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Earned Value Management (EVM) Implementation Handbook

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

February 2013

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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 Systems Description located on the NASA Engineering Network (NEN), Program/Project Management, and EVM Sub-Community at https://nen.nasa.gov/web/pm/evm for detailed information on implementation of the EVM processes, procedures, roles and responsibilities.

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 Systems 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-2010-3403, NASA Schedule Management Handbook; NASA/SP-2010-3404, NASA Work Breakdown Structure (WBS) Handbook; NASA/SP-2010-3406, NASA Integrated Baseline Review (IBR) Handbook and the NASA EVM Systems Description. 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.

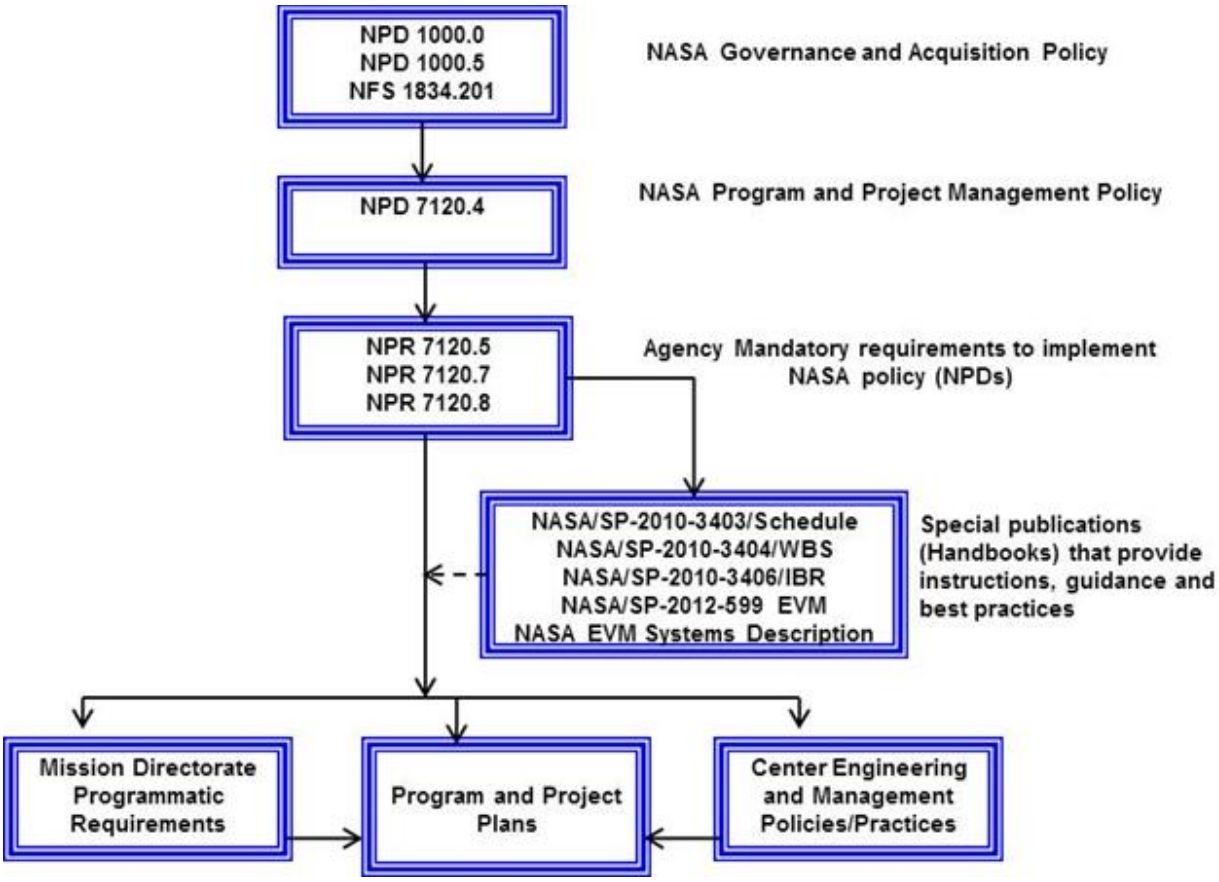


Figure P-1. NASA Program/Project Management Requirements Hierarchy

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, http://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 Sub-Community, https://nen.nasa.gov/web/pm/evm, is for NASA internal use and contains documents such as the EVM Systems Description, EVMS training, wInsight Validity Report access and instructions, 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, NASA Centers, the Jet Propulsion Laboratory (JPL), government partners, academic institutions, international partners, and contractors to the extent specified in the contract or agreement. This handbook does not contradict JPL's validated EVM Systems Description or NASA/Caltech prime contract requirements.

P.3 Authority

- NASA Federal Acquisition Regulation Supplement (NFS) 1834.201, Earned Value Management System Policy

- NASA Policy Directive NPD 1000.0, NASA Governance and Strategic Management Handbook
- NPD 1000.5, Policy for NASA Acquisition
- NPD 7120.4, Program/Project Management
- NASA Procedural Requirements (NPR) 7120.5, NASA Space Flight Program and Project Management Requirements
- NPR 7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Requirements
- NPR 7120.8, NASA Research and Technology Program and Project Management Requirements

P.4 References

- American National Standards Institute/Electronic Industries Alliance Standard (ANSI/EIA-748), Earned Value Management Systems
- Department of Defense (DoD) Earned Value Management Implementation Guide (EVMIG)
- Government Accountability Office (GAO), GAO Cost Estimating and Assessment Guide, GAO-09-3SP
- NASA EVM Website, http://evm.nasa.gov/
- NASA Engineering Network (NEN), Program/Project Management, EVM Sub-Community, https://nen.nasa.gov/web/pm/evm
- NASA Space Flight Program and Project Management Handbook
- NASA Special Publication, NASA/SP-2010-3403, NASA Schedule Management Handbook
- NASA/SP-2010-3404, NASA Work Breakdown Structure (WBS) Handbook
- NASA/SP-2010-3406, NASA Integrated Baseline Review (IBR) Handbook
- National Defense Industrial Association (NDIA) Program Management Systems Committee (PMSC), Earned Value Management Systems Intent Guide, http://www.ndia.org/Divisions/Divisions/Procurement/Pages/Program_Management_Systems_Committee.aspx
- NDIA PMSC Earned Value Management Systems Application Guide
- NDIA PMSC Earned Value Management System Acceptance Guide
- NDIA PMSC Surveillance Guide
- Office of Management and Budget (OMB) Circular A-11, Part 7, Planning, Budgeting, Acquisition, and Management of Capital Assets; and the Capital Programming Guide

P.5 Point of Contact

Primary point of contact for this handbook is NASA's EVM Program Executive, Jerald G. Kerby, from the Office of Strategic Analysis and Communication, Marshall Space Flight Center, (256) 544-3243, jerald.g.kerby@nasa.gov.

NASA EVM Focal Points (EVMFPs) may also be consulted for assistance with the guidance contained in this handbook. The listing of applicable EVMFPs is located on the NASA EVM website, http://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, that the EVMS be consistent with the guidelines in the American National Standards Institute/Electronic Industries Alliance 748 (ANSI/EIA-748), Earned Value Management Systems, and that in-house work be managed with the same rigor as contractor work. 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 ANSI/EIA-748 standard, are applicable for developmental efforts.

The Office of the Chief Engineer (OCE) is NASA's policy and functional owner for EVM. The OCE has developed 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 Systems Description, selected tools, and training. NASA's EVM capability can be found on the NASA Engineering Network (NEN) Program/Project Management/EVM Sub-Community, 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 J 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 ANSI/EIA-748 standard for EVMS. The EVMS guidelines are shown in Figure I-1, Appendix I, of this handbook. An overview of the NASA EVM requirements criteria is provided below (Figure 1-1).

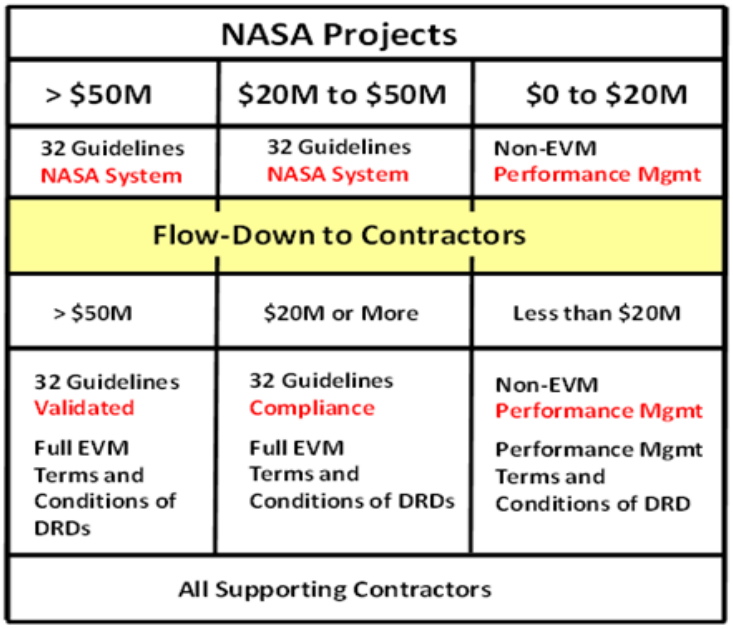


Figure 1-1 NASA EVM Requirements

EVM implementation begins with planning during early Formulation (Phases A and B). Projects in phases C and D with a life cycle cost estimated to be $20 million or greater and programs at the discretion of the Mission Directorate Associate Administrator (MDAA) perform EVM. EVM is also applied when modifications, enhancements, or upgrades are made during Phase E when the estimated development cost is $20 million or more. Each applicable project uses an EVMS that complies with the guidelines in ANSI/EIA-748 and the system is described 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 activities during each phase. Specific information on the EVM product/process maturity by phase is provided in Appendix H, section 2-3, The EVM Capability Maturity Model (CMM).

