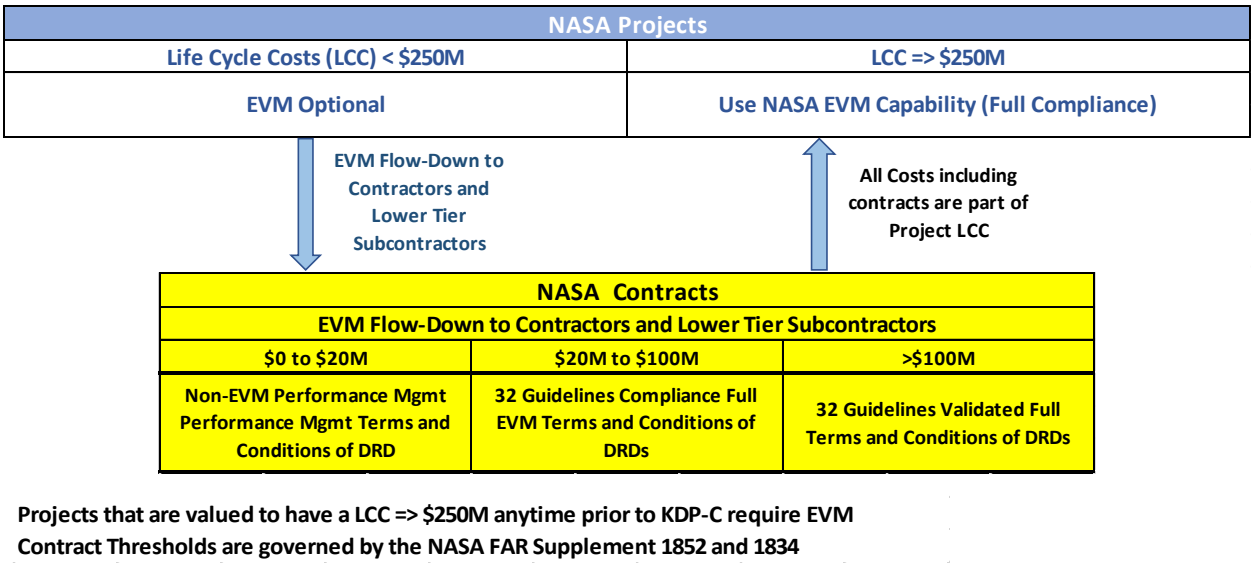


Figure 1-1 NASA EVM Requirements

The figure above illustrates the new thresholds, which will be applied differently depending upon whether the project is new or already underway, namely:

- On new projects, EVM is required when initial LCC will be $250M or greater at or prior to Key Decision Point B (KDP B). Note: EVM requirements for projects that fall under $250M threshold at KDP B, but exhibit cost growth, will be re-assessed at KDP C. If the LCC are expected to be $250M or greater, then EVM is required.
- On existing projects, EVM is required when LCC will be of $250M or greater as determined at KDP B. For existing projects beyond KDP B, the previous EVM threshold of $20M or greater still applies.

Although EVM is no longer required on In-house work for new projects with an LCC less than $250M pre-KDP B, this does not preclude Mission Directorates, Centers, Programs or Projects from implementing EVM as deemed necessary.

Contracts follow requirements outlined in the NFS (PCD 15-05) at https://www.hq.nasa.gov/office/procurement/regs/pcd15-05.htm . Cost or fixed price incentive fee contracts with development scope of $20M (total estimated contract value) or greater will require EVM compliance with the EIA-748 determined by the Contracting Officer (CO). Contracts of $100M (total estimated contract value) or greater will require EVM compliance with the EIA-748 using an EVMS that is accepted by the agency or designee (e.g., Defense Contract Management Agency (DCMA)). The NASA EVM Contract Requirements Checklist summarizes the EVM application and reporting requirements for contracts and subcontracts and is located on the NASA EVM website at https://evm.nasa.gov/regulations.html.

The following examples are provided for EVM application clarification:

Example 1: A new project that consists of $100M of in-house work and $150M of contract(s) requires EVM. The $250M or greater threshold is at the project level with contract thresholds set by the NFS as described in the previous paragraph.

Example 2: In Phase A, a new project with an LCC is estimated at $230M. If subsequent to the LCC estimate, the costs incurred through Phase A and into Phase B exhibit cost growth that indicate the project may exceed the $250M LCC threshold, then the project should prepare to implement EVM. EVM implementation begins with planning during early Formulation (Phases A and B). Each applicable project describes the specific use of the agency EVM Capability in the Project Plan. Figure 1-2 shows the relationship between the EVM requirements and the NASA project life cycle phases, key events/reviews, and significant EVM related program planning and control activities during each phase.

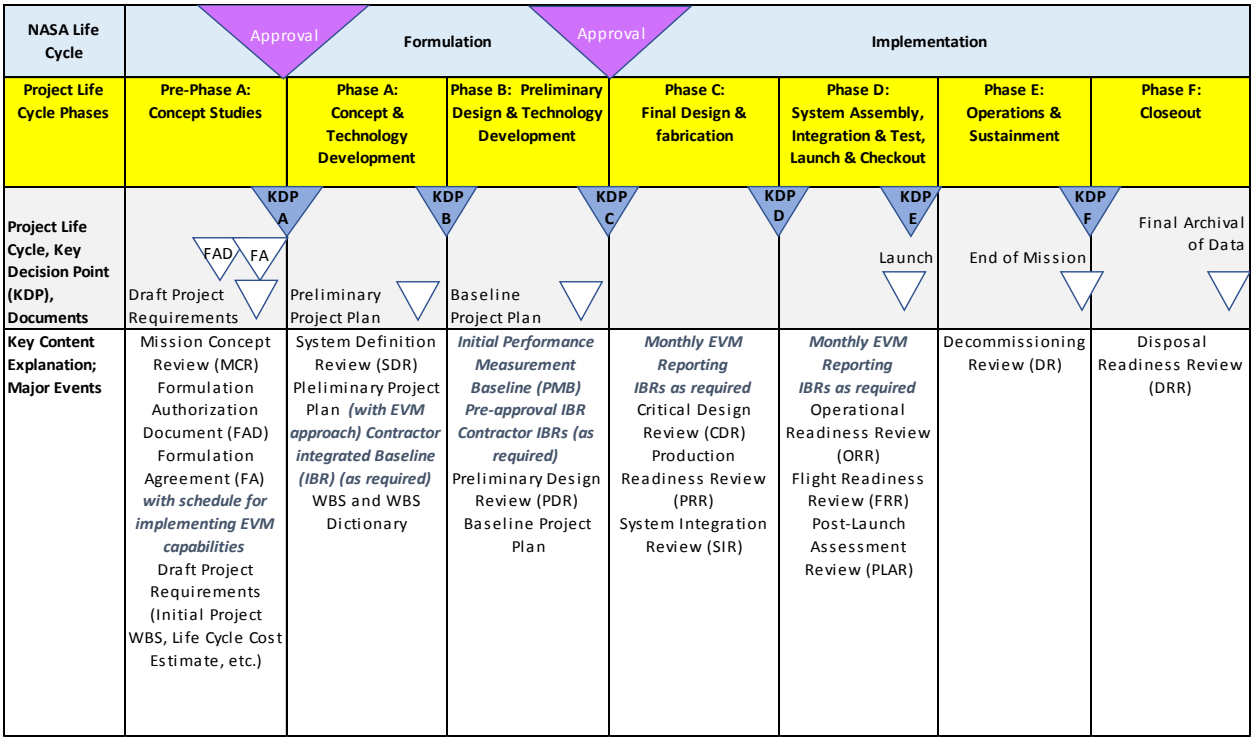


Figure 1-2 NASA Project Life Cycle Relationships and EVM Application

Projects should use the NASA/SP 3704 EVM System Description, and document and coordinate with their respective Center EVM FP, project-specific customization when developing their EVM Implementation Plans. Each project flows down EVMS requirements to its applicable suppliers (intra-agency organizations and contractors). See Appendix A for an example of key pre- and post-contract award activities and Appendix B for example EVMS scope paragraphs to be included in solicitations.

The project's preliminary Performance Measurement Baseline (PMB) is established in Phase B in preparation for KDP C approval and the Integrated Baseline Review (IBR) process. A pre-approval IBR is conducted by the Mission Directorates as part of their preparations for KDP C to ensure the project's work is properly linked with its cost, schedule and risk and the systems are in place to conduct project level EVM. See section 4.4 of this handbook for more information.

2 ROLES AND RESPONSIBILITIES

2.1 Introduction

This section provides a brief description of the responsibilities typically assigned to project organizational roles involved with EVM implementation and maintenance. It should be recognized that the role definitions contained within this document do not contain a complete or detailed job description for each of the roles addressed. For additional roles and responsibilities, see the NASA EVM System Description. Depending on the size of the project, some roles may be combined and served by a single individual or may not be required, e.g., work package manager or task manager. EVM related institutional roles and responsibilities are also included.

2.2 Project Manager

The Project Manager has overall responsibility and accountability for the project's cost, schedule, and technical performance as designated by applicable policy, requirements, and authorizing documents. These responsibilities include but are not limited to the following functions:

- During early project formulation, establish the organization and key structures to facilitate effective EVM implementation and usage (e.g., Project Work Breakdown Structure [WBS], Organization Breakdown Structure [OBS], Responsibility Assignment Matrix [RAM], control accounts, etc.). See the NASA EVM System Description for more detailed instruction.
- Coordinate with and obtain concurrence from the respective Center EVM FP throughout the Request for Proposal (RFP) or Announcement of Opportunity development and proposal evaluation process to ensure EVM requirements are properly defined and tailored as appropriate.
- Coordinate with and obtain concurrence from the respective Center EVM FP throughout the development of project plans regarding implementation, maintenance, surveillance, and reviews of the project's EVMS.
- Stipulate EVM data requirements for project and contract reporting, including formats and tools. NASA has tools such as Empower and Cobra available for use in implementing in-house EVM and conducting EVM data analysis and reporting. Contact your EVM FP for support in obtaining access to such tools to include setting up your project or contract.
- If applicable, submit a waiver and/or deviation requests for the project and/or contract's EVM requirements and include justification and rationale for the request. The waiver should be coordinated with the applicable EVM FP and submitted to the NASA Office of the Chief Financial Officer (OCFO) per the NPR 7120.5 waiver process. Approved waivers will be documented in the Project Plan. See section 4.8 for instructions on minimum waiver requirements for in-house EVM. Requests to deviate from the NFS EVMS requirements on applicable contracts require coordination with the OCFO EVM PE and approval by the NASA Associate Administrator for Procurement.
- Provide budget and staffing forecasts to functional managers to ensure availability of future resources.
- Approve control account documentation such as work authorization documents (WADs), baseline change requests, estimates at completion (EACs), etc., for in-house EVM implementation as appropriate.

- Hold project personnel accountable for effective EVM implementation by incorporating appropriate standards in their performance evaluation plans.
- Implement a surveillance plan to ensure that EVM data is reliable as outlined in Appendix D.

2.3 EVM Focal Point

In addition to the NASA EVM PE, each Mission Directorate, Mission Support Office and Center, including the Jet Propulsion Laboratory (JPL), should designate a representative as its EVM FP. A list of EVM FPs can be found on the NASA EVM website. The responsibilities of an EVM FP should include but not be limited to the following functions:

- Serve as a representative on the Agency EVM FP Working Group (FPWG).
- Serve as the EVM consultant and advisor to programs and projects in the implementation, application, and use of EVM.
- Serve as the EVM representative in developing Agency EVM policies, requirements, and guidance.
- Serve as the EVM consultant in developing EVM policies, requirements, and guidance that are consistent with overall Agency requirements and policies.
- Assist all appropriate offices in the development, review, and approval of NASA training materials related to EVM.
- Assist the project EVM Analyst in preparing the Project EVM Implementation Plan (see Appendix F for additional instructions).
- Assist the Contracting Officer (CO) and the project management staff, where NASA policy requires the application of EVMS on a NASA contract, to ensure the inclusion of EVMS solicitation provisions in the RFP and the use of EVMS contract clauses and applicable Data Requirements Descriptions (DRDs).
- Serve as a consultant to the Source Evaluation Board (SEB) for evaluating the EVM aspects of contractor proposals.
- Assist the project in conducting EVM compliance/validation reviews, surveillance/reviews, and IBRs.
- Prepare and submit EVM metric reports regarding EVM implementation and compliance as required.
- Analyze performance data and prepare and submit independent EACs as required.
- Acquire resources as necessary to support the center's EVM implementation activities.

2.4 Business Manager

Each project with EVM requirements should designate a Business Manager to assist the Project Manager in the effective implementation and use of EVM on the project. The responsibilities of the Business Manager should include but not be limited to the following functions:

- Provide supervision of the Resource Analyst functions within a project.
- Provide supervision of the Planner/Scheduler functions within a project.
- Provide supervision of the EVM analyst functions within a project.
- Ensure integration between the schedule and budget data.

- Assist the Project Manager in managing and reporting project budget, cost, schedule, and performance data.
- Assist the Project Manager in establishing and maintaining project cost and schedule baseline documents, WADs, and project budget logs.
- Submit approved monthly Integrated Program Management Reports (IPMRs) to sponsoring organizations and senior management.
- Assist the PM with EVM Surveillance

2.5 Earned Value Management Analyst

Each project with EVM requirements should designate an EVM Analyst. The responsibilities of the EVM Analyst should include but not be limited to the functions described below. Note that the individual with these functions may have a different job title such as Resource Analyst. These functions should be assigned to an individual regardless of title.

- Develop the EVM Implementation Plan for the Project Plan (see Appendix F for additional instructions).
- Assist the Project Manager and the Contracting Officer (CO), where NASA policy requires the application of EVM on a NASA contract, to ensure the inclusion of EVM solicitation provisions to include applicable DRDs in the RFP and the use of EVM contract clauses.
- Serve on the Source Evaluation Board (SEB) for evaluating the EVM aspects of contractor proposals.
- Facilitate project-related IBRs to include project manager–led IBRs on contracts/agreements with EVM.
- Assist project team in obtaining EVM training.
- Facilitate/participate in Defense Contract Management Agency (DCMA) or NASA led contractor EVMS compliance/validation reviews and surveillance reviews as required.
- Facilitate the EVMS implementation, training, and tools; maintain the project budget logs; provide control account documentation to P-CAMs; prepare the Project IPMR; assist P-CAMs in establishing and maintaining their control account plans and performance analysis.
- Perform data validity checks on monthly EVM in-house and contractor reporting to assess reliability of EVM data to support overall project analysis and surveillance. Identify issues and monitor for satisfactory resolution.
- Analyze performance data and prepare EACs as required. Assist the Project Manager and Business Manager with the annual comprehensive EAC to support the Program, Planning, Budgeting and Execution (PPBE) process.
- Participate in regular project risk meetings to ensure that risks are captured in the estimate at completion (EAC) and schedules, and to assess the adequacy of the management reserve.
- Participate in change control boards to ensure that changes are incorporated into the PMB and EACs in a timely manner.
- Assess EVM data integrity and validity monthly using best practices and tools. Identify issues; monitor to ensure satisfactory resolution.

2.6 Resource Analyst

Each project with EVM requirements should designate a Resource Analyst. The responsibilities of the Resource Analyst should include but not be limited to the following functions:

- Assist in budget development and planning, resource planning, updating financial forecasts, and processing baseline change requests.
- Assist P-CAMs during planning to ensure budgets are planned in the same resource category that actual costs are expected.
- Assist responsible managers in verifying that actual cost data are applied to the correct charge numbers.
- Assist in the preparation and analysis of financial and performance reporting and input to the PPBE process.

2.7 Planner/Scheduler

Each project with EVM requirements should designate a Planner/Scheduler. The responsibilities of the Planner/Scheduler should include but not be limited to the following functions:

- Assist responsible managers in developing schedules, including cost integration.
- Maintain existing schedules by updating progress, performance, and other data as required to reflect both the current plan and the approved baseline.
- Ensure horizontal and vertical schedule integration.
- Assess schedule integrity and data validity of the IMS monthly using best practices and tools that include, but are not limited to, the NASA Schedule Test and Assessment Tool (STAT), and the DCMA 14-Point Schedule Assessment. Identify issues; monitor to ensure satisfactory resolution.
- Assist in the preparation and analysis of cost, performance, and schedule reporting.

2.8 Functional Manager

The Functional Manager is an individual responsible for the administration of a group of people with a specific skill set. Typical responsibilities for a Functional Manager include but are not limited to the following:

- Manage the allocation of a group of skilled resources across multiple projects or efforts in order to meet multiple priorities.
- Assist personnel in their professional advancement along their chosen career path by coordinating training and job assignments.
- Broker agreements with project management to engage the skilled resources necessary for project efforts in the time frame required.
- Ensure that core competencies and capabilities are established and maintained in the responsible functional area for future projects and efforts.

2.9 Integrated Product Team

An Integrated Product Team (IPT) is a group of individuals within a project organization that have differing skills but are assigned work responsibilities for the same product or service. The IPT Lead has overall responsibility for the cost, schedule, and technical performance of the specific

IPT product or service as assigned by the Project Manager and applicable policy, requirements, and authorizing documents.

2.10 Project Control Account Manager

The Project Control Account Manager (P-CAM) shall have overall responsibility for the cost, schedule, and technical performance of a scope of work represented by a WAD for a control account, subordinate to the Project Manager and applicable policy, requirements, and authorizing documents. See the NASA EVM System Description and the NASA EVM Reference Guide for Project-Control Account Manager Handbook for more explanation.

2.11 Work Package Manager

The Work Package Manager has overall responsibility (as delegated) for the cost, schedule, and technical performance of a scope of work represented by a work package as assigned by the P-CAM and applicable policy, requirements, and authorizing documents.

2.12 Task Manager

The Task Manager has overall responsibility (as delegated) for the cost, schedule, and technical performance of a scope of work represented by a task as assigned by the Work Package Manager and applicable policy, requirements, and authorizing documents.

2.13 Contracting Officer

The CO has overall responsibility for negotiating and executing the contracts in accordance with the NFS and NASA procurement policy and procedures and ensures that the appropriate EVMS clauses and data requirements are included in major contracts.

3 EVM IMPLEMENTATION ON NASA CONTRACTS

3.1 Overview

Throughout the contract planning and acquisition process, the Project Manager (or his/her designee) should coordinate with the Center EVM FP for assistance in defining the appropriate EVM requirements for each contract and to facilitate effective EVM implementation after contract award. This section addresses the key activities involved in effective contract planning and execution. Appendix A, Example Contract EVMS Implementation Activities, provides a listing of relevant pre- and post-contract award activities and responsibilities to facilitate effective application and implementation of NASA contract EVMS requirements. *Keep in mind that EVM is applicable to development contracts based on the value, contract type, period of performance and nature of the work - not on the program/project phase.*

3.2 Activities before Contract Award

The Project Manager, Business Manager, or EVM analyst initiates contact with the Center EVM FP to define EVM requirements early in the planning and development of the Request for Proposal (RFP) or Announcement of Opportunity. By applying in-depth knowledge of the project and the proposed contract, the Project Manager, Business Manager or EVM analyst and the EVM FP can select the best approach to implementing EVM and reporting requirements on the particular contract. Information unique to the program/project can affect the type and level of EVM requirements included in the RFP and later invoked on the contract. Understanding the project and its associated risks, allows greater insight into tailoring EVM requirements. The NASA EVM Contract Requirements Checklist, located at the NASA EVM website at https://evm.nasa.gov/regulations.html, is a tool that the project team can use to ensure the EVM requirements are properly applied.

The EVM FP provides guidance before contract award to ensure that the RFP and the awarded contract contain the appropriate EVM-related clauses and reporting requirements. Historically, many problems occurring during EVM implementation are directly related to inadequate definition of EVM requirements in the RFP.

The Project Manager should ensure that the project personnel receive the appropriate training such as EVM, IBR, etc. The Center EVM FP can assist with this requirement.

3.2.1 Determine Contract Type

The contract type is a key element in determining EVM requirements. Contract types fall into two basic categories: Cost Reimbursable or Fixed Price. Different variations of each of these two basic types exist. The particular contract structure should reflect the degree of risk assumed by the government. Definitions of common variations follow. Additional guidance can be found in FAR Part 16.

- Firm Fixed Price (FFP): The contract stipulates a fixed amount of compensation regardless of the actual cost (i.e., regardless of whether the contractor has experienced a cost overrun or a cost underrun). This contract is the lowest risk instrument for the contracting entity.
- Fixed Price Incentive Fee (FPIF): The contract stipulates a target cost, target fee, and a share ratio associated with any underrun or overrun to the target cost. The share ratio establishes percentages that NASA and the contractor will share in the underrun or overrun. The contract will define the maximum and minimum fee.

- Cost Plus Incentive Fee (CPIF): The contract allows cost reimbursement for all in-scope effort. The fee determination is similar to FPIF contracts but there is no ceiling price. The incentive fee may be based on cost, technical performance, or both.
- Cost Plus Award Fee (CPAF): The contract allows cost reimbursement for all in-scope effort. The award fee is used as an incentive to the contractor to perform to a predetermined set of criteria. An Award Fee Plan identifies the evaluation periods, the available award fee pool of dollars by period, and the award fee criteria to be used in evaluating the contractor's performance.
- Cost Plus Fixed Fee (CPFF): The contract allows cost reimbursement for all in-scope effort. The contractor fee is fixed. The contractor is guaranteed that fee regardless of an underrun or overrun. This contract is the highest risk instrument for the contracting entity.

Since many NASA projects use CPAF contracts, the application of EVM in the award fee criteria is a valuable tool to promote good project management. However, the use of a single EVM indicator, such as the Cost Performance Index (CPI), is not recommended. A single indicator is not always a true indicator of performance when considered out of context. Careful consideration should be given to choosing multiple indicators that are relatively easy to measure yet not easily distorted.

A recommended approach for EVM award fee criteria is to use qualitative measures such as: the contractor shall maintain a current and realistic EAC; the contractor shall provide effective and updated variance analysis; risk management is used in cost control; integration of subcontractor performance into the performance measurement baseline is current and accurate; and EVM is effectively integrated and used for project management.

Project Managers are also discouraged from tying an award fee to an IBR event, especially the initial IBR. A lesson learned from other NASA projects has shown that this can result in a hastily contrived, inaccurate, and inadequate "baseline," eventually leading to significant replanning. It may encourage the contractor to minimize the IBR event, be less forthcoming with data, and hold the event even if the contractor is not fully ready from a baseline perspective. An acceptable alternative would be specifying an award fee criterion such as, "Contractor must maintain a realistic and adequate baseline, and have it available for review by the government upon request."

3.2.2 Establish EVM Implementation Requirements

The NFS solicitation provisions and contract clauses should be used to provide notification of NASA's intent to implement EVM on contracts. NFS Parts 1834 and 1852 provide the respective NFS solicitation provisions and contract clauses required for the implementation of EVM on contracts. These provisions and clauses establish the requirements for contractors to propose an EVMS that is or will be validated by the government as being compliant with the EIA-748 guidelines. If a prospective contractor proposes to use an EVMS that has not been validated by the government, then the contractor is required to submit a plan for validation in accordance with NFS 1834.2 and 1852.234-1 and 1852.234-2. A contractor that has an EVMS validated by the government will normally propose to use this system. If so, the contractor will submit documented proof of their EVMS validation in accordance with the contract EVMS clause.

3.2.3 Specify EVM Reporting Requirements

The required contract reporting requirements are summarized in the NASA EVM Contract Requirements Checklist located on the NASA EVM website at https://evm.nasa.gov/regulations.html. Contract reporting requirements are defined in specific DRDs included in the solicitation and contract. The EVM FP will work with the Project Manager and the CO to ensure the DRDs are included and tailored as necessitated by the complexity of the contract and project management reporting requirements.

The IPMR is the primary report the government uses for obtaining earned value and schedule data. The IPMR requirement should be added as a DRD for all contracts that have an EVM requirement. In accordance with the NFS1834.201, the appropriate solicitation provisions and contract clauses are to be used to implement EVM and IPMR reporting on these contracts.

The IPMR is used by the contractor to provide NASA with monthly cost, schedule, and technical performance information. The IPMR has seven formats:

- Format 1: cost/schedule data by Work Breakdown Structure (WBS)
- Format 2: cost/schedule data by OBS
- Format 3: baseline
- Format 4: workforce
- Format 5: variance analysis format
- Format 6: IMS
- Format 7: time-phased historical and forecast cost submission

The contract IPMR DRD provides guidance for the preparation and submission of the IPMR, required formats, variance analysis thresholds, reporting frequency, reporting levels, distribution, and specific project instructions if required. The Data Item Description, DI-MGMT-81861 (current revision), "Integrated Program Management Report," is a useful guide for the development and tailoring of the DRD for the IPMR and is located at https://www.acq.osd.mil/evm/resources/policies-guidance.shtml . The NASA IPMR DRD Implementation Guide contains sample IPMR DRDs and tailoring instructions and can be found on the NASA EVM website at https://evm.nasa.gov/reports.html.

3.2.4 Create a Work Breakdown Structure

The project WBS provides the structure for technical planning, scheduling, cost estimating and budgeting, contract scope definition, work authorization, product development, status reporting and assessment. In other words, the WBS provides the framework for implementing EVM. The WBS should be a product-oriented hierarchical division of the hardware, software, services, and data required to produce the required deliverables. The WBS should also be consistent with current NASA requirements in NPR 7120.5, 7120.7 and 7120.8. An example of a contract DRD for the WBS and WBS dictionary is provided in the NASA WBS Handbook located on the NASA EVM website.

Normally, during the RFP stage, the solicitation will provide a contract WBS down to level three. The contractor will use this contract WBS and extend it to the appropriate management level. The

contractor may also propose changes to the contract WBS. The NASA WBS Handbook provides recommended methods and best practices for developing the project and contract WBS.

3.2.5 Determine Schedule Requirements

The RFP should include language that requires a logic network schedule and defines the logic network schedule requirements. These requirements should be consistent with NPR 7120.5 and satisfy the scheduling "best practices" included in the NASA Schedule Management Handbook located on the NASA EVM website. Requirements should ensure the establishment, management, and control of the baseline master schedule and its derivative schedules. These requirements help ensure establishment of a valid framework for time phasing budgets and coordination of efforts into a master plan that also enables the measurement of accomplishments. Format 6, Integrated Master Schedule (IMS) of the IPMR contains instructions for preparing, maintaining and submission of the IMS. See the NASA IPMR DRD Implementation Guide for guidance on preparing the DRD to include sample DRDs at https://evm.nasa.gov/reports.html. Additionally, the NASA Schedule Management Handbook provides recommended methods and best practices for the development and maintenance of the IMS.

3.2.6 Include Integrated Baseline Review Requirements

Including the contract clause, 1852.234-2 Earned Value Management System, in the solicitation and contract notifies contractors that an IBR will be conducted. Providing additional information in the contract will ensure understanding of requirements and provide an opportunity for clarifications. Include this information in a contract statement of work (SOW) or a performance work statement. The SOW should require the contractor to demonstrate with evidence and to show all appropriate documentation to support proof of an executable baseline and direct contractors to NASA's IBR Handbook on the NASA EVM website for guidance.

3.2.7 Include Management Review Requirements

Management reviews are typically held on a regular basis and involve government team members and contractors reviewing the work status. Guidance should be included in the contract SOW or performance work statement to describe the role and content of EVM in these reviews. The review includes such topics as cost, schedule, and technical performance. It should also include a quantified risk assessment with impacts and provide a means of identifying action items and ensuring that they are completed. As each manager presents, they should integrate the EVM data into the presentations to give an overall picture of cost, schedule, and technical performance.

3.2.8 Specify EVM Links to Risk Management

Effective EVM includes an integrated risk management process. Early planning during the RFP stage should include consideration in schedule and cost estimates for reasonable risks. Recognized risks that are not quantifiable should be considered when developing management reserve (MR) or unallocated future expense (UFE). As the project advances in the life cycle, linkage between the risks (recorded in the risk system) and project scope (reflected in the schedule and budget) are necessary to properly manage. The nature of this linkage should be defined during the early planning stages of RFP development.

3.2.9 Participate in the Source Evaluation Board

During the Source Evaluation Board (SEB) process, the Center EVM FP or EVM Analyst establishes DRDs and requirements and evaluates the offeror's responses. For example, in accordance with NFS EVMS Clause 1852.234-1, the offeror shall provide documentation that its proposed EVMS complies with the EVMS guidelines in the EIA-748 Standard for Earned Value Management Systems. If the offeror proposes to use a system that currently does not meet the requirements, the offeror shall submit its comprehensive plan for compliance with the EVMS guidelines to the government for approval. An EVMS expert must review these systems and plans for adequacy and recommend any changes to the selection board.

3.3 Activities after Contract Award

This section describes the EVMS compliance, validation, and maintenance following contract award for any contract requiring EVMS application.

3.3.1 Gain Access to EVM Tools

The Project Manager should request assistance from the applicable EVM FP to identify appropriate EVM analytical methodologies and tools for project use. NASA provides Empower as an EVM analysis and reporting tool for use by all NASA projects. To gain access, follow the instructions on the NASA EVM website. Additionally, NASA has developed the Schedule Test and Assessment Tool (STAT), which is compatible with MS Project. STAT consists of several applications to include the Schedule Health Check Tool, the Schedule Performance Work-off Trend, and the Summary Assessment Summary Report (SASR) and considers applicable GAO and DCMA best practices. Instructions for acquiring access to this tool are also available on the NASA EVM website at https://evm.nasa.gov/handbooks.html.

3.3.2 Conduct EVMS Validation

Cost or fixed price incentive contracts, task and delivery orders that have a period of performance of at least 12 months, contain developmental work scope and are $100 million or greater require a validated EVMS by the government. NASA has an overarching Memorandum of Understanding (MOU) with DCMA that describes the typical validation and surveillance responsibilities expected of DCMA when requested. Projects Managers and COs complete the NASA Form 1430A to delegate responsibility for validation and surveillance of contractor EVMS to the DCMA. The DCMA will review the contractor's plan for validation and provide NASA with a report regarding the plan's adequacy for the intended contract. When validation is necessary, the contractor is responsible for scheduling related reviews with the DCMA and NASA customer. The National Defense Industry Association's (NDIA) EVMS Intent Guide, the NDIA EVMS Acceptance Guide and the DoD EVMS Interpretation Guide (EVMSIG) provide additional information on these reviews. NASA and the Project Manager will provide specialists to augment the DCMA team as appropriate to accomplish these reviews. If a contract is awarded to a contractor and DCMA is not involved, the NASA Project Manager will work with the EVM PE for the appropriate validation approach. See Appendix C of this handbook for more information.

Contracts, task and delivery orders greater than $20 million but less than $100 million are not required to have a formally validated EVMS. While no validation is required, the contractor is expected to comply with the requirements listed in EIA-748. The government (NASA Project Manager with assistance from the applicable EVM FP) will evaluate the offeror's proposed EVM

approach in the source selection evaluation process and determine/confirm compliance with the EIA-748 guidelines and perform surveillance to ensure continued compliance during the course of the contract (see section 3.3.5).

3.3.3 Extend the Contract WBS

Extension of the Contract WBS (CWBS) will be done by the contractor after contract award to reflect the division of lower level products and services and to describe how these contribute to the higher level products and services. The reporting of progress, performance, risks, and engineering evaluations, as well as financial data and variance analyses are based on the CWBS. For assistance in understanding the appropriate extension of the CWBS, refer to the NASA WBS Handbook at https://evm.nasa.gov/handbooks.html..

3.3.4 Conduct Integrated Baseline Review

All contracts with EVM are required to have an Integrated Baseline Review (IBR) to finalize the agreement on the baseline and ensure all risks are identified and understood. The Project Manager and his responsible technical managers, with the support of the EVM FP, should conduct an IBR within 180 calendar days of contract award as required by NFS 1852.234-2(c). This timeline applies to the authority to proceed on letter contract awards as well. The project phase is *not* a consideration. An IBR must also be conducted within 180 calendar days following the exercise of significant contract options or 60 days after a major contract modification. The NASA IBR Handbook (https://evm.nasa.gov/handbooks.html) provides further guidance on the IBR process.

The Project Manager should ensure that training is available to each team member prior to the IBR. Such training may be conducted jointly with the contractor and should consist of the basics of EVM and the IBR process. The Project Manager should conduct a workshop just prior to the IBR to cover the mechanics of the review and examples of specific items to be reviewed.

The objective of an IBR is for all stakeholders to jointly assess the baseline to be used for performance measurement to ensure complete coverage of the SOW, logical scheduling of the work activities, adequate resourcing, and identification of inherent risks. This will be accomplished by evaluating the PMB to ensure it captures the entire technical scope of work, is consistent with schedule requirements, has adequate resources assigned, and has sound management processes applied. To facilitate the credibility assessment of the IMS, the Project Manager's schedule team may use STAT or an equivalent tool.

3.3.5 Implement Contractor EVMS Surveillance

The Project Manager and CO delegate EVMS surveillance to DCMA via NASA Form 1403A. Surveillance is conducted by the responsible DCMA office, with the assistance of NASA project personnel as assigned by the Project Manager. The surveillance responsibilities are described in the MOU between NASA and the DCMA. The MOU covers EVMS surveillance at a contractor site or multiple contractor sites. The MOU scope includes EVMS compliance assessment, validation, and/or evaluation of a contractor's previously validated EVMS for adequacy. The MOU also describes duties, responsibilities, products, and methods of cooperation for contract-specific EVMS surveillance.