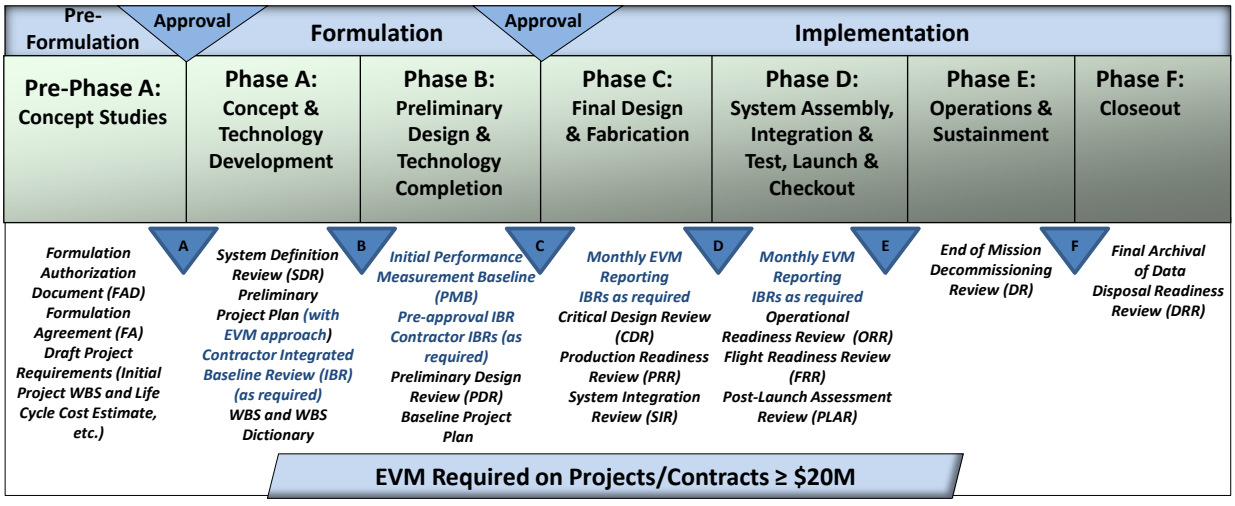


Figure 1-2 NASA Project Life Cycle Relationships and EVM Application

Projects should use the NASA EVM Systems Description, and document and coordinate with their respective Center EVMFP project-specific tailoring when developing their EVM Implementation Plans. Each project flows down EVMS requirements to its applicable suppliers (intra-agency organizations and contractors). See Appendix B and Appendix C of this handbook for the EVMS scope, solicitation and contract clauses.

The project's preliminary Performance Measurement Baseline (PMB) is established in Phase B in preparation for Key Decision Point (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. Within 180 calendar days after KDP C, the project customer (e.g., Program Manager) may conduct an IBR to gain a deeper understanding of the cost, schedule, technical risks of the final PMB implementation and management processes. See section 4.4 of this handbook for more information.

EVM is required on all acquisitions for development designated as major in accordance with OMB Circular A-11 and the Capital Programming Guide, and for development or production projects/contracts and subcontracts, including those for flight and ground systems, and institutional requirements (facility, information technology, investment, etc.) valued at or greater than $20 million regardless of the system acquisition phase. The primary considerations for EVM applicability is the nature of the work and associated risks, and the value of the effort.

In the EVM context, there are two basic classifications of the nature of work—discrete and level of effort (LOE). Discrete work is related to the completion of specific end products or services and can be directly planned, scheduled, and measured. LOE is effort of a general or supportive nature that does not produce definite end products. The application of EVM on projects and/or contracts that are exclusively LOE in nature may be impractical and inefficient and therefore is discouraged. Additionally, EVM is not required or recommended for firm fixed price contracts. For these contracts, the Project Manager should implement an alternative method of management control to provide advanced warning of potential performance problems. See section 3 for recommended approaches.

The NASA EVM requirements to include reporting are summarized for easy reference at Appendix A of this handbook.

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. 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 Systems Description for more detailed instruction.
- Ensure that EVM requirements are included in each Request for Proposal (RFP) or Announcement of Opportunity and the responses are evaluated for compliance with these requirements. The response should include documentation that adequately defines the offeror's process for satisfying the EVM requirements.
- Coordinate with and obtain concurrence from the respective Center EVM Focal Point (EVMFP) throughout the RFP development and proposal evaluation process.
- Coordinate with and obtain concurrence from the respective Center EVMFP 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 made tools such as wInsight™ available for use in conducting EVM data analysis and reporting. See the NASA EVM website for instructions on how to request access to such tools along with support in setting up your project or contract.
- If applicable, submit a waiver request for the project and/or contract's EVM requirements and include justification and rationale for the request. The waiver should be submitted to the NASA OCE 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.
- 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.

2.3 EVM Focal Point

In addition to the NASA EVMFP within the OCE, each Mission Directorate and center, including the Jet Propulsion Laboratory (JPL), should designate a representative as its EVMFP. A list of NASA EVMFPs can be found on the NASA EVM website (http://evm.nasa.gov/council.html). The responsibilities of an EVMFP should include but not be limited to the following functions:

- Serve as a representative on the Agency EVM Working Group (EVMWG).
- Serve as the Mission Directorate and center EVM consultant and advisor to programs and projects in the implementation, application, and use of EVM.
- Serve as the Mission Directorate and center EVM representative in developing Agency EVM policies, requirements, and guidance.
- Serve as the Mission Directorate and center EVM consultant in developing Mission Directorate and center 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 J for additional instructions).
- Assist the Contracting Officer 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 reviews, surveillance, and IBRs.
- Prepare and submit EVM metric reports regarding EVM implementation and compliance to the OCE 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 CPRs to sponsoring organizations and senior management.

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 J for additional instructions).
- Assist the Project Manager and the Contracting Officer, 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 validation reviews and surveillance, as required.
- Facilitate the EVMS implementation, training, and tools; maintain the project budget logs; provide control account documentation to P-CAMs; prepare the Project CPR.
- 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. 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.
- Change control boards to ensure that changes are incorporated into the PMB and EACs in a timely manner.

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 Systems Description and the NASA 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.

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 EVMFP 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. *Keep in mind that EVM application to contracts is based on the value, contract type and nature of the work - not on the program/project phase.*

3.2 Activities before Contract Award

The Project Manager initiates contact with the Center EVMFP to define EVM requirements early in the planning and development of the Request for Proposal (RFP). By applying in-depth knowledge of the project and the proposed contract, the Project Manager and EVMFP 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 on the NASA EVM website, is a tool that the project team can use to ensure the EVM requirements are properly applied.

The EVMFP 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 EVMFP 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 NASA Far Supplement (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 ANSI/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 contractors 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 specified in Table A-1 (Appendix A, NASA EVM Requirements Summary). Contract reporting requirements are defined in specific DRDs included in the solicitation and contract. The standard CPR and the Reporting for Contracts with no EVM Requirement Guide are provided in Appendix D and Appendix E respectively. The EVMFP will work with the Project Manager or the Contracting Officer to ensure the DRDs are

included and tailored as necessitated by the complexity of the contract and project management reporting requirements. Suggested tailoring instructions are included as notations to each sample DRD.

The CPR is the primary report the government uses for obtaining earned value data. The CPR requirement should be added as a DRD for all contracts that have an EVM requirement. In accordance with the NFS1834.2, the appropriate solicitation provisions and contract clauses are to be used to implement EVM and CPR reporting on these contracts.

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

- Format 1 provides EVM data by WBS element
- Format 2 provides EVM data by functional or organizational element (Organization Breakdown Structure [OBS])
- Format 3 provides the time-phased PMB changes
- Format 4 provides staffing of human resources requirements
- Format 5 is the Explanations and Problem Analysis Report

The contract CPR DRD provides guidance for the preparation and submission of the CPR, required formats, variance analysis thresholds, reporting frequency, reporting levels, distribution, and specific project instructions if required. The Data Item Description, DI-MGMT-81466A, "Contract Performance Report," is a useful guide for the development and tailoring of the DRD for the CPR. All five CPR formats are required for qualifying contracts $50 million or greater. CPR formats 1, 3, and 5 are required, as a minimum, for contracts less than $50 million but greater than $20 million. The DI-MGMT-81466A and CPR Formats (1-5) can be found on the NASA EVM website, http://evm.nasa.gov/reports.html.

3.2.4 Create a Work Breakdown Structure

The project Work Breakdown Structure (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, http://evm.nasa.gov/handbooks.html.

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, http://evm.nasa.gov/handbooks.html. 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. A sample DRD for scheduling is included in the NASA Schedule Management Handbook, which 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 or a performance work statement. The statement of work 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 (http://evm.nasa.gov/handbooks.html) 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 statement of work 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 EVMFP 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 ANSI/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 EVMFP to identify appropriate EVM analytical methodologies and tools for project use. NASA provides wInsight™ 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 (http://evm.nasa.gov/handbooks.html).

3.3.2 Conduct EVMS Validation

Development or production contracts of $50 million or greater require a validated EVMS by the government. NASA has a Memorandum of Understanding (MOU) with DCMA that delegates responsibility for validation and surveillance of contractor EVMSs to the DCMA (NASA Form 1430A). 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 and the NDIA EVMS Acceptance Guide (http://www.ndia.org/Divisions/Divisions/Procurement/Pages/Program_Management_Systems_Committee.aspx) 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, then it is the responsibility of the NASA Project Manager, with the assistance of the EVMFP, to ensure the contractor conducts a validation review with an EVM authority appointed by the OCE to provide validation. See Appendix G of this handbook for more information.

Contracts $50 million or less but $20 million or greater 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 ANSI/EIA-748. The government (NASA Project Manager with assistance from the EVMFP) will evaluate the offeror's proposed EVM approach in the source selection evaluation process and determine/confirm compliance with the ANSI/EIA-748 guidelines and perform 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 (http://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 EVMFP, 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 (http://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 statement of work, 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 the Agency-developed STAT.

3.3.5 Implement Contractor EVMS Surveillance

EVMS surveillance is conducted by the responsible DCMA office, with the assistance of NASA project personnel as assigned by the Project Manager, in accordance with 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, part, or none of the items described in the MOU via NASA Form 1430A. A letter of delegation from the Contracting Officer 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 Contracting Officer 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 EVMFP) are available and appropriate for this purpose. See Appendix H, EVMS Surveillance Process, of this handbook for additional information.

When a delegation is issued, the EVMFP should be notified if any EVMS issues arise. The EVMFP 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 project.

3.3.6 Conduct EVM Analysis

A CPR is required when EVM is a requirement. CPR data should be reported in a timely manner per the contractual DRD. CPR 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 CPRs) to ensure that the data are complete, accurate and all data anomalies are explained in the CPR Format 5. Data errors/anomalies not explained should be documented and provided to the contractor for resolution with explanation in the next month's CPR. However, numerous/severe errors may result in the rejection of the CPR and resubmission of a corrected CPR. These types of data problems should be rare if an effective surveillance process exists. NASA has developed a data validity report that can be executed in wInsight™ to facilitate the analysis process. Access and instructions are located on the NEN at https://nen.nasa.gov/web/pm/evm or by contacting your Center EVMFP.

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. 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. 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 stage 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. An example of an EVM status report is shown in Appendix F of this handbook. See the NASA EVM Systems Description, for a more in-depth discussion of EVM analysis methods and techniques.

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 OCE has developed an Agency-wide EVM capability that enables NASA organizations to achieve the NASA and OMB requirements for compliance with the ANSI/EIA-748 standard. EVM is required at the project level where the project effort could be performed as a single contract, or in-house or a combination of both. Figure 4-1 provides an overview of the NASA EVMS architecture.