The Project Manager may delegate all or part of the items described in the MOU via NASA Form 1430A. A letter of delegation from the CO to the cognizant DCMA office is required to implement the surveillance, products, and services provided for within the MOU. The letter of delegation

must define the specific delegation of responsibilities and the specific products and services to be provided. A simple delegation request to implement the MOU is not sufficient.

It is the responsibility of the CO and Project Manager to provide feedback and guidance to the DCMA office if the services provided by the DCMA are not appropriate for the project's needs. If changes are needed to the DCMA services being provided, the Project Manager should formally document such requests. If delegation to the DCMA is not implemented or is withdrawn, the Project Manager should provide for the required surveillance through alternative sources and ensure that resources (e.g., project resources and Center EVM FP) are available and appropriate for this purpose. See Appendix D, EVMS Surveillance Process, of this handbook for additional information.

When a delegation is issued, the EVM FP should be notified if any EVMS issues arise. The EVM FP should remain proactive in working with all organizations, including the DCMA, to resolve EVMS issues at contractor facilities with NASA contracts. However, the Project Manager remains responsible for the specific contract.

3.3.6 Conduct EVM Analysis

An IPMR is required when EVM is a requirement. IPMR data should be reported in a timely manner per the contractual DRD. IPMR data should also be consistent and reconcilable with both the Monthly Contractor Financial Management Report (NASA Form 533M) and the Quarterly Contractor Financial Management Report (NASA Form 533Q) if applicable. NPD 9501.1, NASA Contractor Financial Management Reporting System, states NASA policy and provides additional information and guidance on this topic.

The first step in the analysis process is to assess the validity of the reported EVM data (contractor IPMRs) to ensure that the data are complete, accurate and all data anomalies are explained in the IPMR Format 5. Data errors/anomalies not explained should be documented and provided to the contractor for resolution with explanation in the next month's IPMR. However, numerous/severe errors may result in the rejection of the IPMR and resubmission of a corrected IPMR. These types of data problems should be rare if an effective surveillance process exists. Empower provides data validity reports that facilitate the analysis process. Contact your Center EVM FP or the NASA EVM PE for access and instructions to Empower.

EVM data should be included in all management reviews. Project status based on EVM data should be reported at the level appropriate for all levels of management and utilized for insight and management actions. See the Sample Standard Analysis Package on the NASA EVM website at https://evm.nasa.gov/reports.html. The Project Manager should understand and emphasize the importance of the integrated technical, schedule, cost, and risk analyses provided by EVM in conjunction with other project information to formulate an overall project status. Concentrating on the technical aspects or technical problems of the project alone will not provide for true integrated project management. The associated schedule implications, cost drivers, and corresponding risks should be considered.

Analysis is required when any of the previously established variance thresholds are exceeded. Variance thresholds must be defined in the DRD. See the NASA IPMR DRD Implementation Guide at https://evm.nasa.gov/reports.html for a discussion of different methodologies that can be used to establish thresholds. Focusing first on these problem areas is an efficient and effective

management technique. The analysis for each variance that exceeds a threshold should address three areas:

- Root cause: Simply stating the variance is not identifying the root cause. A simple way to determine root cause is to ask the question, "why?" until it no longer makes sense to do so. Another test for root cause determination is to quantify the root cause or causes as related to rates, usage, efficiency, or a combination of these.
- Impact: A root cause will create an impact on the element(s) and should also be evaluated for the impact on the rest of the project in terms of cost, schedule, technical, or a combination of these areas. Both impact on the element and impact to the project should be distinctly stated and quantified.
- Corrective actions and results: For each impact area, a correction action or recovery plan should be formulated. This plan should contain a description of the actions taken and the anticipated results in terms of the impacted area or areas, including time, cost, and technical components. If recovery is not possible, this should be clearly stated. As long as this variance exceeds the reporting threshold, each subsequent report should include the actual results of implementing corrective actions.

It is also a recommended practice for the P-CAM to routinely use the aforementioned methodology to analyze control accounts for potential problems that have not yet exceeded a variance threshold.

The steps described above are intended to assist the project staff in understanding some of the monthly activities surrounding the EVM analysis process. The level of analysis activity is dependent upon many variables: the phase of the project, the value of the WBS, the contractor's performance, analyst availability and experience, the type of contract, and the EVM analysis tools available. All of these affect the project's capability to perform a detailed analysis. The Project Manager should understand the analysis requirements and arrange for the necessary support to ensure the adequacy of the EVM analysis process. See the NASA EVM System Description for a more in-depth discussion of EVM analysis methods and techniques. The NDIA IPMD Guide for Managing Programs Using Predictive Measures, at http://www.ndia.org/divisions/ipmd/division-guides-and-resources, is also a good resource for additional information on measures and metrics that can provide valuable predictive indicators for use in developing and implementing effective mitigation plans.

3.3.7 Participate in Project Activities

The project's EVM analyst plays a key role on the team, participating in various meetings and activities depending on the project. It is important that the EVM analyst be involved in several key activities to ensure that the project management team has accurate information available to make informed decisions about the project. The Project Manager should ensure EVM analyst participation in project activities that include but are not limited to:

- Regular project risk meetings to ensure that risks are captured in the estimate at completion (EAC) and schedules, and to assess the adequacy of the management reserve.
- Change control boards to ensure that changes are incorporated into the PMB and EACs in a timely manner.
- PPBE process by supplying data to support monthly funds analysis and requirements planning.

4 EVM IMPLEMENTATION ON NASA PROJECTS

4.1 Overview

The Agency has an EVM capability that enables NASA organizations to achieve the NASA and OMB requirements for compliance with the EIA-748. EVM is required on projects (life cycle cost ≥ $250M) where the project effort could be performed as a single contract, or in-house or a combination of both. Figure 4-1 provides an example overview of the NASA EVMS process components and relationships. See the NASA EVM System Description at https://nen.nasa.gov/web/pm/evm for a more detailed description of the EVMS.

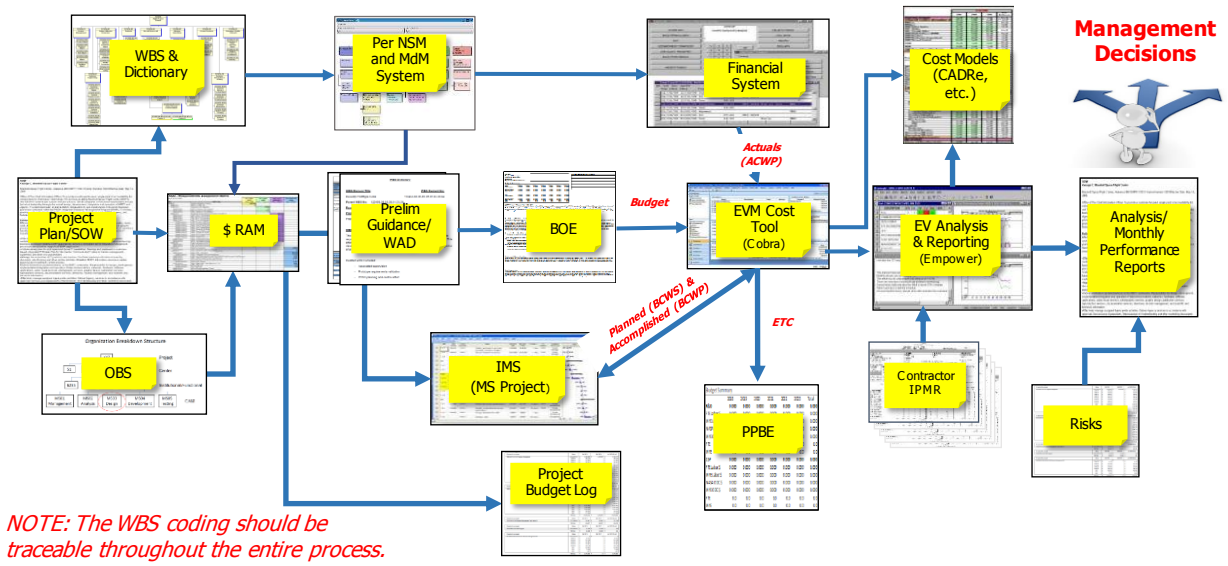


Figure 4-1. Example Overview of EVMS Process for In-house Effort

Projects should use the Agency EVMS to meet their EVM requirements. Project Plans should include the project's EVM implementation approach and use. See Appendix F of this handbook for additional instruction on format and content of the EVM Implementation Plan. Project Managers should engage their Center EVM FP for assistance in developing, documenting, and implementing the NASA EVM System Description on their projects. With the exception of establishing the EVMS process described in section 4.2, the activities required of Project Managers for in-house EVM implementation are very similar to those required for EVM implementation on contracts described in section 3.

4.2 Basic EVMS Process Description

The Project Manager develops a preliminary WBS early in the Formulation phase of the project. See Figure 1-2 of this handbook for the NASA project life cycle relationships and EVM related activities. The Formulation Agreement (FA) is prepared by the project in response to the Formulation Authorization Document (FAD) to establish the technical and acquisition work that needs to be conducted during Formulation and defines the schedule and funding requirements during Phase A and Phase B for that work. The FA includes the schedule for implementing the EVM capability and serves as the basis for the preliminary project plan. The preliminary project planning process through Formulation is an iterative process. Once the project is established with

sufficient and stable scope definition via the Project Plan, then both the NASA in-house work elements and, if required, the contract WBS elements can be adequately planned and established at the necessary levels of detail. All project efforts (i.e., in-house, contracted, international partners, university, and any other performing entity efforts) should be included.

The Project Plan is the overall work authorization document that represents an agreement between the sponsor and the performer on work scope, schedule, and budget. Based on this scope, the WBS and WBS dictionary are established and maintained. NPR 7120.5, Appendix G, provides a standard template to begin WBS development for flight projects. Appropriate templates are also included in NPR 7120.7 and NPR 7120.8. The NASA WBS Handbook (https://evm.nasa.gov/handbooks.html) contains additional guidance for WBS development for all projects. The WBS dictionary should be developed as a companion to the WBS and subjected to the same configuration controls.

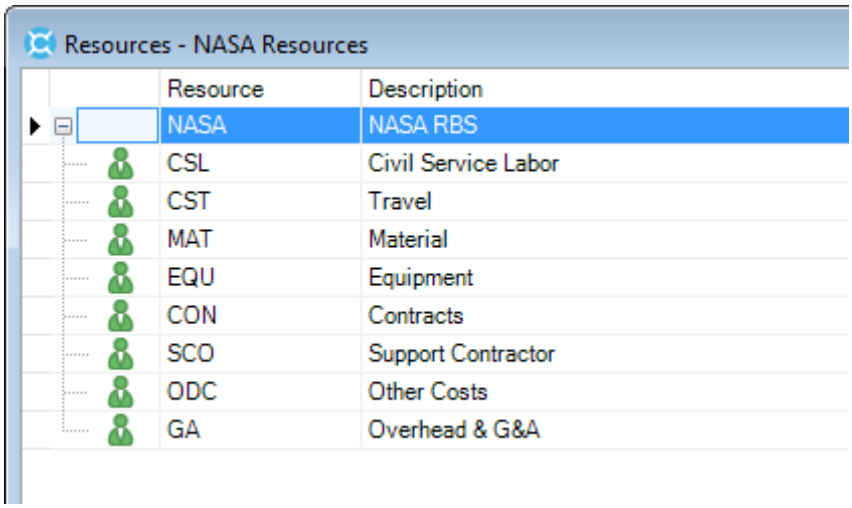
The project WBS and WBS dictionary data are used to establish a framework in the systems that support the EVMS, such as the financial system, scheduling system, risk management system, and EVM cost tool (Cobra®). Disciplined configuration controls should ensure that this framework remains consistent and reconcilable in these systems. See section 5.2 for lessons learned on developing and maintaining the project WBS through the use of the NASA Structure Management (NSM) system numbering scheme and controlled through NASA's Metadata Management (MdM) system. Each Project Manager is ultimately responsible for establishing and controlling the project WBS baseline. The WBS provides a means of rolling up project data to any desired level for analysis and oversight, and provides a common reference for all project communication, both internal and external.

An Organizational Breakdown Structure (OBS) should also be developed to describe the organizations responsible for performing the authorized work. Once developed, the OBS should be cross-referenced to the WBS to ensure responsibility and accountability for planning, performing, and reporting on all authorized work. The resulting matrix is referred to as a Responsibility Assignment Matrix (RAM). The integration of the WBS and OBS creates control accounts that facilitate schedule and cost performance measurement. The control account is the primary point for work authorization, work performance management, and work performance measurement (i.e., where the planned value is established, earned value is assessed, and actual costs are collected). Each control account is assigned to a P-CAM. The P-CAM is responsible for ensuring the accomplishment of work in his or her control account and is the focal point for management control. A sample OBS is shown below. Note that each individual Center should break down this standard OBS to reflect the organization at a lower level.

Code	Description
1	Agency
10	Headquarters
21	Ames Research Center
22	Glenn Research enter
23	Langley Research Center
24	Armstrong Flight Research Center
51	Goddard Space Flight Center
55	Jet Propulsion Lab
62	Marshall Space Flight Center

64 Stennis Space Center
72 Johnson Space Center
76 Kennedy Space Center
77 External Reporting Adjustments

A Resource Breakdown Structure (RBS) is developed to aid in the planning process and control process. An RBS defines the resources that will be used to accomplish the scope of work on the project. Below is a sample standard RBS that projects can use. Actuals downloaded from the Agency's financial system (SAP) using the Actuate report are generated using these standard, predefined resource codes. The Actual Cost Extraction white paper describes the Actuate cost report that was developed to export resources from NASA's accounting system in a format that supports EVMS. See the white paper on the NASA NEN, EVM CoP, for more information. These resource codes would be a natural choice for planning by and collecting actuals. If the centers wish to use different resources for budgeting/planning, then the NASA codes could be used for actuals and a rollup. Having the resources rollup to common parents provides a common basis for reporting across all centers.



Resource	Description
NASA	NASA RBS
CSL	Civil Service Labor
CST	Travel
MAT	Material
EQU	Equipment
CON	Contracts
SCO	Support Contractor
ODC	Other Costs
GA	Overhead & G&A

The rates, hours and calendars that will be used for planning must be defined up front and early in the planning process. Center CFO organizations develop and maintain labor rates for each Center. These rates should be used when "pricing out" the civil service labor to ensure that they accurately reflect each center's rate structure. For hours, it is important that a standard number of hours per year be used in PMB development. Most likely the number of hours would be 2080 since NASA doesn't use pools to collect/distribute paid time off. If some centers use productive hours and others use calendar hours, then the value of one hour will be different between centers and reporting by hours will be compromised. All NASA Centers use the calendar month to represent the fiscal month, hence the last day of the calendar month is used for collecting monthly actual cost. It is important for schedule status to align with the fiscal period cut off to ensure that work performed aligns with actual cost. Note that JPL does not use end of month fiscal periods, so there will always be a slight disconnect when NASA centers collaborate with JPL.

The Project Budget Log is established with the project target cost estimate or project budget base (PBB) for the authorized work to maintain traceability of the project's total budget and all changes

that occur over the life of the project, which includes the distribution of budget to the control accounts as well as the establishment and changes to Unallocated Future Expense (UFE), Management Reserve (MR) and Undistributed Budget (UB). Each control account is formally authorized by a document (e.g., WAD) containing scope, period of performance, schedule, and cost (budget) approved by the delegating manager, typically the Project Manager. The basis of estimate (BOE) provides the ground rules, assumptions, and drivers used in developing the cost and schedule estimates. The WADs are developed collaboratively by the project office and P-CAMs.

Accurate time-phasing of planned work is essential for integrating the work scope, cost and schedule. Budgets should be planned consistent with the details from the schedule to ensure integration. The IMS is the single integrated source of schedule data that accurately reflects how the planned work is to be executed. At the core of the IMS is a logic network dataset that should be maintained in an automated schedule management tool. The dataset consists of tasks and milestones, task durations, interdependencies or relationships, project constraints, and data coding. The NASA Schedule Management Handbook contains additional guidance on schedule development and maintenance.

A time-phased budget baseline is established to facilitate cost/schedule performance measurement and provides the plan to be used on the project. Cost/schedule integration is achieved in the EVM cost tool (Cobra®). The budgeted cost for work scheduled (BCWS) represents the value of the time phased work as it is planned. The value of the work accomplished is the earned value of that work, also known as budgeted cost for work performed (BCWP).

As work is performed, actual cost for accomplishing that work, also known as actual cost of work performed (ACWP) is captured within the financial system. The integrated use of these three elements (BCWS, BCWP, and ACWP) provides the data needed to analyze schedule, cost, and technical performance. The EAC is the expected total cost of a project (or a control account) when the defined scope of work has been completed and consists of performance to date and the estimate to complete (ETC) the scope of work remaining. The ETC/EAC is instrumental in developing budgetary (funding) submissions required by the PPBE process. Additionally, the EVM data is used in periodic updates of the project life cycle cost and CADRe (Cost Analysis Data Requirement). The CADRe is a formal project document that describes the programmatic, technical and life-cycle cost and cost and schedule risk information of a project.

There are various ways to integrate cost and schedule information to evaluate performance. Commercial-off-the-shelf (COTS) tools are available that assist in the data integration and analysis functions. Multiple tools have been used by NASA projects performing EVM (Primavera, MS Project, Cobra®, Empower). Empower is a COTS tool that is used for analyzing and reporting EVM to include IMS data. The Empower tool provides for analysis and reporting capabilities, including standard IPMR formats 1 through 7. Additionally, Empower provides data validity checks and reports to ensure the reliability of the EVM data. All NASA projects/contracts with EVM requirements should use the NASA provided Empower tool for data validity assessment, analysis and reporting.

The tools selected for use by the project should provide the functionality needed to comply with the requirements outlined in NPR 7120.5 and EIA-748. With the exception of Empower and

Cobra®, Project Managers are currently responsible for acquiring tools and should consult with their Center EVM FP for approach and lessons learned.

4.3 Integration of Data from Multiple Centers

Most NASA projects involve several NASA centers working together. Therefore, the NASA Project Manager at the center where the project resides needs to determine how to obtain necessary EVM data from the other centers. The process for work spanning multiple centers should be very similar to the process for projects with contracts. While the intra-agency agreement or "contract" between centers can take many different formats, the intent is the same. The contract between centers should act as an agreement of the scope, estimated cost, and schedule to complete the work. In this intra-agency agreement, the center where the project resides must include requirements for EVMS compliance (if applicable), WBS, RBS, rates, calendars, hours, EVM and IMS, reviews, variance thresholds, and anything else necessary to manage the work, using the methodologies employed with contractors. In cases where the intra-agency work does not meet the threshold for EVM, the project should flow down the appropriate data requirements necessary to support performance management. See the Reporting for Contracts with no EVM Requirement Guide located on the NASA EVM website at https://evm.nasa.gov/reports.html for additional information. The pre- and post-contract award activities discussed in section 3 are similar for intra-agency agreements.

4.4 Integrated Baseline Reviews

Integrated Baseline Reviews (IBRs) are required whenever EVM is required. The Project Plan should identify the contracts and intra-agency work that will require an IBR. As discussed in section 3.3.4, Project Managers will conduct IBRs on applicable contracts within 180 days of contract award or authority to proceed regardless of the project phase.

The requirement for project level IBRs is contained in NPR 7120.5. The project's preliminary PMB is established in Phase B in preparation for KDP C approval and is assessed during the pre-approval IBR. Mission Directorates are required to conduct the pre-approval IBR as part of the preparations for KDP C to ensure that the project's work is properly linked with its cost, schedule, and risk and that the management processes are in place to conduct project level EVM. This review may be conducted in conjunction with the independent assessment activities for the Preliminary Design Review (PDR) to optimize data requirements/review activities and minimize disruption to the project.

Although not a requirement, the project customer/sponsor may decide to conduct an IBR after KDP C if there is a major change to the project and PMB. For example, the Program Manager, as the customer may conduct an IBR on the project (post KDP C) after a significant replan of the PMB to understand how the approved project changes have been incorporated. The Mission Directorate as the sponsor may also be involved. The Project Manager is responsible for conducting IBRs on the project's first tier suppliers with EVM requirements as described in section 3.3.4 of this handbook. The NASA IBR Handbook, located on the NASA EVM website at https://evm.nasa.gov/handbooks.html provides guidance on the IBR process.

4.5 Management Reporting and Data Analysis

Reporting and analysis is most efficient when levels and thresholds are carefully crafted and the primary focus is on elements that exceed these thresholds. The NASA IPMR DRD Implementation

Guide at https://evm.nasa.gov/reports.html provides additional guidance on establishing relevant thresholds. A well-crafted reporting structure should provide the ability to quickly examine the data to determine the source of significant technical, cost, and schedule variances. See section 3.3.6 for additional details.

Whereas the PMB is important to measure performance against a plan (budget), an EAC is necessary to understand the anticipated total funding requirements to complete the project. Real-time updates of EAC at individual control accounts to address issues occur during the monthly review and analysis of performance as appropriate. A bottoms-up EAC is required annually as a minimum to better understand the Project's EAC and total estimated funding requirements. An appropriate time to conduct this bottoms-up EAC is in conjunction with the preparation of the annual PPBE inputs.

4.6 Changes to Baseline Data

All changes to the PBB/contract budget base (CBB) and PMB (scope, schedule, budget, EAC) must be documented in some form in order to provide traceability as required for management control and reviews, as well as compliance with the EIA-748. Most of these data, when changed, will require changes to other related data, such as risk management data.

Flexibility exists to allow changes to the baseline to ensure that it is as realistic as possible while ensuring stability for measuring cost, schedule, and technical progress. Corrections are made if erroneous data are significantly affecting the management value of the EVM system, but the validity and value of management reports may be compromised if current plans or project history (performance to date information) are constantly changing. See section 5.5 for additional guidance on baseline changes.

4.7 Project EVMS Surveillance

Project Managers are responsible for ensuring the accuracy and reliability of the EVMS and performance measurement data. They play a key role in the NASA surveillance process, which includes in-house and contractor EVMS surveillance. The objectives of EVMS surveillance are to ensure continued EVMS compliance with the EIA-748 and data reliability across the project. Section 3.3.5 provides guidance for conducting surveillance on contracts with EVM requirements. The Project Manager typically coordinates delegation of contract EVM surveillance requirements to the DCMA. For projects that are greater than or equal to $250M, the Project Manager will support the development of a surveillance plan that is inclusive of the in-house work. Appendix D provides additional guidance for performing project EVMS surveillance.

4.8 Minimum Waiver Requirements for NASA In-House Programs and Projects

NPR 7120.5 defines the requirements for application of an EVMS to NASA projects and programs. When a program or project meets the requirements for EVM application yet wants to implement a management system not fully compliant with the guidelines in EIA-748 a waiver request must be submitted to the NASA EVM PE. The request must include the minimum waiver requirements defined in Appendix E of this handbook.

Minimum waiver requirements are designed to ensure that the decision makers have the necessary information to make a knowledgeable decision on the waiver. This information is also used to support audits coming from entities within and external to the Agency. The minimum waiver requirements are modeled after NFS 1852.234-1, which NASA uses in solicitations to inform the

potential offeror(s) of the requirement to use an EIA-748 compliant EVMS. Additional guidance on completing a waiver can be found in the NDIA EVM Systems Acceptance Guide. The EVM FP is a source for information and can help to ensure adequate content and minimize time and effort for preparation and disposition.

The NASA EVM PE will evaluate waiver requests and make a determination based on the soundness of the data provided and the risk to the Agency if a waiver is granted. In some cases, additional follow-up and meetings may be required.

The above discusses waiver requests to project level EVMS (which includes in-house work and are approved by the EVM PE). To waive EVMS on applicable contracts, a NFS deviation is required and must be approved by the Office of the Procurement or the CO.

5 LESSONS LEARNED

5.1 Overview

This section describes EVM issues and lessons learned that NASA personnel should consider when implementing and using EVM.

5.2 EVM Planning Begins at Project Formulation

While EVM reporting is not required until Phase C, project planning that will support EVM analysis and reporting is an iterative process beginning early in Formulation. The building block for effective planning and integrated performance management begins with the preliminary project WBS. While the initial purpose of a WBS is to define the project work and structure for cost collection, once in place it also provides the framework for integrating management subsystems, developing schedules and accumulating performance information. Figure 4-1 provides an overview of the NASA EVMS process that includes relevant management subsystems. Disconnects and mismatches among these systems can be minimized if estimates, budgets, schedules, costs, accomplishments, and projections are all oriented to the approved project WBS. Otherwise, the project will be required to implement labor intensive workarounds and reconciliations just to obtain reliable data for management decision making.

NASA requires the technical and financial WBS structures for each project to be the same (through level seven of the project WBS). This is accomplished through the use of the NASA Structure Management (NSM) system numbering scheme and controlled through NASA's Metadata Management (MdM) system which supplies the approved WBS codes (through level seven) to the Agency's core financial system (SAP) and other systems that require coding structure data. This common coding system facilitates communications among all project participants. All project efforts inclusive of suppliers (i.e., all in-house, contracted, international partners, university, and any other performing entity efforts) should be included. Additionally, Project Managers should work with their contracts organization or other performing entities to develop the appropriate contractual language and DRDs for reporting that supports project-level planning and analysis.

It is essential that the WBS/OBS/Control Account/WP/charge code construct be carefully planned during project set-up when developing the preliminary IMS and selecting/initializing the EVM tools. This structure is the basis for schedule/budget integration and establishing the preliminary PMB prior to KDP C. The project management team should seek assistance and guidance from their Center EVM FP when establishing planning guidelines and templates. The Project Manager should review this construct with the entire project team and enable support organizations to understand the structure and the importance of adhering to it. Since the project WBS is not baselined until the later stages of Phase B, projects should not enter the full preliminary WBS into MdM until the scope has stabilized or until specific control accounts are needed for cost collection to avoid charges to an inappropriate WBS. For additional instruction and best practices, see the NASA EVM System Description, NASA Work Breakdown Structure Handbook, and the NASA Schedule Management Handbook at https://evm.nasa.gov/handbooks.html.

5.3 Baseline Planning (Budget and Funds)

The PMB represents the calendar performance plan against which the supplier (project/contractor) is measured during the total authorized (not just annual) project scope. It is the summation of the time-phased budgets for all control accounts, applicable indirect budgets, and any undistributed

budget (UB) for the authorized portion of the project lifecycle. The PMB budget along with MR and authorized unpriced work (AUW) comprises the project budget base (PBB) as depicted in Figure 5-1. For contractor's, this is the contract budget base (CBB).

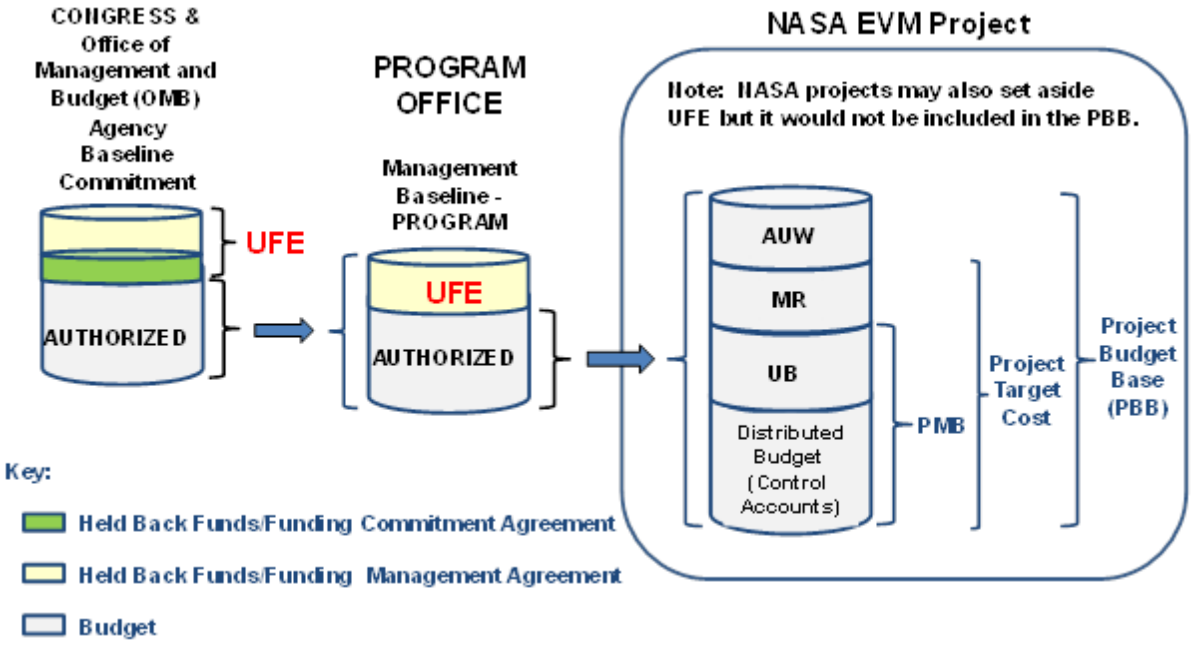


Figure 5-1 NASA Project Budget Walk Down

These budgets equate to the plan and should not be confused with project fun ds, the monetary resource provided to execute the plan. The funds requirements are reviewed and updated based on the project/contract EAC. A compliant EVMS is concerned with the total authorized project scope, the associated planned budget and schedule, and the resultant PMB used to measure progress of the total project. An EAC is necessary to understand the anticipated total funding requirements necessary to complete the project, based on current and expected performance against the plan. It is the actual cost to date plus the estimated costs to complete the remaining work. To better understand the EAC, a comprehensive/bottoms-up EAC should be completed annually as a minimum to support the PPBE process.

Figure 5-2 is an example of a revised funding forecast/requirement based on the EAC. A more detailed explanation of EAC development and reporting is provided in the NASA EVM System Description located at the NEN (https://nen.nasa.gov/web/pm/evm).

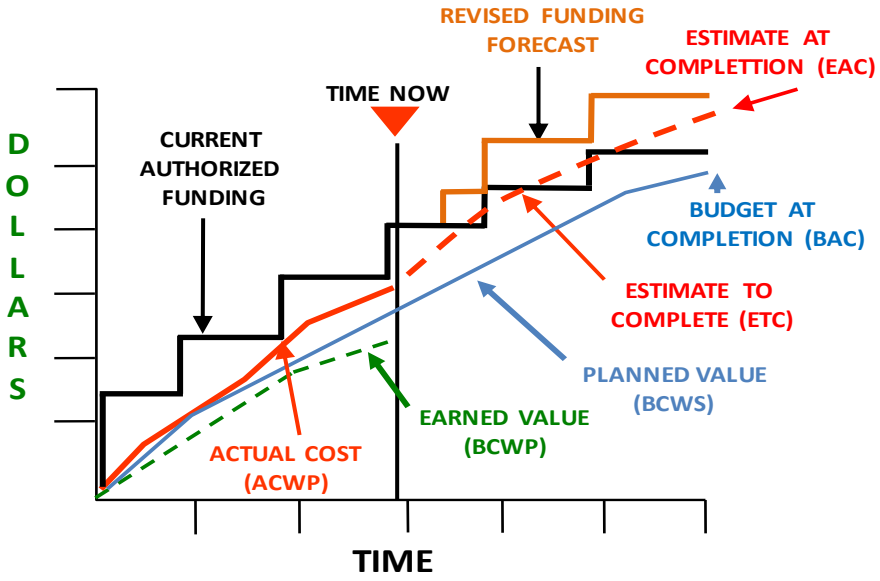


Figure 5-2 Budget versus Funds

When establishing the PMB, it is essential that the entire authorized scope (via contract, task order, approved project plan, etc.) be scheduled and budgeted (time-phased) regardless of fiscal year (FY) boundaries. If the Project Plan/agreement governing the project is divided into severable phases then the later phases may be segregated in planning packages. If the Project Plan/agreement authorizes only the first of several phases in which case authorization for later phases is contingent on specific events, only the basic period's work should be scheduled and budgeted within the PBB or CBB.

Project Managers will need to consider the planned funding by FY as a limiting constraint when establishing their PMB to avoid major replanning. However, funding perturbations may cause internal replanning of the baseline work, or, in the case of significant funding cuts, may necessitate an authorized change to the PMB. The use of planning packages for work beyond the current FY may allow more flexibility in maintaining a valid PMB.

5.4 Management Reserve Planning and Usage

All projects contain some element of risk and should identify a portion of the authorized project budget value, the PBB, for unplanned activity within the project scope. EIA-748 provides for the establishment and use of MR to handle these execution risks. Unanticipated control account changes such as unexpected growth within the currently authorized work scope, rate changes, risk handling, or changes in schedule are circumstances representative of situations that may result in the determination that budgets assigned to a P-CAM are inadequate (i.e., in scope to the project but out of scope to the control accounts) and may benefit from applying MR in the replanning process.

The proper use and control of MR not only complies with the EIA-748 guidelines, but is also a project management best practice. MR should not be confused with the project UFE which is a

contingency fund. MR should not be eliminated from the project budget or contract prices during subsequent negotiations, or used to absorb the cost of program changes. The budget held in MR should not be viewed by a customer as a source of funding for added work scope or used to offset accumulated overruns or under runs.

A NASA lesson learned stresses the importance of Mission Directorates/Program Managers to allow Project Managers to budget for and report MR to manage project risks and to comply with the EIA-748. Project Managers must ensure the project budget logs accurately reflect budget traceability for all budgets inclusive of MR and agree with the authorized PBB. Project EVM reports and information should reflect MR trends and explain uses (to/from accounts). Project Managers should ensure their project EVMS process description and best practices clearly define MR and its use, and ensure that the necessary project personnel receive training on the project MR and the relationship to UFE and funding reserves.