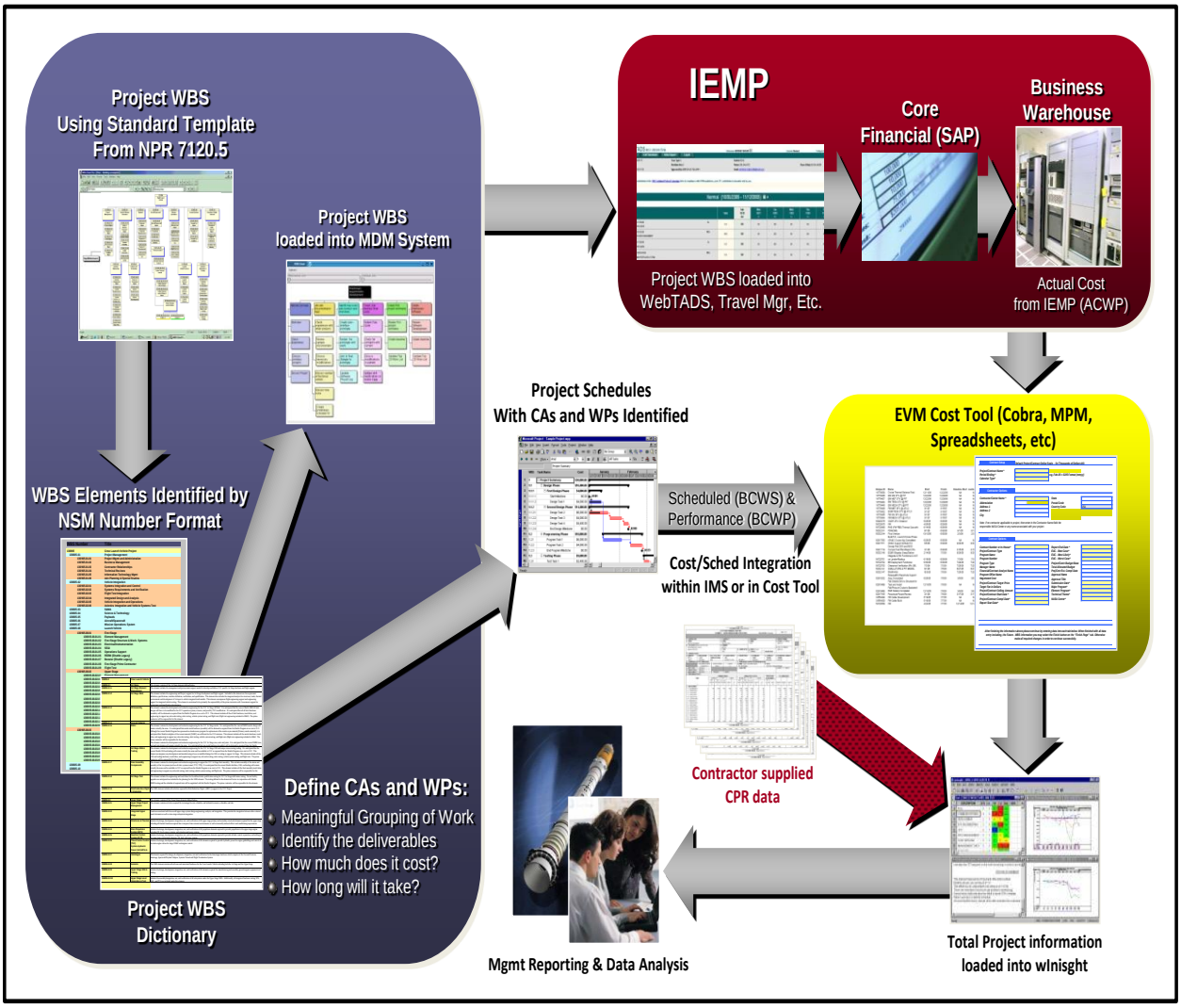


Figure 4-1. Overall EVMS Architecture for In-house Effort

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 J for additional instruction on format and content of the EVM Implementation Plan. Project Managers should engage their Center EVMFP for assistance in developing, documenting, and implementing the NASA EVM Systems 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

Figure 4-1 illustrates the main components of the EVMS and their relationships. The NASA EVM Systems Description provides more detail on each of these components.

The Project Manager develops a preliminary WBS early in the Formulation phase of the project. See Figure 1-1 for the NASA Project Life Cycle Relationships and EVM Application. It is used to assist in the preparation of the FAD and 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, 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 (http://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 accounting system, scheduling system, risk management system, and EVM engine. Disciplined configuration controls should ensure that this framework remains consistent and reconcilable in these systems. 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.

Accurate time-phasing of planned work is accomplished through an IMS. 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 (http://evm.nasa.gov/handbooks.html contains additional guidance on schedule development and maintenance.

As work is performed, actual cost for accomplishing that work, also known as actual cost of work performed (ACWP) is captured within the financial reporting system. The value of the work accomplished is the earned value of that work, also known as budgeted cost for work performed (BCWP). The budgeted cost for work scheduled (BCWS) represents the value of the time phased work as it is planned. The integrated use of these three elements (BCWS, BCWP, and ACWP) provides the data needed to analyze schedule, cost, and technical performance.

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® or MPM™, wInsight™, XML Connect). The wInsight™ is a COTS tool that is used for analyzing and reporting EVM data. The wInsight™ tool provides for analysis and reporting capabilities, including standard CPR formats 1 through 5. Additionally, wInsight™ 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 wInsight™ 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 ANSI/EIA-748. With the exception of wInsight™ Cobra® or MPM™, Project Managers are currently responsible for acquiring tools and should consult with their Center EVMFP 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, 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 Appendix E, Reporting for Contracts with no EVM Requirement for additional information). The pre- and post-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 Standing Review Board (SRB) activities for the Preliminary Design Review (PDR) to optimize data requirements/review activities and minimize disruption to the project. The process is described in the November 2012 NASA Integrated Baseline Review Process White Paper located on the NEN. The process consists of the EVM Capability Maturity Assessment conducted prior to KDP C on the preliminary PMB planning and the IBR event that is completed within 180 calendar days after KDP C. The EVM Capability Maturity Assessment is performed by the Integrated Surveillance Team (IST) appointed by the OCE (see Appendix H for more guidance).

The project customer/sponsor is responsible for conducting the project IBR. For example, the Program Manager, as the customer conducts the IBR on the project (post KDP C) and assesses the project control account planning. The Mission Director 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. The NASA IBR Handbook, located on the NASA EVM website (http://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 CPR DRD in Appendix D provides a relevant threshold example for this purpose. 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 project budget base (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 ANSI/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 supporting the NASA surveillance process, including in-house and contractor EVMS surveillance. The objectives of EVMS surveillance are to ensure continued EVMS compliance with the ANSI/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 but not overall project surveillance. For overall project surveillance, the Project Manager will support their Center EVMFP and the IST in establishing a surveillance plan that is inclusive of the in-house work. Appendix H 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 ANSI/EIA-748 a waiver request must be submitted to the OCE. To assist the OCE in making an informed decision, minimum waiver requirements have been established.

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 ANSI/EIA-748 compliant EVMS.

See Appendix I, Minimum Waiver Requirements for NASA In-House Programs and Projects, for details. Additional guidance on completing a waiver can be found in the DoD EVM Implementation Guide (https://acc.dau.mil/CommunityBrowser.aspx?id=19557) and the NDIA EVM Systems Acceptance Guide http://www.ndia.org/Divisions/Divisions/Procurement/Pages/Program_Management_Systems_Committee.aspx. In addition, the EVMFP is a source for information and can help to ensure adequate content and minimize time and effort for preparation and disposition.

OCE 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.

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 architecture that includes relevant management subsystems. Disconnects and mismatches between 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/CA/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 EVMFP when establishing planning guidelines and templates. The project manager should review this construct with the entire project team and enabling support organizations so they 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 CAs are needed for cost collection to avoid charges to an inappropriate WBS. For additional instruction and best practices, see the NASA EVM Systems Description (https://nen.nasa.gov/web/pm/evm), NASA Work Breakdown Structure Handbook (NASA/SP-2010-3404), and the NASA Schedule Management Handbook (NASA/SP-2010-3403). The handbooks can be accessed on the NASA EVM Website (http://evm.nasa.gov/).

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).

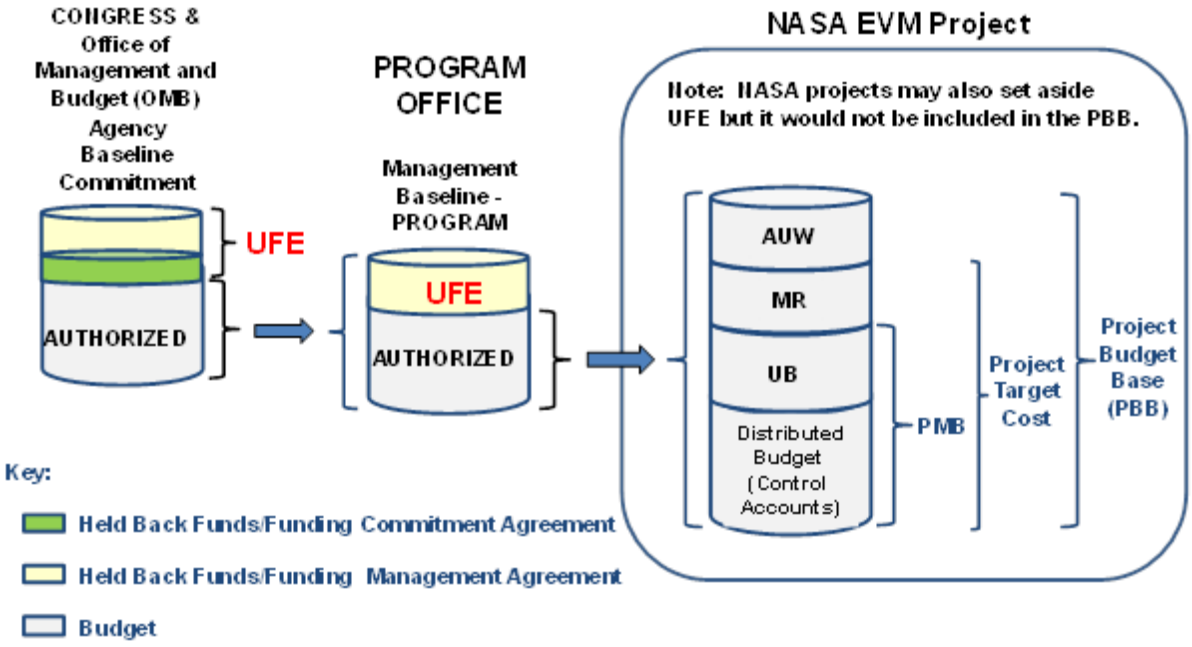


Figure 5-1 NASA Project Budget Walk Down

These budgets equate to the plan and should not be confused with project funds, 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.