5.5 Replanning versus Rebaselining

In the context of the PMB, NASA project personnel typically associate the term "rebaselining" with the process of eliminating all variances (cost and schedule) incurred against the PMB and re-establishing the PMB to reflect changes (usually reductions) in the project funding resulting from the annual PPBE process. However, this is not consistent with the best practices defined in the EIA-748 or the definition of "rebaselining" in NPR 7120.5: "Rebaselining is the process that results from a change to the project's Agency Baseline Commitment (ABC). The ABC establishes and documents an integrated set of project requirements, cost, schedule, technical content, and an agreed-to Joint Confidence Level that forms the basis for NASA's commitment with the external entities of OMB and Congress." The PBB value is established within this external commitment by the program manager and the Project Manager.

Keeping the PBB and the PMB up to date and reflective of authorized scope are essential elements for valid performance measurement on NASA programs/projects/contracts. Revisions to schedule, budgets, and work scope must be processed in a disciplined manner to maintain a clear path from the original approved PMB and to implement changes in a timely manner as prescribed by the EIA-748. Any revisions to the PBB or CBB and PMB are incorporated through replanning actions. Replanning occurs when there is a change in the original plan for accomplishing the authorized scope, typically involving the redistribution of budget for remaining work. Changes requiring replanning can be thought of as internally driven or externally driven.

Internally driven changes, or internal replanning, involve realigning scope, schedule, or budget for the remaining project effort within the authorized PBB. Internal changes also include the correction of errors and routine accounting adjustments that improve the accuracy of the data. Examples of internal replanning include changes resulting from design reviews, reorganization of work or people to improve efficiency of operations, rate changes, etc. The Project Manager approves changes to remaining work, including changes that require allocation of MR. Internal replanning is restricted to remaining effort and, if significant, the customer must be advised of the action.

External changes are driven by the customer and require the project to revise its planning in order to accommodate these changes. Examples of externally directed changes that result in replanning include customer directed changes; funding perturbations resulting from the PPBE process (project re-scope, schedule stretch out, etc.); an Engineering Change Proposal (ECP) that changes baseline

scope, schedule, or budget; partial stop work; etc. An external change may be driven by a rebaseline of the project commitment agreement or ABC.

When replanning (internal or external) of the PBB or PMB is required, the least preferred method is eliminating both the cost and schedule variances. This method should only be used to improve the validity and usefulness of the EVM performance data. Project Managers should consult with their EVM FP for assistance in defining the appropriate replanning approach when internal or external replanning is required.

5.6 EVM Implementation and Letter Contracts

In accordance with FAR 16.603, a letter contract is a written preliminary contractual instrument that authorizes the contractor to begin work immediately. NASA uses this type of contract when (1) the government's interests demand that the contractor be given a binding commitment so that work can start immediately and (2) when negotiating a definitive contract is not possible in sufficient time to meet the requirement. The letter contract should be as complete and definite as feasible under the circumstances and should include the EVMS clauses that are appropriate for the planned type of contract. The letter contract will also include a negotiated definitization schedule that includes the dates for submission of the contractor's price proposal and a target date for definitization. The schedule will provide for definitization of the contract within 180 days after the date of the letter contract or before completion of 40 percent of the work to be performed, whichever occurs first.

The problem is that letter contract definitization can take months/years to occur and, during that time, NASA projects have little insight into contract performance. Additionally, there is a tendency for contractors to delay establishing a PMB, even an interim PMB, prior to contract definitization. Without an interim PMB, it is difficult to determine current performance and assess technical, cost, or schedule risks/impacts; it also diminishes planning and control by both the prime contractor and the government. The process for incorporating the authorized but not negotiated or definitized change budget into the PMB is to record the proposal value or NTE in the project budget base log as AUW. Contractors will assign this budget to UB and then allocate to control accounts for near term work. See the NASA EVM System Description for more explanation.

Project Managers are responsible for ensuring the prime contractors comply with the EVMS and reporting requirements included in letter contract awards. This includes the initialization of the PMB, submission of the IPMR and the WBS and other reporting in accordance with the DRDs, and completion of the IBR within 180 days after contract award (in accordance with the EVMS clause). Project Managers should not allow waivers to these requirements. If a delay in EVM implementation is warranted, Project Managers should coordinate any waivers to EVM requirements with the agency/center EVM FPs and the contracting officer, and process the waiver, if applicable, in accordance with the waiver process described in NPR 7120.5.

APPENDIX A. EXAMPLE CONTRACT EVMS IMPLEMENTATION ACTIVITIES

ACTIVITIES DESCRIPTION	RESPONSIBILITY	REFERENCE/NOTES
Pre-Award Activities		
☐ Develop Program WBS and WBS Dictionary IAW NASA procedures	PM	
☐ Develop/include Contract WBS DRD in RFP	PM/CO	
☐ Define/include EVMS clause and appropriately tailored IPMR DRD in RFP (consult with appropriate EVM FP)	PM/CO	
☐ Conduct review/acceptance of offeror's comprehensive EVMS Plan; coordinate with DCMA, NASA EVM PE and/or Center EVM FP as appropriate.	PM/CO	
An acceptable EVMS Plan (ref NFS 1852.234.1 Notice of EVMS) ○ Describes the EVMS to be used in performance of contract: ➢ Identifies current system/proposed modifications (gap analysis) ➢ Correlates management processes with the 32 Guidelines ○ Describes procedures for application of EVMS requirements to subcontractors ○ Describes process for ensuring EVMS compliance for each subcontractor if not previously validated ○ Provides documentation describing any self-evaluation of system's compliance with EVMS guidelines ○ If proposal ≥ $100M, provides schedule of events leading up to validation/government acceptance of EVMS; Recommended: ➢ Initial progress assistance visit 30 days after award as appropriate ➢ Initial PMB within 90 days after contract award recommended, but NLT 180 days ➢ IBR review within 180 days after award; ➢ Conduct Progress Assessment Review (as appropriate) ➢ Conduct EVMS Compliance Review (CR) ➢ CO compliance determination		
☐ Incorporate major subcontractor(s) effort if not defined at contract award into contract EVMS clause (NFS 1852.234-2 EVMS or Alt 1)	PM/CO	
Post Award Activities (Contracts Requiring EVMS Validation/Acceptance)		
☐ Delegate EVMS Acceptance/Surveillance to DCMA via NF1430A	PM/CO	
☐ Develop CR Plan/identify team/coordinate with NASA EVM PE/PM	CR Lead	
☐ Conduct EVMS progress assessment visit	CR Lead/PM/CO	
☐ Monitor EVMS implementation progress/readiness via progress assessment tag-ups ○ EVMS implementation schedule status ○ EVMS tool identification/implementation ○ EVMS training as appropriate ○ EVMS processes compliance with EIA-748 guidelines ○ Process/products IAW with EVMS description	CR Lead	
☐ Coordinate EVMS documentation requirements with contractor	CR Lead/CO	
☐ Conduct CR ○ Document management process/implementation issues ○ Address initial findings in exit brief	CR Lead/team	
☐ Verify corrective actions	CR Lead/team	
☐ Prepare final draft CR Report; provide to NASA EVM PE, PM, EVM FP for review/concurrence	CR Lead	
☐ Submit final CR Report to CO to support determination of contractual compliance	CR Lead	
☐ Issue contract determination of compliance	CO/PM	
☐ Conduct data driven surveillance/ensure EVMS compliance/data reliability (i.e., EVM data anomalies reports; schedule health check)	DCMA/PM	

*CR Lead = EVMS Compliance Review Lead; PM=Program/Project Manager; CO=Contracting Officer; EVM FP = Earned Value Management Focal Point (Mission Directorate/Center)

APPENDIX B. EXAMPLE SCOPE PARAGRAPHS

The following are recommended SOW inputs for inclusion in the RFP. For intra-agency agreements, the term "supplier" may be used in lieu of "contractor" and "agreement" in lieu of "contract."

Project Management Reviews. The contractor shall conduct Project Management Review (PMR) meetings at mutually agreed upon dates and locations. During the reviews, the contractor shall present integrated cost, schedule, and technical performance status. Integrated Product Team leads or functional managers shall include cost information in discussions of schedule status, technical performance, and risk using earned value management as an integrating tool. The following shall be addressed: Cost/schedule trends, significant cost/schedule technical variances, projected impacts, quantified risk assessments, and corrective action plans. (DRD PMR)

Contractor Integrated Performance Measurement. The contractor shall establish, maintain, and use in the performance of this contract, an Earned Value Management System (EVMS). The correlation and integration of these systems and processes shall provide for early indication of cost and schedule problems, and their relation to technical achievement. (DRD IPMR)

Integrated Master Schedule (IMS). The contractor shall develop and maintain an IMS by logically networking detailed program activities. The schedule shall contain the planned events and milestones, accomplishments, criteria, and activities from contract award to the completion of the requirement. (DRD IPMR)

Integrated Baseline Reviews (IBRs). The contractor shall present its performance measurement baseline plan to the Government within six months after contract award, and subsequently, when required, following major changes to the baseline. The Government will verify during the IBR, and follow-on IBRs when required that the contractor has established and maintains a reliable performance measurement baseline. The contractor will ensure that the baseline includes the entire contract technical scope of work consistent with contract schedule requirements, and has adequate resources assigned. The contractor will assure the Government that effective earned value methods are used to accurately status contract cost, schedule, and technical performance. The contractor will perform a self-assessment of the cost and schedule risk for the IBR. The IBR will be used to achieve a mutual understanding of the baseline plan, cost and schedule risk, and the underlying management processes used for planning and controlling the project.

APPENDIX C. EVMS ACCEPTANCE PROCESS

1. Overview

The EVMS acceptance process applies to those NASA suppliers that require EVMS compliance and acceptance (contracts ≥ $100 million) when the supplier does not have a current EVMS validation. There are three steps for evaluating compliance: (1) assess whether the contractor's EVM System Description adequately documents how its system meets the intent of the EIA-748 Guidelines, (2) evaluate the contractor's ability to demonstrate the EVMS implementation as described by the EVM System Description and supplemental procedures, and (3) ensure the EVMS is providing timely, accurate, reliable and auditable data. Compliance is determined based upon the results of all three steps.

The OMB and NASA recognize the DCMA acceptance of contractor EVMS compliance. NASA employs DCMA for the contractor EVMS acceptance process. NASA has a Memorandum of Understanding (MOU) with DCMA (located at http://evm.nasa.gov/mou.html) that assigns responsibility for the validation and surveillance of a contractor's EVMS to DCMA. An overview of the approach for validating a contractor's EVMS when DCMA is delegated contractor EVMS acceptance is shown in Figure G.1-1. See DCMA-INST 208 Earned Value Management System Compliance Reviews (current revision) for additional instruction.

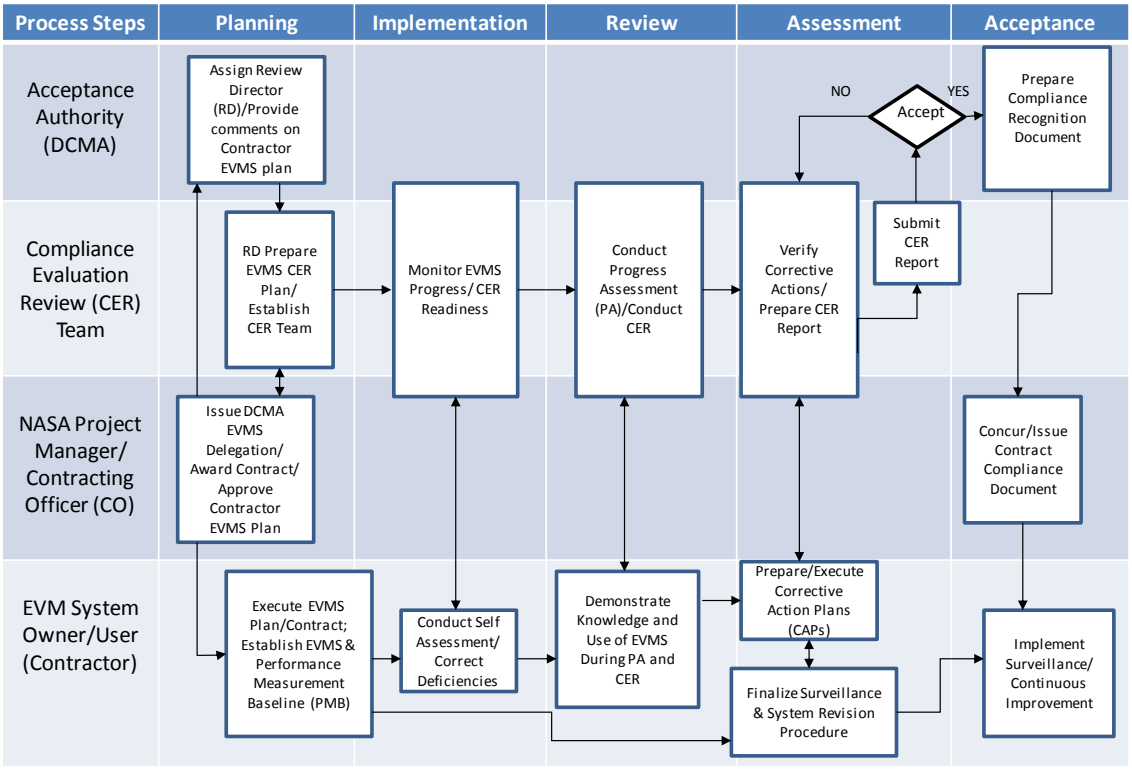


Figure C.1-1 Contractor EVMS Acceptance Process Overview

For those suppliers that DCMA is not delegated EVMS acceptance such as Civilian agencies, universities, not for profits, laboratories, one-time contracts, etc., then NASA is responsible for

verifying the EVMS acceptance and contract compliance determination. Figure G.1-2 provides a decision matrix for determining system acceptance and surveillance review responsibility. The acceptance process generally follows the same steps as the DCMA led compliance reviews by using the DoD Earned Value Management System Interpretation Guide (current revision) located at http://www.acq.osd.mil/evm/resources/PG-EVMS.shtml as the common standard interpretation guide. The process also leverages the following guides when applicable: NDIA IPMD Earned Value Management System Acceptance Guide, Intent Guide and Guideline Scalability Guide located at http://www.ndia.org/Divisions/Divisions/IPMD/Pages/default.aspx.

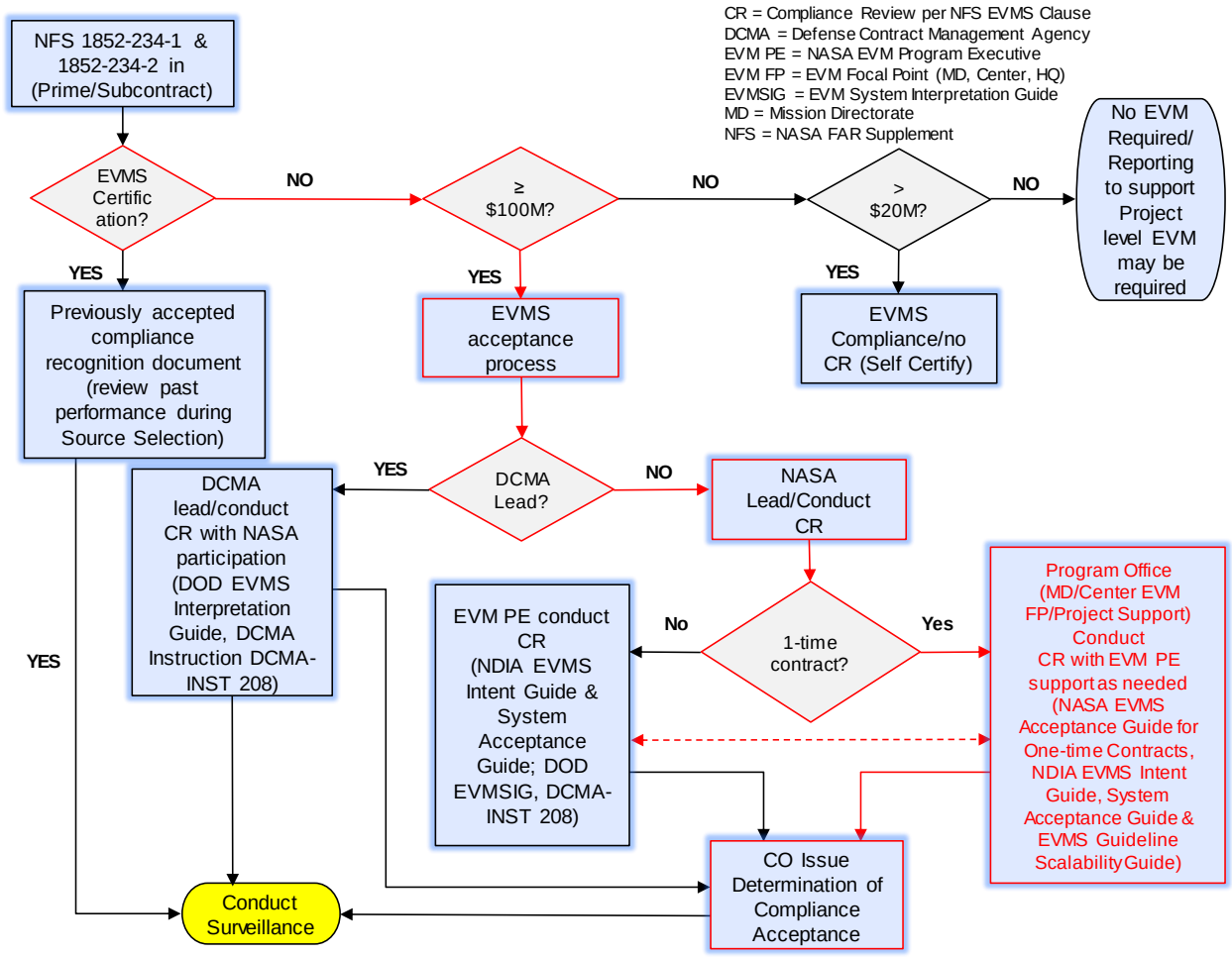


Figure C .1-2 NASA EVMS Acceptance and Surveillance Responsibility Overview

2. Roles and Responsibilities

The roles and responsibilities are summarized below.

- Defense Contract Management Agency (DCMA) is the DoD Executive Agent for EVM and Contractor EVMS Compliance with EIA-748
    - Assigns the Review Director for the Compliance Evaluation Review (CER) for NASA contracts
    - Issues Compliance Recognition Document via NASA Contracting Officer to the contractor once EVMS is accepted

- The CER Team is led by the DCMA Review Director who
    - Establishes team comprised of DCMA EVMS support and Defense Contract Audit Agency (DCAA) if applicable; and NASA EVM PE; and NASA EVM/Schedule Subject Matter Experts
    - Plans review approach/requirements with Contractor and NASA Project Office
    - Conducts the review and documents compliance

- The NASA Project Manager and Contracting Officer (CO)
    - Ensures EVMS requirement (NFS EVMS, reporting, etc.) is incorporated into the solicitation/contract
    - Delegates EVMS system acceptance and surveillance to DCMA
    - Participates in the CER as applicable
    - Documents approved EVMS in the contract per the NFS EVMS clause

- EVM System Owner is the contractor with the EVMS requirement
    - Develops and maintains EVMS Implementation Plan
    - Establishes and implements the EVMS (policies, processes, resources, tools, training)
    - Supports the CER team during the system acceptance process
    - Demonstrates EVMS compliance with the EIA-748

3. Contractor EVMS Acceptance Approach

3.1 Planning

Prior to contract award, the NASA CO with assistance from the SEB, the EVM FP and DCMA (if required), reviews the contractor proposed EVMS Implementation Plan required to be submitted with the proposal. Once the contract is awarded, the contractor executes the EVMS Implementation Plan. The CO for the NASA Project Office delegates EVMS system acceptance and surveillance to DCMA. The DCMA will assign the Review Director who will prepare the CER plan jointly with the contractor and the NASA Project Office. This plan will address the applicable interim reviews such as the Progress Assessment Review and the CER.

The primary products from this step include the contractor EVMS Implementation Plan, the CO delegation letter to DCMA and the initial CER Plan.

The CO with support from the Project Manager is responsible for ensuring the contractor's EVMS compliance with the EIA-748 and contractual compliance. If the NASA Project Office and CO do not delegate system acceptance and surveillance to DCMA (may not be appropriate for Civilian Agencies, universities, etc.) or DCMA is unable to accept the delegation, then the Project Manager is responsible for requesting the assistance of the Center EVM FP and notifying the appropriate organization as noted in Figure G.1-2 to conduct the review. More detailed information is provided in the NASA Contractor EVMS Acceptance and Surveillance Guide (current revision) and the NASA Earned Value Management (EVM) System Acceptance Process for One-time Contracts Guide (current revision) located on the internal NASA EVM CoP.

3.2 Design and Implementation

The contractor executes the EVMS Implementation Plan which includes the schedule with resources assigned to ensure proper and effective design, documentation, implementation, and maintenance of the management system that complies with EIA-748. The contractor establishes EVM policy followed by the development and implementation of an EVMS. There are several approaches to documenting the processes involved in the structure of an EVMS. A typical approach is a single document referred to as a "system description" that describes how the program management processes and procedures meet the intent of EIA-748.

Implementation of the EVMS occurs during the system design and documentation process. As the processes are implemented, feedback on the effectiveness and accuracy of system documentation and procedures is important to ensure that needed improvements are incorporated in a timely manner. Keep in mind that the contractor is obligated to implement the planning and control processes to ensure establishment of a reliable preliminary PMB and support the IBR required within 180 calendar days after contract award.

The contractor should also conduct internal training in both the basic concepts of EVM and specific process elements of the EVMS that includes unique project management aspects of the system, forms designed for implementation, and process oriented interfaces with other internal systems. This training should occur early in the implementation phase.

During this phase, the CER team will monitor the contractor's progress toward implementing the EVMS, assess the contractor's readiness to demonstrate a fully integrated EVMS based on the results of the contractor's internal self-assessment and will also finalize the CER Plan.

3.3 Review

The purpose of the CER (Validation Review) is to conduct a formal assessment of the contractor's proposed management system to verify that the system being reviewed meets the intent of EIA-748. The primary objectives are:

- Evaluate the management system capabilities against the EIA-748 guidelines
- Assess the description of the management system to determine if it adequately describes the management processes demonstrated during the review, and
- Evaluate the application of the EVMS on the contract being reviewed.

The review consists of system documentation reviews, data traces and discussions with contractor personnel (Control Account Managers, Functional Managers, Business Manager, Project Manager, etc.). The system documentation reviews and data traces are typically performed prior to the onsite review which consists of discussions with the contractor personnel, etc. During this process step, the contractor demonstrates to the team how the EVMS is structured and used in actual operation. Major activities include:

- Findings are documented in a Deficiency Report. The DR is a systemic or limited occurrence of an EIA-748 non-compliance or a significant impact to reporting and requires a corrective action plan (CAP).
- Other issues may be documented in the form of a continuous improvement opportunity.

During this step, the team prepares a written report documenting the activities of the review and the results. The team's findings will include actions that are required prior to obtaining validation of compliance. The report will reflect how the team verified compliance with the guidelines, and that the described system was properly and effectively implemented on the contract(s) under review.

3.4 Acceptance

Before a final decision on acceptance is made, the contractor should provide documentation that all corrective actions for DRs have been completed. The Acceptance Authority reviews the CER Report and determines that the contractor's EVMS complies with EIA-748 and the contract, project or program is using the compliant EVMS. The EVMS compliance recognition is a letter or compliance recognition document that clearly indicates the system reviewed complies with EIA-748.

Once the acceptance document is issued, the contractor is required to maintain the system and implement EVM on contracts requiring EVMS. The contractor should notify the Acceptance Authority issuing system compliance recognition when revisions are made to the EVMS (policy, process, procedures, or practices). Continued EVMS compliance is determined through surveillance.

After acceptance, the DCMA will perform system surveillance as delegated to verify the system is being maintained and used by the contractor. For contracts where NASA led validation reviews occurred, the NASA EVM PE is responsible, with support from the NASA Project Office and applicable Center EVM FP, for the surveillance process. See Appendix D for an overview of the surveillance process.

4. EVMS Reciprocity

NASA supports OMB's efforts to eliminate duplicative and costly EVMS reviews per the OMB memo dated October 23, 2015, Subject: *Reducing the Burden of Certifying Earned Value Management Systems (EVMS)*. NASA currently recognizes contractors' EVMS acceptance by DCMA and the Federal Aviation Agency (FAA). NASA is pursuing reciprocal agreements with DCMA and other agencies for those contractors where NASA has conducted the CER and accepted the EVMS as the Cognizant Federal Agency. NASA's EVM PE maintains the compliance review information (e.g., reports and findings). Reciprocal agreements will be posted to the NASA EVM website in accordance with the reciprocal MOUs.

APPENDIX D. EVMS SURVEILLANCE PROCESS

1.1 Purpose

Surveillance is the process of reviewing the health of the approved EVMS process applied to projects. The purpose is to ensure the EVMS is effectively used to manage cost, schedule, and technical performance and provide reliable performance management information. An effective surveillance process ensures the EVMS is maintained over time and effectively used on subsequent applications. This appendix describes the surveillance process for NASA projects/contracts with EVM requirements and assigns roles and responsibilities to assess the system's operation. NASA's approach leverages the NDIA IPMD Surveillance Guide (current revision) to the extent practical. In addition to the goals identified in the NDIA IPMD Surveillance Guide (Current revision), additional goals of NASA's surveillance process are to:

1. Maintain confidence in the contractor's EVMS validated and accepted by NASA to support EVMS recognition (reciprocity) by other government entities.
2. Leverage DCMA's risk-based and data driven surveillance approach to extent practical (see DCMA-INST 210 Earned Value Management System (EVMS) Standard Surveillance (current revision) at http://www.dcma.mil/Portals/31/Documents/Policy/DCMA-INST-210.pdf?ver=2016-12-21-130222-180 .
3. Optimize resources/minimize duplication by leveraging contractor internal surveillance process/products and Surveillance Reviews (SRs) to better assess risks.
4. Increase awareness of areas where improvement in the EVMS provides more timely/reliable decision making data and minimize EVMS cost.

1.2 Scope

Surveillance is performed on major acquisitions that meet the threshold for applying an accepted EVMS (see Section 1.2, Figure 1-1 NASA EVM Requirements of this handbook). It includes in-house efforts as well as major contracts with EVM requirements.

1.3 Applicable Definitions

Relevant definitions from the NDIA IPMD Surveillance Guide are as follows:

Joint Surveillance: Project surveillance conducted jointly by the supplier and customer (e.g., for contractor's this is typically performed by the contractor's EVMS organization, the customer and the cognizant DCMA if applicable).

Organization: A customer or supplier entity, including agencies responsible for management of internal projects using EVMS, prime contractors, subcontractors and inter-organizational transfers (IOT), with EVMS ownership and oversight responsibility for one or more sites.

Project Surveillance: The process of reviewing an individual project's implementation of the organization's accepted EVMS process. For example, the OCFO conducts a project EVM Assessment in conjunction with independent evaluations of projects during project life cycle reviews (LCRs) to support KDPs.

Surveillance Plan: An annual plan that identifies the projects to be included in surveillance reviews, as well as the frequency and scope of the individual surveillance visits planned for each project included in the annual plan.

Surveillance Program: A surveillance program comprises an organization's people, processes, tools, and training necessary to execute internal and contractor surveillance, independent of customer surveillance activities or requirements, for the purpose of ensuring that its projects are effectively managed to meet their cost, schedule, and technical objectives. NASA's Surveillance Program includes all surveillance activities/products inclusive of customer (Program/Project Manager) surveillance activities.

System Surveillance: Cross-project EVMS surveillance is used to assess an organization's capability to consistently implement and use its accepted EVMS on all projects with EVMS requirements. Cross-project EVMS surveillance is also known as system surveillance, because it can identify findings common to multiple projects, which are indicative of systemic problems. System surveillance therefore comprises a summarization of multi-project surveillance results rather than a separate system level surveillance review.

2.1 EVMS Surveillance Process

All programs, projects, contracts and suppliers with the requirement for an EIA-748 compliant EVMS must conduct routine EVMS surveillance. The NASA surveillance process is designed to promote a common understanding of the expectations for compliance with the requirements of the EIA-748 guidelines.

Surveillance is structured to facilitate the exchange of information about the EVM process implementation and the supplier's approach to it. It should be approached as a mentoring or problem-solving session rather than an audit since it not only identifies inconsistencies but also solutions to resolve the problems.

NASA ensures that the EVMS is providing valid, accurate and timely data through routine surveillance and EVM Assessments. While the purpose of the EVMS surveillance is the same, the approach will differ depending on two factors: first is whether the scope is being performed in-house or externally, and second is whether the EVMS validation was issued by NASA or not. The table below summarizes some of the differences, with more details addressed in the pursuant paragraphs.

	Routine Surveillance	Routine Surveillance Responsibility	EVM Assessment Responsibility
NASA Project	X	NASA PM	NASA EVM PE
DCMA Validated EVMS	X	DCMA	N/A
NASA Validated EVMS	X	NASA EVM Program Executive (PE)	N/A
NASA Validated EVMS One-Time Contracts	X	NASA Program Manager	N/A

Table D.1-1 NASA EVMS Surveillance

2.2 NASA Projects

EVMS surveillance for NASA Projects is conducted under a two-pronged approach – routine surveillance and EVM Assessments. Routine surveillance is performed on a monthly basis and is

the responsibility of the NASA Project Manager. Routine EVMS surveillance involves reviewing performance reports, anomalies reports, review documentation, and databases to ensure that the performance data generated from the EVMS are accurate and reliable and used to inform management decision making. NASA provides EVM tools (Cobra and Empower) to Project Managers to facilitate EVM implementation and analysis as well as the NASA Schedule Test and Assessment Tool (STAT) to assess the integrity of the IMS. Project Managers use the STAT and Empower automated anomalies reports to identify, explain and resolve major issues as well as potential problems. For example, the DCMA Attributes and Test Report in Empower shows the results of data quality checks and maps test results to the 32 guidelines of EIA-748. Project Managers should conduct the internal surveillance by using the above mentioned tools routinely to identify issues in a timely manner and take corrective actions as needed. The EVM FP can assist in the surveillance process.

At the agency level, project EVMS implementation and compliance is assessed through EVM Assessments. Each year, the EVM PE prepares a project EVM Assessment Plan based on Agency life cycle reviews/KDPs schedule. This schedule defines the major projects to be developed for each project and tailored to the specific review as appropriate. An EVM Assessment will be conducted at KDP-B/C/D.

Project EVM Assessments are conducted during Formulation to assess EVMS planning and contract performance to ensure timely establishment of the preliminary Performance Measurement Baseline (PMB) for Phase C and facilitate the pre-approval integrated baseline review in preparation for KDP-C.

During formulation, projects conduct EVM planning which includes obtaining EVMS implementation assistance for the Center EVM FP and the EVM PE as needed. Projects should use the Agency EVMS capability process to meet their EVM requirements. The EVM Capability documentation can be found in the NASA internal EVM CoP at https://nen.nasa.gov/web/evm. The focus of the project EVM Assessment during Formulation is to ensure that the capabilities and processes required for effective project control are in place, or will be in place by the start of project Implementation (Phase C) and meet the intent of NPR 7120.5 to include formal EVM reporting. The NPR also requires Mission Directorates to conduct a pre-approval integrated baseline review as part of their preparations for KDP-C to ensure the project's work is properly linked with its cost, schedule and risk and that the management processes are in place to conduct project level EVM. The EVM Assessment will be conducted in conjunction with the project's independent evaluation activities and the Mission Directorate pre-approval integrated baseline review as appropriate.

Project specific EVM application and tailoring should be documented in the EVM Implementation Plan which is included in their Project Plan (see Appendix F for more detailed instruction). This includes the schedule for EVMS implementation (initially included in the Formulation Agreement at KDP A) through establishment of the PMB for KDP C, identification and management of suppliers with EVM requirements (contractors and Intra-Agency); tools used to facilitate EVM implementation and reporting; a monthly business rhythm; and establishing an EVM Training Plan for applicable project personnel. Project EVM Assessments continue through /KDP D with focus on ensuring the PMB is properly maintained and the EVMS data is reliable and used in project planning and control.

The NASA EVM Assessment White Paper includes specific data requirements tailored to each LCR/KDP and process for documenting the review findings/assessments. NASA leverages the

DCMA surveillance templates and interview findings forms for surveillance of those contractor's where NASA is the acceptance authority and cognizant federal agency.

The results of the review will be discussed with the project and customer and documented. Corrective Action Requests (CARs) or equivalent documents will be issued depending on the specific review requirements to document non-compliance findings and require corrective actions plans. All CARs will be tracked by the project and status reported periodically to the OCFO. Table D.1-2 includes a description of typical surveillance products. See the NASA EVMS Acceptance and Surveillance Guide and the NASA EVM Assessment Whitepaper located on the EVM CoP at https://nen.nasa.gov/web/evm/documents.

Title	Description
Nasa Project EVM Assessment Schedule	Prepared by the EVM PE with input from the Strategic Investments Division (SID), Mission Directorates, etc. Identifies the LCR/KDP by Phase and FY for each applicable project.
Project EVM Assessment Plan	Prepared by the EVM Subject Matter Expert (SME) assigned by the EVM PE. A plan is prepared for each LCR/KDP to define purpose, scope, schedule, data/documentation requirements, etc.
Project EVM Assessment Report	Prepared by the EVM SME with concurrence of the EVM PE. The report documents the EVM Assessments, results, CARs, etc.
Surveillance Plan (Contractor)	Prepared by the EVM SME assigned by the EVM PE. The plan identifies the surveillance activities to be conducted by the NASA SME for contractors with a NASA accepted EVMS.
Surveillance Report (Contractor)	Prepared by the EVM SME to document results of Surveillance Reviews, CARs, etc.
Corrective Action Requests (CARs)	Documents deficiencies that require corrective actions.