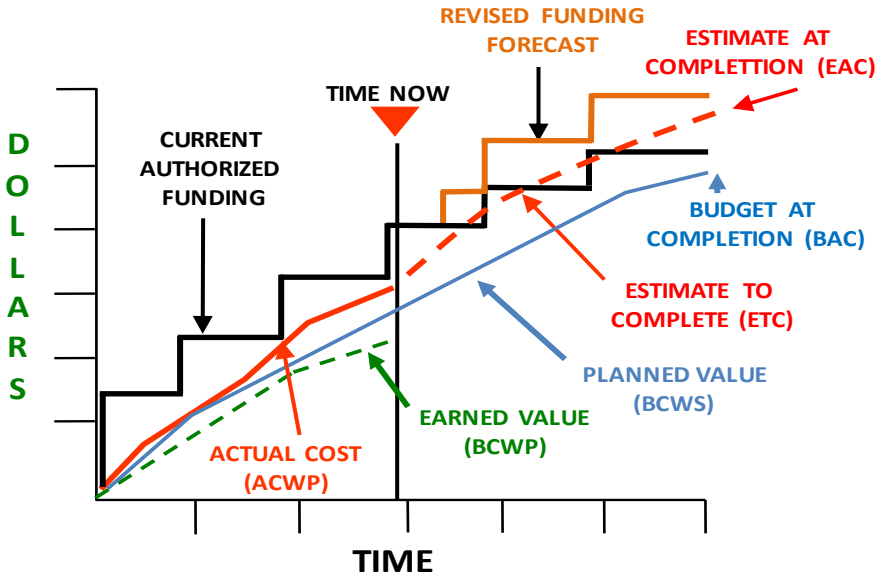


Figure 5-2 Budget versus Funds

A more detailed explanation of EAC development and reporting is provided in the NASA EVM Systems Description located at the NEN (https://nen.nasa.gov/web/pm/evm).

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. ANSI/EIA-748 provides for the establishment and use of MR to handle these known-unknowns or unknown-unknowns. 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 ANSI/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 ANSI/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 ANSI/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 ANSI/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 EVMFP 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 definization. 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 Systems 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 CPR, WBS, and the IMS 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 EVMFPs and the contracting officer, and process the waiver, if applicable, in accordance with the waiver process described in NPR 7120.5.

APPENDIX A. NASA EVM Requirements Summary

EVMS Requirements/Guidance (See Table A-1, NASA EVMS and Reporting Requirements for Projects/Contracts)

- Earned Value Management System (EVMS) in compliance with guidelines in ANSI/EIA-748 is required for development or production work for both government agreements and contracts that are equal to or greater than $20 million**.
- A formally validated and accepted EVMS is required for development and production work for government agreements and contracts equal to or greater than $50 million**.
- For NASA projects of $20 million** or greater, planning and implementation for EVM is initiated early in Formulation (Phases A and B) and applied during Implementation (Phases C and D). EVM is required during Phase E when modifications, enhancements and upgrades are made of $20 million** or greater.
- NASA projects are highly encouraged to use the NASA EVM Systems Description (located at https://nen.nasa.gov/web/pm/evm) with applicable tailoring to meet their EVMS requirements.
- EVM is discouraged for Firm-Fixed Price (FFP) contracts. The Contracting Officer (CO) will collaborate with the Project Manager to ensure the appropriate data can be obtained to fulfill project management needs and comply with NPR 7120.5.
- EVM may be imposed on government agreements/contracts less than $20 million** as a risk-based decision of the Project Manager.
- Prime contractors will flow down the same EVM requirements to applicable subcontracts.

***Project Lifecycle Cost Estimate or total estimated contract value inclusive of options*

Statement of Work

- The Statement of Work (SOW) (for contracts) or work scope (for government projects) shall not contain guidance or direction that conflicts with, removes, or adds work scope to the supplier's validated EVMS.
- Refer to Appendix B of the EVM Implementation Handbook for sample SOW language.

NASA FAR Supplement for Contracts (See NFS 1834.2)

- Insert NASA FAR Supplement NFS 1852.234-1, Notice of Earned Value management System, in contract solicitations for:
  - Development or production, including flight and ground support projects and institutional projects (facility IT, investment, etc.) with a value exceeding $20 million**
  - Acquisitions of any value designated as major by the project manager in accordance with OMB Circular A-11
- Insert NFS 1852.234-2, Earned Value Management System, in solicitations and contracts with a value equal to or exceeding $50 million** that include the provision at 1852.234-1. The clause with its Alternate I will be used when the contract value is less than $50 million**.

Data Requirements

- A product oriented Work Breakdown Structure (WBS) in accordance with NASA procedures (NPRs 7120.5, 7120.7 and 7120.8) is required for projects. Additionally, the Contractor WBS (CWBS) and CWBS Dictionary DRD will be included in all contracts requiring EVM. See the NASA WBS Handbook (NASA/SP-2010-3404), http://evm.nasa.gov/, for the CWBS DRD.
- A Contract Performance Report (CPR) and Project Integrated Master Schedule (IMS) are required monthly as a minimum whenever EVM is required.
- For *contracts*, the CPR is required within 90 days of contract award. For *projects*, formal reporting begins at Phase C (typically within 60 days of confirmation). See Appendix D of the NASA EVM Implementation Handbook (NASA/SP-2012-599), http://evm.nasa.gov/, for CPR DRD.
    - The CPR Data Requirements Description (DRD) for projects/contracts of $50 million or greater should require all five CPR formats.
    - The CPR DRD for projects/contracts less than $50 million may tailor down the DRD to accommodate project information needs.
    - The IMS DRD will be included in project agreements and contracts whenever EVM is required. See the NASA Schedule Management Handbook (NASA/SP-2010-3403), http://evm.nasa.gov/, for the IMS DRD.
- Contractor Financial Management Reports, Monthly and Quarterly, NASA forms NF533M and NF533Q respectively, are required on contracts (see NPD 9501.1I and NPR 9501.2) and, when EVMS is required, will reflect information consistent with the CPR and generated from the same management information systems.
- Cost Reporting for non-EVM contracts is required monthly from suppliers that are performing work in support of a NASA project that is using EVM. See Appendix E, NASA EVM Implementation Handbook (NASA/SP-2012-599), for sample DRDs. Examples of these contracts/agreements are steady state or level of effort and do not meet the EVM requirements or are below the threshold for applying EVM.

Integrated Baseline Reviews (IBRs)

- IBRs are required whenever EVM is required.
- For *contracts*, NASA Project Managers will conduct IBRs within 180 calendar days after contract award (if a pre-award IBR has not been conducted), or exercise of significant options, or within 60 calendar days after incorporation of major modifications.
- For NASA *projects*, NASA Program Managers should conduct IBRs within 180 calendar days after KDP C, after major modifications and exercise of significant options. Note: The project IBR process begins prior to KDP C with the pre-approval IBR 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.
- IBR teams should include schedule and EVM subject matter experts. See the NASA IBR Handbook (NASA/SP-2010-3406), http://evm.nasa.gov/, for additional information.

Additional Information

- NASA EVM websites: Public - http://evm.nasa.gov/; Internal - https://nen.nasa.gov/web/pm/evm
- NASA Integrated Baseline Review Process White Paper, Rev 7, 30 Nov 12, located on the NEN
- NPR 7120.5, NASA Space Flight and Project Management Requirements; NPR.7120.7, NASA Information Technology and Institutional Infrastructure Program and Project Management Requirements, NPR 7120.8, NASA Research and Technology Program and Project Management Requirements. http://nodis3.gsfc.nasa.gov/lib_docs.cfm?range=7
- EVM Community of Practice: https://acc.dau.mil/evm
- NDIA Program Management Systems Committee: http://www.ndia.org/Divisions/Divisions/Procurement/Pages/Program_Management_Systems_Committee.aspx

Table A-1 NASA EVMS and Reporting Requirements for Projects/Contracts

Requirement	Project Lifecycle/ Contract Total Estimated Value		
	$50 million and greater	**$20 million but less than $50 million**	**<$20 million**
ANSI/EIA-748	Compliance with guidelines; Validation Required*	Compliance with guidelines*; Validation *not* required	Not required (optional at discretion of Project Manager)
NASA EVMS Solicitation and Contract Clause	Required: NFS 1852.234-1 & NFS 1852.234-2	Required: NFS 1852.234-1 & NFS 1852.234-2 with Alternate I	Required if Project Manager elects to require EVM, NFS 1852.234-1 & 1852.234-2 with Alt 1
CPR DRD	Required (all 5 CPR formats)	Required (CPR Formats 1,3 & 5 as minimum)	Required if Project Manager elects to require EVM
IMS DRD	Required	Required	Required if Project Manager elects to require EVM
WBS DRD	Required	Required	Required
Project Cost Report DRD (Non-EVM)**	Required if EVM and CPR not required	Required if EVM and CPR not required	Required if EVM and CPR not required
IBR	Required whenever EVM is required.		
Supplier Flow Down	Same as for Project/prime contractor; the prime contractor must apply EVMS and appropriate reporting requirements to subcontractors		

Notes:

EVM is applied on development or production contracts and subcontracts, including flight and ground support projects and institutional projects (facility IT, investment, etc.) and major acquisitions as designated by the Project Manager (see NPR 7120.5, 7120.7, 7120.8 and NFS 1834.2).

**NASA projects are highly encouraged to use the NASA EVM Systems Description (located at https://nen.nasa.gov/web/pm/evm) with applicable tailoring to meet the EVMS requirements.*

The application of EVM is discouraged on Firm Fixed Price contracts, programs/projects/contracts < 12 months in duration (inclusive of options), non-developmental engineering support services, steady state operations, basic and applied research, and routine services such as janitorial or grounds maintenance services.

Integrated Baseline Reviews (IBRs): For contracts, project managers will conduct IBRs within 180 calendar days after contract award (if a pre-award IBR has not been conducted), or exercise of significant options, or within 60 calendar days after incorporation of major modifications. For NASA projects, program managers should conduct IBRs within 180 calendar days after KDP C, after major modifications and exercise of significant options. The IBR process begins prior to KDP C with the pre-approval IBR 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 Appendix E, Reporting For Contracts with No Earned Value Management (EVM) Requirements of the NASA EVM Implementation Handbook*.

Legend:
ANSI/EIA-748 – American National Standards Institute/Electronic Industries Alliance Standard 748, Earned Value Management System
CPR – Contract Performance Report
DRD – Data Requirements Description
IBR – Integrated Baseline Review
IMS – Integrated Master Schedule
NFS – NASA Federal Acquisition Regulation Supplement
WBS – Work Breakdown Structure

APPENDIX B. SAMPLE SCOPE PARAGRAPHS

The following are recommended statement of work 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 CPR)

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 IMS)

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. NFS EVMS SOLICITATION AND CONTRACT CLAUSES

(Note: Check the NASA FAR Supplement (NFS) for latest version prior to use.)

1852.234-1 Notice of Earned Value Management System.

As prescribed in 1834.203-70(a), insert the following provision:

NOTICE OF EARNED VALUE MANAGEMENT SYSTEM

(NOVEMBER 2006)

(a) The offeror shall provide documentation that its proposed Earned Value Management System (EVMS) complies with the EVMS guidelines in the American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA)-748 Standard, Earned Value Management Systems.

(b) If the offeror proposes to use a system that currently does not meet the requirements of paragraph (a) of this provision, the offeror shall submit its comprehensive plan for compliance with the EVMS guidelines to the Government for approval.

(1) The plan shall—

(i) Describe the EVMS the offeror intends to use in performance of the contract:

(ii) Distinguish between the offeror's existing management system and modifications proposed to meet the EVMS guidelines in ANSI/EIA-748;

(iii) Describe the management system and its application in terms of the EVMS guidelines;

(iv) Describe the proposed procedure for application of the EVMS requirements to subcontractors;

(v) Describe how the offeror will ensure EVMS compliance for each subcontractor subject to the flow-down requirement in paragraph (c) whose EVMS has not been recognized by the Cognizant Federal Agency as compliant according to paragraph (a);

(vi) Provide documentation describing the process and results, including Government participation, of any third-party or self-evaluation of the system's compliance with the EVMS guidelines; and

(vii) If the value of the offeror's proposal, including options, is $50 million or more, provide a schedule of events leading up to formal validation and Government acceptance of the Contractor's EVMS. This schedule should include progress assistance visits, the first visit occurring no later than 30 days after contract award, and a compliance review as soon as practicable. The Department of Defense Earned Value Management Implementation Guide (https://acc.dau.mil/CommunityBrowser.aspx?id=19557) outlines the requirements for conducting a progress assistance visit and validation compliance review.

(2) The offeror shall provide information and assistance as required by the Contracting Officer to support review of the plan.

(3) The Government will review the offeror's EVMS implementation plan prior to contract award.

(c) The offeror shall identify in its offer the major subcontractors, or major subcontracted effort if major subcontractors have not been selected, planned for application of the EVMS requirement. Prior to contract award, the offeror and NASA shall agree on the subcontractors, or subcontracted effort, subject to the EVMS requirement.

(d) The offeror shall incorporate its compliance evaluation factors for subcontractors into the plan required by paragraph (b) of this provision.

(End of provision)

1852.234-2 Earned Value Management System.

As prescribed in 1834.203-70(b) insert the following clause:

EARNED VALUE MANAGEMENT SYSTEM

(NOVEMBER 2006)

(a) In the performance of this contract, the Contractor shall use--

(1) An Earned Value Management System (EVMS) that has been determined by the Cognizant Federal Agency to be compliant with the EVMS guidelines specified in the American National Standards Institute (ANSI)/Electronic Industries Alliance (EIA) – 748 Standard, Industry Guidelines for Earned Value Management Systems (current version at the time of award) to manage this contract; and

(2) Earned Value Management procedures that provide for generation of timely, accurate, reliable, and traceable information for the Contract Performance Report (CPR) required by the contract.

(b) If, at the time of award, the Contractor's EVMS has not been determined by the Cognizant Federal Agency to be compliant with the EVMS guidelines, or the Contractor does not have an existing cost/schedule control system that is compliant with the guidelines in the ANSI/EIA-748 Standard (current version at the time of award), the Contractor shall apply the system to the contract and shall take timely action to implement its plan to obtain compliance/validation. The Contractor shall follow and implement the approved compliance/validation plan in a timely fashion. The Government will conduct a Compliance Review to assess the contactor's compliance with its plan, and if the Contractor does not follow the approved implementation schedule or correct all resulting system deficiencies identified as a result of the compliance review within a reasonable time, the Contracting Officer may take remedial action, that may include, but is not limited to, a reduction in fee.

(c) The Government will conduct Integrated Baseline Reviews (IBRs). Such reviews shall be scheduled and conducted as early as practicable, and if a pre-award IBR has not been conducted, a post-award IBR should be conducted within 180 calendar days after contract

award, or the exercise of significant contract options, or within 60 calendar days after distribution of a supplemental agreement that implements a significant funding realignment or effects a significant change in contractual requirements (e.g., incorporation of major modifications). The objective of IBRs is for the Government and the Contractor to jointly assess the Contractor's baseline to be used for performance measurement to ensure complete coverage of the statement of work, logical scheduling of the work activities, adequate resourcing, and identification of inherent risks.

(d) Unless a waiver is granted by the Cognizant Federal Agency, Contractor proposed EVMS changes require approval of the Cognizant Federal Agency prior to implementation. The Cognizant Federal Agency shall advise the Contractor of the acceptability of such changes within 30 calendar days after receipt of the notice of proposed changes from the Contractor. If the advance approval requirements are waived by the Cognizant Federal Agency, the Contractor shall disclose EVMS changes to the Cognizant Federal Agency at least 14 calendar days prior to the effective date of implementation.

(e) The Contractor agrees to provide access to all pertinent records and data requested by the Contracting Officer or a duly authorized representative. Access is to permit Government surveillance to ensure that the Contractor's EVMS complies, and continues to comply, with the EVMS guidelines referenced in paragraph (a) of this clause, and to demonstrate—

(1) Proper implementation of the procedures generating the cost and schedule information being used to satisfy the contract data requirements;

(2) Continuing application of the accepted company procedures in satisfying the CPR required by the contract through recurring program/project and contract surveillance; and

(3) Implementation of any corrective actions identified during the surveillance process.

(f) The Contractor shall be responsible for ensuring that its subcontractors, identified below, comply with the EVMS requirements of this clause as follows:

(1) For subcontracts with an estimated dollar value of $50M or more, the following subcontractors shall comply with the requirements of this clause.

(Contracting Officer to insert names of subcontractors or subcontracted effort).

_____

_____

_____

_____

(2) For subcontracts with an estimated dollar value of less than $50M, the following subcontractors shall comply with the requirements of this clause except for the requirement in paragraph (b), if applicable, to obtain compliance/validation.

(Contracting Officer to insert names of subcontractors or subcontracted effort.)

_____

_____

_____

_____

(g) If the contractor identifies a need to deviate from the agreed baseline by working against an Over Target Baseline (OTB) or Over Target Schedule (OTS), the contractor shall submit to the Contracting Officer a request for approval to begin implementation of an OTB or OTS. This request shall include a top-level projection of cost and/or schedule growth, whether or not performance variances will be retained, and a schedule of implementation for the reprogramming adjustment. The Government will approve or deny the request within 30 calendar days after receipt of the request. Failure of the Government to respond within this 30-day period constitutes approval of the request. Approval of the deviation request does not constitute a change, or the basis for a change, to the negotiated cost or price of this contract, or the estimated cost of any undefinitized contract actions.

(End of clause)

(ALTERNATE I)

(NOVEMBER 2006)

As prescribed in 1834.203-70(b), substitute the following paragraph (b) for paragraph (b) of the basic clause:

(b) If, at the time of award, the Contractor's EVMS has not been determined by the Cognizant Federal Agency to be compliant with the EVMS guidelines, or the Contractor does not have an existing cost/schedule control system that is compliant with the guidelines in the ANSI/EIA-748 Standard (current version at the time of ward), the Contractor shall apply the system to the contract and shall take timely action to implement its plan to be compliant with the guidelines. The Government will not formally validate/accept the Contractor's EVMS with respect to this contract. The use of the Contractor's EVMS for this contract does not imply Government acceptance of the Contractor's EVMS for application to future contracts. The Government will monitor compliance through routine surveillance.

(End of Clause)

APPENDIX D. CONTRACT DATA REQUIREMENTS DESCRIPTIONS

DATA REQUIREMENTS DESCRIPTION (DRD)

1. **DPD NO.**: XXX ISSUE: Standard 2. **DRD NO.**:

3. **DATA TYPE**: 4. **DATE REVISED**:

5. **PAGE:**

6. **TITLE**: Contract Performance Report (CPR)

7. **DESCRIPTION/USE**: To provide information for: (1) integrating cost and schedule performance data with technical performance measures, (2) assessing the magnitude and impact of actual and potential problem areas causing significant cost and schedule variances, and (3) providing valid, timely project status information to higher management.

8. **OPR**: 9. **DM**:

10. **DISTRIBUTION**: Per Contracting Officer's letter.

11. **INITIAL SUBMISSION**: Within 90 days after Authority to Proceed. Format 5: Initial Contract Performance Report (CPR) shall contain rankings of cost and schedule drivers.

12. **SUBMISSION FREQUENCY**: Monthly; by the 12th working day following the close of the prior month accounting period. Updated list of the cost and schedule driver rankings in Format 5 every 180 calendar days, based on performance to date.

13. **REMARKS**:

14. **INTERRELATIONSHIP**: The Financial Management Reports shall include reconciliation between the 533M/533Q and the CPR, which shall be submitted as an attachment to the 533M/533Q reports and the CPR. The CPR reporting levels and frequency shall be in accordance with the Contract Work Breakdown Structure DRD and contract provisions.

15. **DATA PREPARATION INFORMATION**:

15.1 **SCOPE**: The CPR includes data to measure cost and schedule performance.

15.2 **APPLICABLE DOCUMENTS**:

DI-MGMT-81466A Data Item Description for Contract Performance Report (available at: NASA EVM Website, http://evm.nasa.gov/reports.html)

15.3 **CONTENTS**: The CPR shall include data pertaining to all authorized contract work, including both priced and unpriced effort that has been authorized at a not-to-exceed amount in accordance with the Contracting Officer's direction. The CPR shall separate direct and indirect costs and identify elements of cost for all direct reporting elements. The CPR shall consist of:

(a) Format 1, Work Breakdown Structure (WBS): Format 1 shall provide data to measure cost

and schedule performance by summary level WBS elements, and the hardware, software, and services NASA is buying.

(b) Format 2, Organizational Categories: Format 2 provides the same data as Format 1, sorted by the contractor organization. If the contractor is organized by product, Format 2 is optional. Organizational category reporting shall be to the first level of the program's organizational structure.

(c) Format 3, Baseline: Format 3 provides the budget baseline plan against which performance is measured. It is the baseline report used to track all changes to the Performance Measurement Baseline (PMB). Format 3 shall contain the time-phased budget for two 3-month periods (columns 10 and 11), two subsequent 12-month periods (columns 12 and 13), and the remainder of the contract for the last period (column 14).

(d) Format 4, Staffing: Format 4 shall provide manpower staffing forecasts for correlation with the budget plan and cost estimates and contain the manpower baseline which shall be updated and submitted whenever the PMB changes. Organizational category reporting shall be to the first level of the program's organizational structure. Format 4 shall contain baseline and manpower forecasts for two 3-month periods (columns 10 and 11), two subsequent 12-month periods (columns 12 and 13), and the remainder of the contract for the last period (column 14).