Table D.1-2 Typical NASA EVMS Surveillance Products

2.3 Contractor EVMS Surveillance – DCMA Validated EVMS

For contracts with EVM requirements, EVMS surveillance begins at contract award regardless of the project or system acquisition phase. It continues through the compliance or validation process if required, and extends throughout the duration of each contract. The Project Manager and Contracting Officer (CO) delegate contract EVMS surveillance to DCMA as outlined in NFS 1843.201 (See Appendix C, Figure C.1-2 NASA EVMS Acceptance and Surveillance Responsibility Overview).

NASA employs the DCMA for contractor EVMS acceptance reviews as explained in section 3.3.5 and Appendix C of this handbook. When delegated by the assigned NASA CO for the Project, the DCMA is responsible for:

- System Acceptance: Reviewing contractor EVMS plans and verifying initial compliance with EIA-748, Earned Value Management Systems Standard.
- System Surveillance: Conducting system surveillance activities that verify the contractor's EVMS complies with and meets the full intentions of EIA-748. System surveillance

includes evaluating changes to the contractor's validated EVMS to ensure continuing compliance.

When applicable, DCMA will perform system surveillance activities jointly with the contractor.

NASA Project Managers should partner with DCMA to facilitate insightful system surveillance. As a minimum, the project EVM analyst (or analyst responsible for EVM) should participate in contractor surveillance reviews as requested. The Project Manager and staff should also conduct its own internal surveillance as discussed in Section 2.1. The Center EVM FP should also supplement the DCMA surveillance team as appropriate. See DCMA-INST 210, Earned Value Management System (EVMS) Standard Surveillance (current revision) for additional information.

2.4 Contractor EVMS Surveillance - NASA Validated EVMS

For those contracts where NASA has verified and accepted the contractor's EVMS, a Surveillance Plan is developed by the NASA EVM PE or designee. This plan defines the approach for EVMS surveillance to optimize resources and minimize duplication (joint NASA/contractor/customer). The surveillance is comprised of the following actions: 1) the results of the contractor's EVMS internal surveillance, and 2) the NASA anomalies reporting assessment. Based on the results of these two actions, additional work could be conducted to resolve any recurring issues. Plans are updated as appropriate based on project dynamics.

For one-time contracts, the EVMS Acceptance for One-time Contracts Guide should be used which can be found at https://nen.nasa.gov/web/evm/documents. Once a supplier's EVMS is accepted by the NASA Program Manager, the supplier and the NASA program office should routinely perform data driven surveillance to ensure reliability of products and to identify process improvements.

NASA Project Managers should partner with the NASA EVM PE or designee to facilitate insightful system surveillance. As a minimum, the project EVM analyst (or analyst responsible for EVM) should participate in contractor surveillance reviews as needed. The Project team should also review the EVMS and Schedule anomalies report monthly to identify areas of concern and take the necessary actions to help correct the issues. The Center EVM FP should also supplement the surveillance team as appropriate.

APPENDIX E. MINIMUM WAIVER REQUIREMENTS FOR NASA IN-HOUSE PROGRAMS AND PROJECTS

Requirements: Any waiver request submitted to NASA headquarters OCFO must include the following information:

1. A description of the management system that will be used in the performance of the program or project. This could be captured in documentation such as a program or project plan, Center management practices, an EVM Implementation Plan, EVM System Description or other program/project documentation.

2. A matrix that correlates each guideline in EIA-748 to the corresponding process in the program or project written management procedures. This is referred to as a Compliance Review Checklist (CRC) and can be found in Figure J-1 below.
    a. For each of the 32 guidelines, state whether or not the program or project's documented management procedures meet the intent of the guideline.
    b. Provide a corresponding reference to the program or project's written management procedures for each guideline.
    c. For each guideline that is not met, describe a plan for compliance or rationale describing why the guideline will not be met.

3. The proposed procedures for application of the EVMS requirements to suppliers. This could take several forms including an EVM Implementation Plan, EVM clause(s), DRDs for the IPMR, WBS, and other EVM-type reporting, intra-Agency work agreements, Program or Project plan, Acquisition Plan or other.

4. A point of contact for additional information or assistance to support review of the request.

Figure E-1: EVMS Guideline Compliance Review Checklist

Guideline - EIA-748 (*Note: Check with EVM FP for current revision of EIA-748 and CRC)*	**Intent Met? Yes/No**	**Management Procedure Reference & Notes**	**Plan for Compliance or Rationale for Non-Compliance**
Organization			
1. Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.			
2. Identify the program organizational structure including, the major subcontractors, responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.			
3. Provide for the integration of the planning, scheduling, budgeting, work authorization and cost accumulation processes with each other,			

and as appropriate, the program work breakdown structure and the program organizational structure.			
4. Identify the organization or function responsible for controlling overhead (indirect costs).			
5. Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.			
Planning, Scheduling and Budgeting			
6. Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.			
7. Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.			
8. Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefinitized work. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. If an over target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.			
9. Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of contractors.			
10. To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.			
11. Provide that the sum of all work package budgets plus planning package budgets within			

a control account equals the control account budget.			
12. Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is not measurable or for which measurement is impractical may be classified as level of effort.			
13. Establish overhead budgets for each significant organizational component for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.			
14. Identify management reserves and undistributed budget.			
15. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.			
Accounting Considerations			
16. Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.			
17. When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.			
18. Summarize direct costs from the control accounts into the organizational elements without allocation of a single control account to two or more organizational elements.			
19. Record all indirect costs which will be allocated to the program consistent with the overhead budgets.			
20. Identify unit costs, equivalent unit costs, or lot costs when needed.			
21. For EVMS, the material accounting system will provide for: (1) Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques. (2) Cost recorded for accomplishing work performed in the same period that earned value is measured and at the point in time most suitable for the category of material involved, but no earlier than the time of actual receipt of material. (3) Full accountability of all			

material purchased for the program including the residual inventory.			
Analysis and Management Reports			
22. At least on a monthly basis, generate the following information at the control account and other 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.			
23. Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.			
24. Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.			
25. Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.			
26. Implement managerial actions taken as the result of earned value information.			
27. Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.			
Revisions and Data Maintenance			
28. Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.			

29. Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.			
30. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments 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.			
31. Prevent revisions to the program budget except for authorized changes.			
32. Document changes to the performance measurement baseline.			

APPENDIX F. EVM IMPLEMENTATION DESCRIPTION IN PROJECT PLANS

1. Purpose: The purpose of this template is to provide guidance and instruction on a suggested format and information to be included in the Project Plan when EVM is required.

2. Background: In accordance with NPR 7120.5, NASA Space Flight Program and Project Management Requirements, NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements, and NPR 7120.8, NASA Research and Technology Program and Project Management Requirements, major projects prepare a Project Plan that provides an agreement between the Project Manager, Program Manager, and Center Director, etc., on the scope, implementation approach, project operational environment, and the baseline commitments of the project. The Project Plan is updated over the project life cycle in response to changes in program requirements on the project or the baseline commitments. Execution of the Project Plan is the responsibility of the Project Manager. The Plan includes accompanying stand-alone plans such as Safety and Mission Assurance, Risk Management, System Engineering Management, Software Management, Security Plans, Technical/Cost/Schedule and Control Plan, etc., summarized in section 3, which collectively provide the guidance and control for the project.

3. Project Plan Requirements: The Project Plan Template is included as an appendix in each of the NPRs cited above. For example, in NPR 7120.5, Appendix H, Project Plan Template, section 3.1, Technical, Schedule, and Cost Control Plan, projects are required to describe how it plans to control project requirements, technical design, schedule, and cost to achieve the program requirements on the project to include EVM. The EVM implementation approach can be included in this section or described in a separate control plan and referenced in this section. This control plan describes the project's implementation of EVM including:

    a. How the PMB will be developed and maintained for the project and how UFE will be established and controlled;

    b. The methods the project will use to authorize the work (e.g. work agreements) and to communicate changes for the scope, schedule, and budget of all suppliers; how the plan is updated as make-buy decisions and agreements are made;

    c. The process to be used by the project to communicate the time-phased levels of funding that have been forecasted to be made available to each supplier;

    d. For the class of suppliers not required to use EVM, the schedule and resource information required of the suppliers to establish and maintain a baseline and to quantify schedule and cost variances; how contractor performance reports will be required; and

    e. How the cost and schedule data from all partners/suppliers will be integrated to form a total project-level assessment of cost and schedule performance.

    f. How the project plans to report technical, schedule, and cost status to the program manager, including the frequency

    g. A description of any additional tools necessary to implement the project's control processes (e.g., the requirements management system, project scheduling system,

project information management systems, budgeting, risk management, and cost accounting system) and

h. The process for establishing, monitoring and controlling the IMS and the process for utilizing the project's technical and schedule margins and Unallocated Future Expenses (UFE) to meet the Management and Commitment Baselines.

4. Assumptions:

When EVM is required, new projects will implement the NASA EVM Capability to ensure compliance with the EIA-748 standard for EVMS and include this as a reference in their EVM Implementation Plan. The EVM Capability consists of processes, procedures, tools and training. Use of NASA's EVM Capability and processes ensures compliance with the EIA-748 standard and allows customization to match the individual needs of the program or project, while still meeting the EIA-748 guidelines. NASA's EVM System Description and EVM Capability training can be found on the internal NASA Engineering Network, EVM Community of Practice (CoP) at https://nen.nasa.gov/web/pm/evm. The project will describe any tailoring of the procedures for their specific application in their EVM Implementation Plan to include the topics in section 5.

If the project does not use the NASA EVM System Description, then it must fully describe the EVM processes, procedures, tools and training that will be implemented on the project and include a matrix that demonstrates how this approach complies with the 32 guidelines of the EIA-748. See the NASA EVM System Description for an example of the type of processes, procedures, and tools required to comply with this requirement. Projects should use the compliance map included in the NDIA IPMD EVMS Intent Guide, as an aid in verifying their compliance with the EIA-748 EVMS guidelines.

5. Specific Topics:

The outline and instruction of this template serves as a guide for projects in developing and communicating the specific EVM applications for their project. The Project should include information that is unique to its EVM implementation such as EVMS milestones, process flows, charts and diagrams to better illustrate specific processes described in the NASA EVM capability (see the NASA EVM System Description), management system architecture, business process timelines, etc.

Projects should coordinate with their applicable EVM FP (see http://evm.nasa.gov/council.html) for guidance and assistance in implementing EVM and preparing their EVM Implementation Plan. In addition to the requirements listed in paragraph 3, projects should describe the following:

a. Project EVMS implementation milestones through PMB establishment, project and supplier IBRs, etc.

b. Project team at control account level (include the Responsibility Assignment Matrix (RAM)), specific roles and responsibilities to include the program, planning and control (PP&C) roles and responsibilities

c. Structures that will be used for planning including the WBS and WBS Dictionary and charge code relationships, the Resource Breakdown Structure (RBS), Organizational Breakdown Structure (OBS), rates, fiscal calendars, planning hours, etc.

d. Work Authorization process (work agreement process) and form that will be used

e. System architecture/tools used in the EVM system

f. Process for planning and accumulating indirect cost

g. Monthly Business Rhythm (input/output timeline to include: down load actual cost; update/analyze IMS; EV update; supplier IMS/EVM analysis/system update; prepare VARs; P-CAM reviews; project level reviews; prepare and submit monthly report; IMS and EVM validity reviews, etc.)

h. Management meetings/reviews (internal/external, frequency, information requirements such as specific metrics and trend analysis charts, etc.)

i. List of contracts/agreements and flowdown/reporting requirements - contractor name, scope, value, period of performance, flowdown requirements to include EVM, date of validated EVMS or plan for validation if applicable, other reporting, etc.), COR/Tech lead, etc.

j. Rolling wave approach

k. Process for tying EVM to risk management

l. IBR schedule and plan (both in-house and contractor)

m. Use of estimated actuals and reconciliation process

n. Integrated performance analysis and reporting (IMS, NF533 data reconciliation, ETC/EAC, funds forecast, Risk Register and schedule margin/MR analysis, EV metrics, UFE assessment, etc.)

o. ETC/EAC approach and frequency, including routine and comprehensive EAC

p. Thresholds for identifying significant variances and VAR preparation to include specific form if used

q. Change management process - Baseline Change Requests, Budget Log(s) (process, forms, approvals, replanning methods, etc.)

r. Identify process for incorporating new rates into the baseline

s. Training requirements/plan (EVM basics, project team training on EVM capability, tools, etc.)

t. EVMS surveillance approach (In-house and contractor)

APPENDIX G. ACRONYMS

ABC	Agency Baseline Commitment
ACO	Administrative Contracting Officer
ACWP	Actual Cost of Work Performed
BAC	Budget at Completion
BCWP	Budgeted Cost for Work Performed
BCWR	Budgeted Cost for Work Remaining
BCWS	Budgeted Cost for Work Scheduled
CAP	Control Account Plan or Corrective Action Plan
CAR	Corrective Action Request
CBB	Contract Budget Basel
CCB	Change Control Board
CFO	Chief Financial Officer
COTS	Commercial-off-the-Shelf
CPAF	Cost Plus Award Fee
CPFF	Cost Plus Fixed Fee
CPI	Cost Performance Index
CPIF	Cost Plus Incentive Fee
CV	Cost Variance
CWBS	Contract Work Breakdown Structure
DCMA	Defense Contract Management Agency
DI-MGMT-81861	Data Item Description, Integrated Program Management Report (IPMR)
DM	Data Manager
DRD	Data Requirements Description
EIA-748	Electronic Industries Alliance-748
EAC	Estimate at Completion
ETC	Estimate to Complete
EVM	Earned Value Management
EVM FP	Earned Value Management Focal Point
EVMS	Earned Value Management System
EVM FPWG	Earned Value Management Focal Point Working Group
EVMS	Earned Value Management System

FA	Formulation Agreement
FAD	Formulation Authorization Document
FFP	Firm Fixed-Price
FMR	Financial Management Requirements
FPIF	Fixed-Price Incentive Fee
FY	Fiscal Year
GAO	Government Accountability Office
GFP	Government Furnished Property
IBR	Integrated Baseline Review
IMS	Integrated Master Schedule
IPMR	Integrated Program Management Report
IPT	Integrated Product Team
IT	Information Technology
JPL	Jet Propulsion Laboratory
KDP	Key Decision Point
LCR	Life Cycle Review
LOE	Level of Effort
M	Million
MDAA	Mission Directorate Associate Administrator
MOU	Memorandum of Understanding
MR	Management Reserve
NASA	National Aeronautics and Space Administration
NASA FAR	NASA Federal Acquisition Regulation
NDIA	National Defense Industry Association
NFS	NASA FAR Supplement
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
OBS	Organization Breakdown Structure
OCFO	Office of the Chief Financial Officer
OMB	Office of Management and Budget
OPR	Office of Primary Responsibilities
OTS	Over Target Schedule
PBB	Project Budget Base

P-CAM	Project Control Account Manager
PDR	Preliminary Design Review
PMB	Performance Measurement Baseline
PPBE	Program, Planning, Budgeting and Execution
RAM	Responsibility Assignment Matrix
RFP	Request for Proposal
SEB	Source Evaluation Board
SOW	Statement of Work
SP	Special Publication
SPI	Schedule Performance Index
STAT	Schedule Test and Assessment Tool
SV	Schedule Variance
TAB	Total Allocated Budget
TCPI	To Complete Performance Index
UB	Undistributed Budget
UFE	Unallocated Future Expense
VAC	Variance at Completion
WAD	Work Authorization Document
WBS	Work Breakdown Structure

APPENDIX H. GLOSSARY

Actual Cost of Work Performed (ACWP). The costs actually incurred and recorded in accomplishing the work performed within a given time period. Actual costs include the direct cost plus the related indirect cost such as overhead, general and administrative, etc. allocated to the activity. (Also known as Actual Cost).

Administrative Contracting Officer (ACO). The individual within the Defense Contract Management Agency (DCMA) Contract Management Office (CMO) responsible for ensuring that the functions described in NFS 1842.302 are completed by the contractor in accordance with the terms and conditions of the contract.

Agency Baseline Commitment (ABC). An Agency Baseline Commitment is the highest-level commitment for NASA and is established at the beginning of the Implementation Phase of a program or project's life cycle, Key Decision Point C (KDP C). It includes the program's approved funding budgetary target. This target is used by OMB and Congress as the total appropriation target value for the funding request and some additional Unallocated Future Expense (UFE), and/or schedule or margin/reserve to ensure a reasonable amount of funding margin/reserve is available for unforeseen problems beyond the program's control.

Authorized Unpriced Work (AUW). Any effort for which contractually definitized costs have not been agreed upon, but for which written authorization has been received.