(e) Format 5, Explanations and Problem Analyses: Format 5 shall be a narrative report used to explain significant cost and schedule variances and other identified contract problems. Subcontractor variance analyses (determined by the prime contractor) and a discussion of the prime contractor's analysis of the subcontractor's performance shall be provided in Format 5. In the initial submission of the CPR (Format 5), the contractor shall rank, in descending order of criticality (i.e., the most critical elements will be at the top of the list and the least critical will be at the bottom), all reporting level WBS elements anticipated (as determined by the contractor project manager) to be schedule drivers, and all WBS elements (in a similar ranking) anticipated to be the cost drivers on the project. The contractor shall submit an updated list of the rankings every 180 calendar days, based on performance to date. The Government reserves the right to modify this ranking based on Government perception of criticality. If the contractor uses "critical path" scheduling techniques, identification of the critical path by WBS element shall meet the schedule drivers' requirement. Ranking of the critical path cost drivers shall also be provided. These critical elements shall reconcile to the Master Schedule submitted to the Government.

(f) Variance Analysis: The Variance Analysis shall be a narrative report addressing the following:

(1) Reporting elements that equate to 50% of the list of the schedule drivers (i.e., if 20 schedule drivers are listed, the 10 most critical schedule driver variances over $100k shall be addressed). If there are 10 or less schedule driver variances, all variances over $100k shall be addressed.

(2) Reporting elements that comprise the top 50% of the cost drivers (i.e., if 20 cost drivers are listed, the top 10 most critical cost driver variances over $100K). If there are 10 or less cost driver variances, all cost variances over $100K shall be addressed.

(3) Impact to the contract Estimate-at-Complete (EAC) for all cost and schedule driver

variances addressed.

(4) Explanation for all variances at completion over $500K.

(5) Corrective Action Plan, as applicable.

(g) Subcontractor CPRs: All subcontractor performance data will be integrated into the Prime's CPR. Additionally, the subcontractor CPRs shall be submitted as an attachment to the Prime's CPR.

15.4 **FORMAT**: CPR formats shall be completed according to the instructions outlined in DI-MGMT-81466A and the following forms: Format 1 (DD Form 2734/1); Format 2 (DD Form 2734/2); Format 3 (DD Form 2734/3); Format 4 (DD Form 2734/4); and Format 5 (DD Form 2734/5). Images of the CPR forms are located at http://evm.nasa.gov/reports.html. Contractor format shall be substituted for CPR formats whenever they contain all the required data elements at the specified reporting levels in a form suitable for NASA management use. The CPR shall be submitted electronically using the American National Standards Institute (ANSI) X12 standards (transaction sets 839) or XML using WINST.DTD format (format can be found at http://evm.nasa.gov/reports.html or the UN/EDIFACT standard (PROCST message) and followed up with a signed paper copy. Structures and Units from the EVM engine should be configured as stated below for a basic set-up.

Structures:

WBS	Work Breakdown Structure
OBS	Organization Breakdown Structure
IPT	Integrated Product Team
Units:	Dollars, Hours, EQP

APPENDIX E. REPORTING FOR CONTRACTS WITH NO EARNED VALUE MANAGEMENT (EVM) REQUIREMENTS

A Guide for Obtaining Data to Support Project-Level EVM Analysis and Reporting

1. Introduction

NASA policy requires the implementation of EVM on projects that meet established parameters and thresholds. In some cases, EVM is applicable to a project but not to a contract. Some examples of this include steady state or Level of Effort (LOE) support contracts, contracts that do not meet the established thresholds for EVM application, Firm Fixed Price (FFP) contracts, and others. This guide will discuss the different data elements required to support project-level EVM analysis and reporting and provide options for obtaining that information on non-EVM contracts.

It is important to note, that for these recommendations to work, it is necessary to plan for the implementation of EVM early in both the total project planning and the procurement process. It may be more challenging if contracts are owned by another organization, so it is critical to share this strategy with project managers and procurement organizations. Also, when developing requirements to support EVM, be sure to review the other Data Requirements Descriptions (DRDs) on the contract for commonality. It is possible that the data requested in other DRDs will provide data needed to support EVM planning and analysis as is or with minimal changes required.

2. Data Elements to Support Project-Level EVM Analysis & Reporting

EVM represents the integration of cost, schedule, and technical data to provide an assessment of project performance and health. Actual cost data, cost plans (including changes to those plans), forecasts, work status, and variance explanations are the pieces of information required to conduct EVM planning and analysis. The Work Breakdown Structure (WBS) serves as a common framework for cost, schedule, and technical planning. For this reason the WBS DRD plays a key role in the integration of cost, schedule, and technical data so all reporting instructions must ensure reporting in accordance with the WBS. For example, the WBS used in cost reporting must align with the WBS for schedule reporting.

There are several options for obtaining the data that will be based largely on factors such as the size of the contract, the type of work, and the NASA Project Manager's needs for insight. Several sample contract wording and DRDs are provided that describe the basic elements needed to support EVM planning, analysis, and reporting. The content and format can be tailored to support each project's unique needs.

3. Actual Cost Data

Monthly actual cost data by WBS are needed to support EVM planning and analysis and serve as the source for Actual Cost of Work Performed (ACWP) or Actual Cost (AC). There are various methods, both formal and informal, that can be used to obtain cost data.

If a NASA Form (NF) 533 is required on a contract, it will serve as the source for actual cost data. See NASA Procedural Requirements (NPR) 9501.1 NASA Contractor Financial

Management Reporting System for instructions on preparing an NF 533 DRD. It is important to ensure that the language in the NF 533 DRD or the Performance Work Statement (PWS) allow for flexibility in the reporting structure. Some examples include:

- "Provisions shall be made to allow costs to be collected by government provided cost allocation as well as by special projects or activities."
- "Further breakdown may be required for funding codes and customers which will be reflected in the work order report and in scheduled monthly reviews."

If an NF 533 will not be required on the contract, or cannot support detailed cost collection, other methodologies must be employed to ensure availability of monthly actual costs. One method is to use a separate DRD for contractor reporting of actual cost. This can be in any electronic format required for integration with the project management tool, but must be done on a monthly basis. A project utilizing a specific software tool to load actual cost data will want to specify a reporting format in a DRD that format will allow for automatic upload of data into the tool. A sample DRD entitled Actual Cost Data in Support of Project-Level Earned Value Management (EVM) Planning and Analysis is shown in Figure 1. Projects can use this DRD to collect data and tailor based on their specific reporting needs. For example, a column can be added to the format to require reporting of both Work Year Equivalents (WYEs) and hours.

For Firm Fixed Price Contracts that will not receive an NF 533, the best approach for obtaining actual cost data is when payments are made based on established milestones. This ensures that actual cost align with the work accomplished. If billing does not coincide with work accomplished, actual costs can be estimated based on an assessment of work accomplished through schedule status, weekly meetings, or other interactions with the contractor.

Another option for obtaining contractor cost data is to request access to the contractor's financial data. If this methodology is employed, the contract performance work statement must specify this requirement if this will be the route for obtaining actual cost information. For example, "The contractor shall provide an automated, network accessible, ad hoc query capability to permit specific Government users, as identified by the Contracting Officer, access to determine the cost, schedule, and status of work at the level of detail reported in individual work orders, specific customers, unique projects, WBS, and NASA Form (NF) 533 reports."

4. Cost Plans and Forecasts

Cost plans are needed to support the project-level Performance Measurement Baseline (PMB) and serve as the basis for Budget Cost for Work Performed (BCWP) or Earned Value (EV). Forecasts are needed to support the development of the project-level Estimate at Complete (EAC). This data can be formally requested as a monthly deliverable from the contractor or can be developed by the project manager (PM) and Project Office.

In cases where a contract is small or just providing WYEs in support of a larger NASA task, the PM may want to develop cost plans and forecasts internally, with support from the contractor. It is important that any rate updates be submitted to NASA to ensure cost plans and forecasts are developed utilizing the latest information when updating the cost plan or the Estimate At Completion (EAC). Figure 2 entitled Direct and Indirect Rates DRD can be used to request rate information from a contractor. The NASA PM must specify the basis for the rate, for example hourly or annualized rates. Note that rate information DRD is not necessary if the contractor is

providing the cost plan as a deliverable or if the contract or the contracting officer can provide the rate information.

In cases where the contracts are larger, or perhaps when the contractor generates this data internally, the NASA PM may want to formally request the data from the contractor in a DRD. Two similar DRDs have been developed, one for capturing cost plan data and the other for capturing forecast data. Figure 3 entitled Time-Phased Cost Plans in Support of Project-Level Earned Value Management (EVM) Planning and Analysis provides a format that can be tailored to collect cost plans in PM specified units, e.g. WYEs, hours, and/or dollars. Note that when changes are requested, it is important that estimates be time-phased monthly by customer-specified WBS. Figure 4, entitled Time-Phased Cost Forecast in Support of Project-Level Earned Value Management (EVM) Planning and Analysis can be tailored to a project's needs for forecasting. It is standard that comprehensive forecasts be conducted on an annual basis, and this format can be used to support that process.

5. Status of Work Accomplished

Several methods can be employed to status work accomplished that serves as the basis for the Budgeted Cost for Work Performed (BCWP) or Earned Value (EV). The most preferred way to obtain status of work accomplished is from an Integrated Master Schedule (IMS) that is current and delivered on a monthly basis. See NASA's Schedule Management Handbook for a sample IMS DRD. It is important that the WBS used for the IMS is the same that is used for cost actual, plan, forecast, and variance explanation reporting.

If the contract will not include a requirement for an IMS deliverable, other options can be employed to obtain status. First, the status can be obtained through regularly scheduled meetings with the contractor. If this route is selected, be sure to include language in the contract's performance work statement requiring the contractor to provide a status of work accomplished for each WBS specified for reporting. These status reviews must occur at least monthly and provide an assessment of work accomplished on tasks using objective measures and exit criteria. The status will be in the form of percentage complete, and the NASA team will verify accuracy of the status and make adjustments as required.

Another option is to request from the contractor a status of work accomplished for each WBS specified for reporting. The status must be based on objective measures and exit criteria. The status takes a percent complete format that is then dollarized by multiplying that percent complete by the WBS element total budget. A sample DRD entitled Measurement of Work Accomplishment Status in Support of Project-Level Earned Value Management (EVM) Planning and Analysis is shown in Figure 5.

Another method for obtaining status is by asking the contractor to use a cost weighted milestone methodology to provide a dollarized status of the work accomplished each month. This requires that each sub-task be broken down into monthly cost weighted milestones that represent a portion of the total sub-task budget. It is important that the sum of all cost weighted milestones must equal 100% of the planned subtask budget. On a monthly basis, a report will be generated which captures the "dollarized" planned accomplishments compared to the actual accomplishments. Ideally, these milestones will align with those established for payment, such that actuals will align with work achievement. If not, actual cost will have to be estimated. A sample DRD entitled Cost Weighted Milestone Methodology in Support of Project-Level Earned Value Management (EVM) Planning and Analysis is included for reference in Figure 6. Note

that using this DRD also provides the Budgeted Cost for Work Scheduled (BCWS) or Planned Value (PV); therefore a separate Cost Plan DRD is not required in this case.