Budget at Completion (BAC). The sum of all budgets (BCWS) allocated to the project or a given Control Account. It is synonymous with the term Performance Measurement Baseline.

Budgeted Cost for Work Performed (BCWP). The sum of budgets for completed work packages and partially completed work packages, plus the appropriate portion of the budgets for level of effort and apportioned effort work packages. (Also known as Earned Value)

Budgeted Cost for Work Scheduled (BCWS). The sum of the budgets for all work packages, planning packages, etc., scheduled to be accomplished (including in-process work packages), plus the amount of level of effort and apportioned effort scheduled to be accomplished within a given time period. This is the value of planned work. (Also known as Planned Value)

Change Control Board (CCB). The CCB is a committee that makes decisions on whether proposed changes to project baselines (technical, schedule or cost) should be accepted.

Contract. A mutually binding legal relationship obligating the seller to furnish the supplies or services (including construction) and the buyer to pay for them. It includes all types of commitments that obligate the Government to an expenditure of appropriated funds and that, except as otherwise authorized, are in writing. In addition to bilateral instruments, contracts include (but are not limited to) awards and notices of awards; job orders or task letters issued under basic ordering agreements; letter contracts; orders, such as purchase orders, under which the contract becomes effective by written acceptance or performance; and bilateral contract modifications. Contracts do not include grants and cooperative agreements.

Contract Budget Base (CBB). The sum of the negotiated contract cost plus the estimated cost of authorized unpriced work. It includes the PMB and MR. Customer approval is generally required to change it. (See also Project Budget Base.)

Contract Work Breakdown Structure (CWBS). A work breakdown structure of the products or services to be furnished under contract. It is comprised of selected Project WBS elements specified in the contractual document and the contractor's lower level extensions of those elements.

Control Account. A management control point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes. A control account is a natural management point for planning and control since it represents the work assigned to one responsible organizational element (or integrated product team) for a single WBS element.

Control Account Manager. See Project Control Account Manager (P-CAM).

Control Account Plan (CAP). A format upon which a control account plan is displayed. A CAP typically displays the control account scope and budget in time-phased work packages and planning packages, cost element visibility, earned value techniques for each work package, responsible performing organizations and at least one charge number.

Corrective Action Plan (CAP). Documents action(s) required to resolve deficiencies.

Corrective Action Request (CAR). Documents deficiencies that require corrective action.

Cost Performance Index (CPI). A measure of cost efficiency. It compares BCWP to the actual cost to perform that work (CPI = BCWP / ACWP). An index of 1.0 means that we are spending exactly what we planned to spend to accomplish the work performed. CPI > 1.0 means we are under running costs. CPI < 1.0 means that we are over running costs.

Cost Variance (CV). A metric for the cost performance derived from earned value data. It is the algebraic difference between earned value and actual cost (CV = BCWP – ACWP). A positive value indicates a favorable condition and a negative value indicates an unfavorable condition. It may be expressed as a value for a specific period of time or cumulative to date.

Critical Path. The Critical Path is the sequence of activities that are tied together with network logic that have the longest overall duration from time now until project completion.

Data Requirements Description (DRD). The document that describes the specific data required for supplier/contract management and reporting.

Defense Contract Management Agency (DCMA). The Department of Defense (DoD) component that works directly with Defense suppliers to help ensure that DoD, Federal, and allied government supplies and services are delivered on time, at projected cost, and meet all performance requirements. As the DoD Executive Agent for EVMS, DCMA is responsible for ensuring the integrity and application effectiveness of contractor EVMS. The NASA Program/Project contracting officer will normally delegate the responsibility for verifying a supplier’s initial and continuing compliance with EIA-748 guidelines to the designated DCMA Administrating Contracting Officer (ACO) assigned to a DCMA Contract Management Office (CMO).

Earned Value Management (EVM). A tool for measuring and assessing project performance through the integration of technical scope with schedule and cost objectives during the execution of the project. EVM provides quantification of technical progress, enabling management to gain insight into project status and project completion costs and schedules. Two essential characteristics of successful EVM are EVM system data integrity and carefully targeted monthly EVM data analyses (i.e., risky WBS elements).

Earned Value Management Focal Point (EVM FP). The EVM subject matter expert at each NASA center/organization that serves as the point of contact for coordination and exchange of information on EVM. The EVM FP is responsible for effective policy implementation within their component, ensuring consistency with NASA policy and the provisions of this guide.

Earned Value Technique (EVT). See Performance Measurement Technique (PMT).

Earned Value Management FP Working Group (FPWG). A group consisting of the EVM Subject Matter Experts from each center and other organizations to facilitate Agency-wide communication, consistency, and lessons learned related to implementing and using EVM.

Earned Value Management System (EVMS). The integrated set of policies, processes, systems and practices that meet an organization's implementation of EIA-748. An integrated management system and its related subsystems that allow for planning all work scope to completion; assignment of authority and responsibility at the work performance level; integration of the cost, schedule, and technical aspects of the work into a detailed baseline plan; objective measurement of progress (earned value) at the work performance level; accumulation and assignment of actual costs; analysis of variances from plans; summarization and reporting of performance data to higher levels of management for action; forecast of achievement of milestones and completion of events; forecast of final costs; and disciplined baseline maintenance and incorporation of baseline revisions in a timely manner.

Electronic Industries Alliance (EIA)-748, Earned Value Management Systems Standard. The set of 32 guidelines that define the requirements an organization's EVM system should meet.

Estimate at Completion (EAC). A value (expressed in dollars and/or hours) developed to represent a realistic projection of the final cost of a task (or group of tasks) when completed. EAC is the sum of direct and indirect costs to date, plus the estimate of costs for all authorized remaining work. EAC = Inception to date ACWP + ETC

Estimate to Complete (ETC). A value (expressed in dollars and/or hours) developed to represent a realistic projection of the "to go" cost of the unaccomplished work to complete a task.

Formulation Authorization Document (FAD). The document issued by the MDAA (or MSOD) to authorize the formulation of a program whose goals will fulfill part of the Agency's Strategic Plan, Mission Directorate Strategies, or Mission Support Office Functional Leadership Plans. In addition, a FAD or equivalent is used to authorize the formulation of a project.

Independent Estimate at Completion (IEAC). The IEAC is a forecast of most likely total project costs based on assessment of historical project performance.

Integrated Baseline Review (IBR). A risk-based review conducted by Program/Project Management to ensure mutual understanding between the customer and supplier of the risks inherent in the supplier's PMB and to ensure the PMB is realistic for accomplishing all the authorized work within the authorized schedule and budget.

Integrated Master Schedule (IMS). An integrated schedule developed by logically networking all detailed program/project activities. The highest level schedule is the Master Schedule supported by Intermediate Level Schedules and by lowest level detail schedules. See IPMR Format 6.

Integrated Program Management Report (IPMR). The standard government report format to report monthly cost/schedule performance and status. Projects will use the following formats:

- Format 1: cost/schedule data by Work Breakdown Structure (WBS)

- Format 2: cost/schedule data by OBS
- Format 3: baseline
- Format 4: workforce
- Format 5: variance analysis format
- Format 6: IMS
- Format 7: time-phased historical and forecast cost submission

Key Decision Point (KDP). The event at which the decision authority determines the readiness of a program/project to progress to the next phase of the life cycle (or to the next KDP).

Level of Effort (LOE): Effort of a general or supportive nature that does not produce definite end products. Examples include supervision, program administration and contract administration.

Management Reserve (MR). An amount of the total allocated budget withheld for management control purposes rather than designated for the accomplishment of a specific task or a set of tasks. It is not part of the Performance Measurement Baseline.

Memorandum of Understanding (MOU). The MOU is a bilateral or multilateral document describing the agreements between two parties.

Metadata Manager (MdM). The MdM houses the WBS structure and supplies this information to the NASA Core Financial System [sometimes nicknamed SAP because the system is based on SAP (Systems, Applications, Products) business applications]) and other subsystems such as WebTADS, FedTraveler, and Contract Management.

Mission Directorate Associate Administrator (MDAA). Responsible for managing programs within the Mission Directorate; recommends the assignment of programs and Category 1 projects to centers; assigns Category 2 and 3 projects to centers; serves as the KDP Decision Authority for Category 2 and 3 projects; and has responsibility for all programmatic requirements.

NASA Procedural Requirements (NPR). Agency mandatory instructions and requirements to implement NASA policy as delineated in an associated NPD.

NASA Policy Directive (NPD). Agency policy statements that describe what is required by NASA management to achieve NASA's vision, mission, and external mandates and describe who is responsible for carrying out those statements.

NASA Structure Management (NSM). The NSM is the internal coding schema used by the Agency to define and organize project work content. The WBS with its NSM nomenclature provides a common management framework for project management decisions and communication, the definition and authorization of work, the development of project schedules, and the planning and allocation of resources. This same coding system is also used to account for all financial activities associated with funds appropriated by Congress to accomplish project work.

Office of Chief Financial Officer (OCFO). The OCFO provides leadership for the planning, analysis, justification, control, and reporting of all Agency fiscal resources. The OCFO is responsible for EVM policy and guidance.

Office of Management and Budget (OMB). A Cabinet-level office which is the largest office within the Executive Office of the United States President. The OMB oversees and coordinates the Administration's procurement, financial management, information, and regulatory policies. In

each of these areas, the OMB's role is to help improve administrative management, to develop better performance measures and coordinating mechanisms, and to reduce any unnecessary burdens on the public.

Office of Procurement (OP). The Office of Procurement provides functional management, leadership, and policy direction of procurement and financial assistance activities (excluding Space Act Agreements) for the entire Agency.

Organizational Breakdown Structure (OBS). The project hierarchy of line and functional organizations as applied to the specific project.

Over Target Baseline (OTB). Replanning actions involving establishment of cost and/or schedule objectives that exceed the desired or contractual objectives on the program. An OTB is a new baseline for management when the original objectives cannot be met and new goals are needed for management purposes.

Over Target Schedule (OTS). An established schedule that extends beyond the contractual milestones or delivery dates.

Performance Measurement Baseline (PMB). The time-phased budget plan against which performance is measured. It is formed by the budgets assigned to scheduled control accounts and the applicable indirect budgets. For future effort, not planned to the control account level, the PMB also includes budgets assigned to higher level WBS elements and undistributed budgets. It equals the total allocated budget less management reserve.

Performance Measurement Technique (PMT). The method or "algorithm" used to calculate earned value at the work package level.

Planning Package (PP). A logical aggregate of far-term effort within a control account that can be identified and budgeted, but not yet defined into discrete Work Packages.

Program. A strategic investment by a Mission Directorate or Mission Support Office that has a defined architecture and/or technical approach, requirements, funding level, and a management structure that initiates and directs one or more projects. A program defines a strategic direction that the Agency has identified as critical.

Program Plan. The document that establishes the program's baseline for implementation and is signed by the MDAA, Center Director(s), and program manager.

Project. A specific investment having defined goals, objectives, requirements, life-cycle cost, a beginning, and an end. A project yields new or revised products or services that directly address NASA's strategic needs. They may be performed wholly in-house; by Government, industry, academic partnerships; or through contracts with private industry.

Project Budget Base (PBB). The negotiated value of the project plus the estimated cost of authorized unpriced work. It is the Government project equivalent to the Contract Budget Base. It includes the PMB and MR. Customer approval is generally required to change it.

Project Control Account Manager (P-CAM). A NASA manager responsible for task performance of a Control Account within the PMB and for planning and managing the resources authorized to accomplish such task.

Project Plan. A detailed plan which, when formally approved, sets forth the agreement between a program manager and Project Managers, and defines the guidelines and constraints under which the project will be executed.

Rebaselining. The process that results in a change to a program's/project's Commitment Agreement. This agreement establishes and documents an integrated set of project requirements, cost, schedule, technical content, and an agreed-to Joint Confidence Level that forms the basis for NASA's commitment with the external entities of OMB and Congress.

Reciprocity. A reciprocal arrangement or relationship which allows two or more groups to agree to the acceptance of another organizations' EVMS, thereby reducing the burden of multiple reviews by individual groups.

Replanning. The process by which a program or project updates or modifies its plans. This applies to a change in the original authorized PBB or CBB planning for accomplishing formally authorized requirements, typically involving the redistribution of budget for remaining work. In accordance with the EIA-748, traceability is required to previous baselines, and funding requirements need to be considered in any replanning effort. There are two types of replanning:

- Internal Replanning. Replanning actions performed by the supplier for remaining effort within the recognized PBB or CBB. It is caused by a supplier's need to accommodate cost, schedule, or technical problems that may have made the original plan unrealistic. Internal replanning is restricted to remaining effort and if significant, the customer must be advised of the action.
- Authorized Change (or External) Replanning. A change necessitated by government/ customer direction which may be in the form of either a definitized or a no cost contract change order for contracts or formal change to the Project Plan for in-house Projects that calls for a change in the original plan. It most often results from a change in the authorized requirement affecting cost, schedule, technical parameter or a combination thereof.

Reprogramming (or Formal Reprogramming). A comprehensive replanning of the remaining PMB that results in an Over-Target Baseline (OTB), an Over-Target Schedule (OTS) or both. This type of replan is for performance measurement purposes only and requires prior coordination and approval of the Customer.

Request for Proposal (RFP). A solicitation used in negotiated acquisitions to communicate government requirements to prospective contractors and solicit proposals.

Responsibility Assignment Matrix (RAM). A chart showing the relationship between the CWBS elements and the organizations assigned responsibility for ensuring their accomplishment. The RAM normally depicts the assignment of each control account to a single manager, along with the assigned budget.

Risk Management Plan (RMP). The document that describes how risks will be identified and managed for a specific program/project.

Schedule Performance Index (SPI). A measure of schedule efficiency. It compares the BCWP to the work scheduled (SPI = BCWP / BCWS). An index of 1.0 means the work is being performed right to the schedule. SPI > 1.0 means that the work is ahead of schedule. SPI < 1.0 means that the work is behind schedule.

Schedule Variance (SV). A metric for the schedule performance derived from earned value data. It is the algebraic difference between earned value and the planned value (SV = BCWP – BCWS). A positive value is a favorable condition while a negative value is unfavorable. It may be expressed for a specific period of time or cumulative to date.

Statement of Work (SOW). A document that contains a narrative description of the work scope requirements for a project or contract.

Suppliers. Each project office is a customer having a unique, multi-tiered hierarchy of suppliers to provide it products and services. A supplier may be a contractor, grantee, another NASA Center, university, international partner, or other government agency. Each project supplier is also a customer if it has authorized work to a supplier lower in the hierarchy.

To Complete Performance Index (TCPI). The future cost efficiency needed to accomplish the remaining work within a financial goal such as the Budget at Completion (BAC) or the Estimate at Completion (EAC). It compares the budget for remaining work with the remaining cost or the estimated remaining cost to complete the work. TCPIBAC = (BAC – BCWP cum) / (BAC – ACWP cum). Or TCPIEAC = (BAC – BCWP cum) / (EAC – ACWP cum). Compare the CPI to determine if the BAC or the EAC is realistic or not.

Total Allocated Budget (TAB). The sum of all budgets allocated to a project/contract. Total allocated budget consists of the PMB and all MR. The TAB should reconcile directly to the PBB/CBB. If the TAB is greater than the CBB/PBB, the difference is attributable to an over target baseline and must be documented.

Unallocated Future Expense (UFE). The portion of estimated cost required to meet specified JCL that cannot yet be allocated to the specific project WBS sub-elements because the estimate includes probabilistic risks and specific needs that are not known until these risks are realized. Typically not part of PBB unless allocated to the project in conjunction with a formal change to the PBB.

Undistributed Budget (UB). Budget associated with specific work scope or authorized changes that have not been assigned to a control account or lower level WBS element.

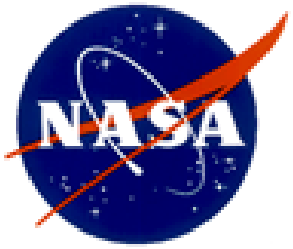
Work Authorization Document (WAD). A form used to document authorized and budgeted work from the Project Manager or sub-project/element manager. As a minimum this document must include the relevant WBS Control Account code, SOW, scheduled start and completion dates, budget, and the name of the P-CAM.

Work Breakdown Structure (WBS). The product-oriented hierarchical breakdown or division of hardware, software, services and other work tasks that organizes, displays, and defines the products to be developed and/or produced and relates the elements of the work to be accomplished to each other and the end products.

Work Package (WP). A detail, short duration task or material item identified by the Project Control Account manager for accomplishing a control account task. A work package has the following characteristics:

- Represents unit of work at the level where work is performed.
- Clearly separate from other Work Packages.
- Assignable to a single organizational element.

- Has scheduled start and completion dates, and interim milestones, if required, all of which represent physical accomplishment.
- Has budget expressed in terms of dollars or hours/FTEs.
- Its duration is limited to a relatively short span.
- Is integrated with detailed engineering, shop, or other schedules.
- Has a correct Earned Value Technique assigned to it.



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