6. Variance Explanations

Explanations of cost, schedule, and at complete variances are also required for EVM planning and analysis. This data can be formally requested from the contractor on a monthly basis, or it may be discussed at Monthly Status Reviews.

If the contract will not require formal submittal of variance explanations, the contractor can present variance data at the Monthly Status Review (MSR). A sample DRD entitled Monthly Status Reviews (MSRs) in Support of Project-Level Earned Value Management (EVM) Planning and Analysis is attached in Figure 7. This DRD can stand alone or be combined with a DRD for Monthly Status Reviews where other information is required to be presented by the contractor. In most cases, contracts will require a monthly status review and a separate DRD will not be required.

The variance explanation data can be a formal report prepared and submitted by the contractor on a monthly basis. If this is the requirement, a DRD will need to be inserted into the contract. A sample DRD entitled Variance Explanations in Support of Project-Level Earned Value Management (EVM) Planning and Analysis is attached for review in Figure 8. The project must specify a variance threshold for reporting of variances, noting that these thresholds can differ by reportable WBS. The project must also determine whether monthly and cumulative explanations will be required. Note that different thresholds can be used for the types of variance (cost/schedule/at complete), current versus cumulative, and even by WBS element. Note that formal variance analysis reporting may be too time-consuming and expensive for smaller contracts.

7. Summary

The table below summarizes some of the options for obtaining the information needed to support earned value planning and analysis.

Element:	Actual Cost	Cost Plans	Forecast	Work Status	Variance Explanation
Source For:	ACWP (AC)	BCWS (PV) BAC	EAC ETC	BCWP (EV)	Analysis
Options:	NF 533 DRD (Figure 1) Contractor System Access Estimates	Developed by NASA PM DRD (Figure 3)	Developed by NASA PM DRD (Figure 4)	IMS Status Meetings DRD (Figures 5 & 6)	Status Meetings DRD (Figure 7) Formal Reporting DRD (Figure 8)

The options selected for obtaining the necessary data elements will depend on several factors including contract type, value, and the NASA PM's needs. For example, firm fixed price contracts usually provide a payment plan that can be used for planning, actual and earned data. The COTR or contracting officer should be able to provide variance data on these contracts. Small cost plus contracts are a little more complicated and require additional DRD data from the contractor. A cost plan, an IMS, 533 actual cost reporting and monthly status meetings for the

variance data may be required. Support contracts are usually managed by a Project Control Account Manager (P-CAM), so the planning and status is often maintained in the project IMS.

Figure 1. Sample Data Requirements Description (DRD)

TITLE: Actual Cost Data in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) collecting and assessing actual costs , (2) supporting project analysis, (3) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 30 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The actual cost received in this format must reconcile with the NASA Form 533 and come from the contractor's internal accounting system. The reporting structure for the actual costs aligns with the Work Breakdown Structure (WBS) elements specified for reporting.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: NASA Form 533 M and Q, Work Breakdown Structure (WBS)

CONTENTS: Include the beginning and end dates of the accounting month for which the actual costs and hours were consumed. Include the name of the contract and the associated work order, task order, job order, or other unique project identifier. Provide cost information, hours and or WYEs consumed by the specified WBS.

Beginning of Period:

End of Period:

Contract Name:

Work/Task/Job Order #:

WBS #	WBS Description	Hours/WYEs	Actual Cost
123456.01	Project Management		
123456.02	Systems Engineering		
123456.03	Safety & Mission Assurance		
123456.04	Science/Technology		
123456.05	Payloads		
123456.06	Spacecraft		
123456.07	Mission Operations		
123456.08	Launch Vehicle/Services		
123456.09	Ground Systems		
123456.10	Systems Integration & Testing		
123456.11	Education & Public Outreach		
TOTAL			

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify the units needed, such as hours, WYEs, dollars, etc.]

MAINTENANCE: None required

Figure 2. Sample Data Requirements Description (DRD)

TITLE: Direct and Indirect Rates

DESCRIPTION/USE: To provide information for: (1) developing and maintaining a project Performance Measurement Baseline (PMB) and Estimate At Complete (EAC) forecast, (2) supporting project analysis, (3) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 30 days after Authorization to Proceed

SUBMISSION FREQUENCY: Quarterly

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The rates must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process and other DRDs in support of project-level EVM planning and analysis.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD), NASA Form 533M and Q, Other Budget and Operating Plan DRDs

CONTENTS: For each of the elements below, provide the rates escalated by year for the life of the contract:

Direct Rates (prime and subcontractors):

Indirect Rates:

Fringes - all pools:

G&A Rate:

Overhead Rate:

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify the basis for the rate, for example hourly or annualized rates.]

MAINTENANCE: None required

Figure 3. Sample Data Requirements Description (DRD)

TITLE: Time-Phased Cost Plans in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) developing and maintaining a project Performance Measurement Baseline (PMB), (2) supporting project analysis, (3) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure for the cost plans align with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD), NASA Form (NF) 533 M and Q, Other Budget and Operating Plan DRDs

CONTENTS: Define the beginning and end dates of the period for the current month. Include the name of the contract and the associated work order, task order, job order, or other unique project identifier. Plans must be time-phased by month and by customer-specified Work Breakdown Structure (WBS) and include all authorized work scope. Specify the month and year in each column. Provide a description of any authorized changes to the cost plans from the previous month that exceed +/- [NASA Project Manager specified threshold(s)] of the total cost plan for each WBS element specified for reporting. Authorized changes include allocation of management reserve, changes to time-phasing due to internal replanning or formal reprogramming, contract changes, rephasing of budgets, etc. Note that pure cost growth for in-scope work is reflected as a change to the forecast, not as a cost plan change. Include the reason for the change, impacts to current activities, impacts to overall cost and schedule, and any corrective actions required.

Beginning of Period:

End of Period:

Contract Name:

Work/Task/Job Order #:

WBS #	WBS Description	Current Month	Current Month + 1	Current Month + 2	Current Month + 3	Current Month + 4	Current Month + n	Total
123456.01	Project Management							
123456.02	Systems Engineering							
123456.03	Safety & Mission Assurance							
123456.04	Science/Technology							
123456.05	Payloads							
123456.06	Spacecraft							
123456.07	Mission Operations							
123456.08	Launch Vehicle/Services							
123456.09	Ground Systems							
123456.10	Systems Integration & Testing							
123456.11	Education & Public Outreach							
TOTAL								

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify units, e.g. hours, WYEs, or dollars]

MAINTENANCE: None required

Figure 4. Sample Data Requirements Description (DRD)

TITLE: Time-Phased Cost Forecast in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) developing and maintaining a project Performance Measurement Baseline (PMB), (2) supporting project analysis, (3) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month. Comprehensive forecast annually to coincide with NASA's Program, Planning, Budget, and Execution (PPBE) process.

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure for the cost plans align with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's PPBE process.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD), NASA Form 533M and Q, Other Budget and Operating Plan DRDs

CONTENTS: Define the beginning and end dates of the period for the current month. Include the name of the contract and the associated work order, task order, job order, or other unique project identifier. Forecasts must be time-phased by month and by customer-specified Work Breakdown Structure (WBS) and include all authorized work scope. Specify the month in each column and expand the format as necessary to capture all authorized work scope. Provide a description of any changes to the estimate from the previous month that exceed +/- [NASA Project Manager specified threshold(s)] of the total cost forecast for each WBS element specified for reporting. Include the reason for the change, impacts to current activities, and impacts to overall cost and schedule.

Beginning of Period:

End of Period:

Contract Name:

Work/Task/Job Order #:

WBS #	WBS Description	Current Month	Current Month + 1	Current Month + 2	Current Month + 3	Current Month + 4	Current Month + n	Total
123456.01	Project Management							
123456.02	Systems Engineering							
123456.03	Safety & Mission Assurance							
123456.04	Science/Technology							
123456.05	Payloads							
123456.06	Spacecraft							
123456.07	Mission Operations							
123456.08	Launch Vehicle/Services							
123456.09	Ground Systems							
123456.10	Systems Integration & Testing							
123456.11	Education & Public Outreach							
TOTAL								

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify units, e.g. hours, WYEs, or dollars]

MAINTENANCE: None required

Figure 5. Sample Data Requirements Description (DRD)

TITLE: Measurement of Work Accomplishment Status in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) supporting project analysis and (2) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure for the cost plans align with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process. The

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD) and Monthly Status Review DRDs

CONTENTS: Include the contract name and work/task/job order number (or other unique project identifier) associated with the report. The contractor will provide a current month and cumulative since inception dollarized status of work accomplished by each WBS item specified for reporting. Cumulative status of tasks is represented by a percent complete assessment based on objective measures and exit criteria. The status is then dollarized by multiplying the percent complete status by the total budget for each WBS specified for reporting in the WBS DRD. To calculate a dollarized current month status, subtract last month's cumulative by this month's.

Beginning of Period:

End of Period:

Contract Name:

Work/Task/Job Order #:

WBS #	WBS Description	Total Budget ($K)	Current Month		Cumulative Since Inception	
			% Complete	Dollarized Status ($K)	% Complete	Dollarized Status ($K)
123456.01	Project Management	200	20	40	50	100
123456.02	Systems Engineering					
123456.03	Safety & Mission Assurance					
123456.04	Science/Technology					
123456.05	Payloads					
123456.06	Spacecraft					
123456.07	Mission Operations					
123456.08	Launch Vehicle/Services					
123456.09	Ground Systems					
123456.10	Systems Integration & Testing					
123456.11	Education & Public Outreach					

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify the units needed, such as hours, WYEs, dollars, etc.]

MAINTENANCE: None required.

Figure 6. Sample Data Requirements Description (DRD)

TITLE: Cost Weighted Milestone Methodology in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) supporting project analysis, (2) assessing progress and (3) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure for the cost plans align with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD)

CONTENTS: The contractor will use a cost weighted milestone methodology to provide a dollarized status of the work accomplished each month. This requires that each sub-task be broken down into monthly cost weighted milestones that represent a portion of the total sub-task budget. It is important that the sum of all cost weighted milestones must equal 100% of the planned subtask budget. On a monthly basis, a report will be generated which captures the "dollarized" planned accomplishments compared to the actual accomplishments.

On a monthly basis, determine, document and update the status of each of the scheduled milestone accomplishments for the month and make a definitive determination as to whether or not the effort is completed. Each milestone or task will use a 0/100 performance measurement methodology where performance is not earned until the milestone or task is completely finished. This will aid in achieving objectivity where progress and cost is concerned. An example of the process is outlined below.

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify units, e.g. hours, WYEs, or dollars]

MAINTENANCE: None required

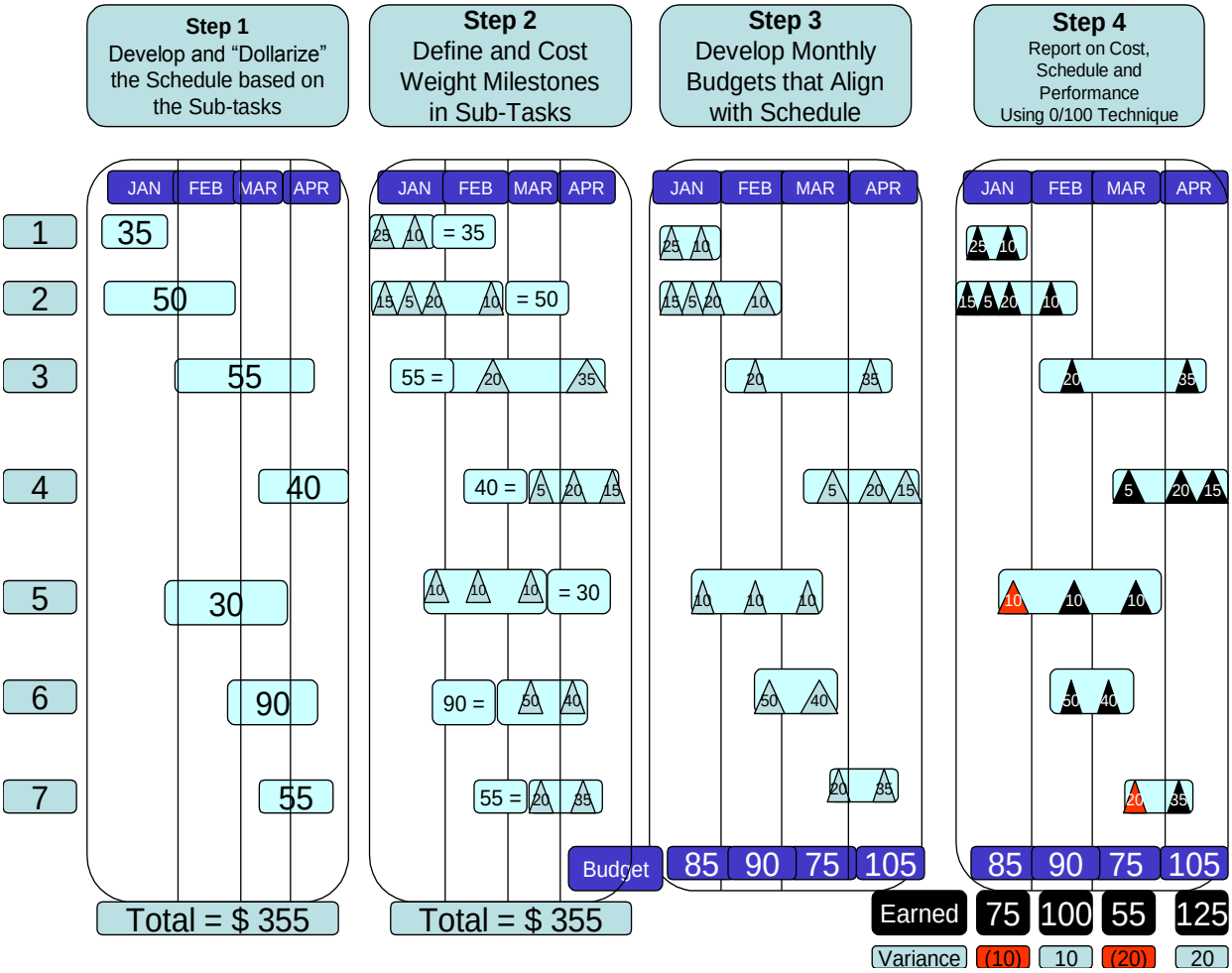

Step 1
Develop and "Dollarize" the Schedule based on the Sub-tasks
Step 2
Define and Cost Weight Milestones in Sub-Tasks
Step 3
Develop Monthly Budgets that Align with Schedule
Step 4
Report on Cost, Schedule and Performance Using 0/100 Technique
JAN
FEB
MAR
APR
1
2
3
4
5
6
7
35
50
55
40
30
90
55
= 35
= 50
55 =
40 =
= 30
90 =
55 =
Budget
85
90
75
105
Total = $ 355
Total = $ 355
Earned
75
100
55
125
Variance
(10)
10
(20)
20

Figure 7. Sample Data Requirements Description (DRD)

TITLE: Monthly Status Reviews (MSRs) in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) supporting project analysis and (2) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 15 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure aligns with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process. The

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD), NASA Form 533M and Q, Other Budget and Operating Plan DRDs, Other Monthly Status Reviews DRDs

CONTENTS: The contractor will conduct a Monthly Status Review (MSR) with NASA to include the following information:

Comparison of the dollarized work accomplished to the cost plan for each WBS specified for reporting in the WBS DRD (both cumulatively since inception and current month). This represents the schedule variance.

Comparison of the dollarized work accomplished to the actual cost incurred to accomplish that work (both cumulatively since inception and current month). This represents the cost variance.

Comparison of the Budget At Complete (BAC) to the latest forecasted Estimate At Complete (EAC). This represents the Variance At Complete (VAC).

Explanation of variances that exceed +/- [NASA Project Manager specified threshold(s)] must be explained and include the reason for the variance, the impact to the immediate task and overall cost and schedule at completion (if none, explain why), and any corrective actions that will be undertaken to recover.

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify units, e.g. hours, WYEs, or dollars]

MAINTENANCE: None required

Figure 8. Sample Data Requirements Description (DRD)

TITLE: Variance Explanations in Support of Project-Level Earned Value Management (EVM) Planning and Analysis

DESCRIPTION/USE: To provide information for: (1) supporting project analysis and (2) and providing valid, timely project status information to higher management.

PRIMARY RESPONSIBILITY: Center EVM Focal Point

DISTRIBUTION: Per Contracting Officer's letter

INITIAL SUBMISSION: 90 days after Authorization to Proceed

SUBMISSION FREQUENCY: Monthly; 12 working days after close of accounting month

REMARKS: This DRD will be used when the contractor is performing work in support of a NASA project that is using Earned Value Management.

INTERRELATIONSHIP: The reporting structure aligns with the Work Breakdown Structure. The cost plans must reconcile back to other deliverables supporting NASA's Program, Planning, Budget, and Execution (PPBE) process.

DATA PREPARATION INFORMATION:

SCOPE: This report will be used as the basis for integration of project cost, schedule, and technical data to support project-level EVM planning and analysis.

APPLICABLE DOCUMENTS: Work Breakdown Structure (WBS) Data Requirements Description (DRD), NASA Form 533M and Q, Other Budget and Operating Plan DRDs, Monthly Status Reviews DRDs

CONTENTS: The contractor will provide variance explanations on a monthly basis for all variances that exceed +/- [NASA Project Manager specified threshold(s)] on a [NASA Project Manager specified current and/or cumulative basis]. For each WBS specified for reporting, provide the following information:

WBS number and Description:

Type and Magnitude of Variance. For type, select from the following:

Schedule Variance: Comparison of the dollarized work accomplished to the cost plan for each WBS specified for reporting in the WBS DRD (both cumulatively since inception and current month).

Cost Variance: Comparison of the dollarized work accomplished to the actual cost incurred to accomplish that work (both cumulatively since inception and current month).

Variance At Complete (VAC): Comparison of the Budget At Complete (BAC) to the latest forecasted Estimate At Complete (EAC).

Effect on the immediate task

Effect on the overall contract

Corrective actions taken or planned

FORMAT: Electronic versions shall be compatible with Microsoft Excel. Contractor formats that provide all required data are acceptable.

UNITS: [NASA Project Manager must specify units, e.g. hours, WYEs, or dollars]

MAINTENANCE: None required

APPENDIX F. SAMPLE EVM STATUS REPORT

January 2008

SCHEDULE PERFORMANCE — Y ↓

COST PERFORMANCE — Y ↓

TO MEET BUDGET AT COMPLETION (BAC) — R ↓

TO MEET CONTRACTOR'S LATEST REVISED ESTIMATE (LRE) — R ↑

Performance Indicator Key		At Completion Indicator Key
Worse than -10%	R	TCPI > CPI by more than 5%
Between -10% and -5%	Y	TCPI > CPI by less than 5%
Better than -5%	G	TCPI < CPI
Change Threshold = 5%		

January 2008

EVM Quick-Look Report

Dollars in Thousands

$$ in Thousands	BCWS	BCWP	ACWP	Schedule Variance			Cost Variance		
Current Pd.	1,645	1,509	1,707	-136.2	-8.3%	Y ↓	-197.8	-13.1%	R ↓
Cumulative	7,279	6,851	7,350	-427.8	-5.9%	Y ↓	-499.0	-7.3%	Y ↓

	NASA	Ktr.	
BAC		20,796	↑
EAC	22,480	20,761	↓
VAC		35	↓

Variance Status Indicator Key	
R Worse than -10%	G Better than -5%
Y Between -10% and -5%	Change Threshold = 5%

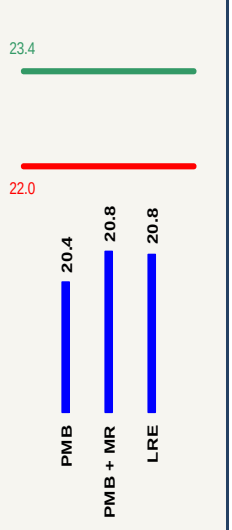
EAC Forecast	Min.	Max
	22,022	23,385

SPI	Current	0.92	↓
	Cumulative	0.94	↓
CPI	Current	0.88	↓
	Cumulative	0.93	↓

Percent Scheduled	35.0 %	
Percent Complete	32.9 %	
Percent Spent	35.3 %	
3 Mo. Avg Spend Rate	1,441	(7%)
6 Mo. Avg Spend Rate	1,067	(5%)

3 Mo. Avg CPI	0.95	
6 Mo. Avg CPI	0.92	
To Compl Perf Index (TCPI) BAC	1.04	↑
To Compl Perf Index (TCPI) LRE	1.04	↓

Funding Status



Top Issues Summary

Top Schedule Variances

	WBS	Description	SV	CV	VAC	SPI	SV	CV
1	3200	COMMUNICATIONS	R ↑	R ↓	G ↔	0.78	(203)	(131)
2	3700	DATA DISPLAY	R ↑	G ↔	G ↔	0.59	(113)	0
3	3300	AUX EQUIP	R ↓	G ↓	G ↓	0.88	(93)	78
4	3100	SENSORS	Y ↑	G ↓	G ↔	0.91	(37)	(11)
5	2100	PROJ MANAGEMENT	G ↑	Y ↔	G ↔	0.96	(12)	(17)

Top Cost Variances

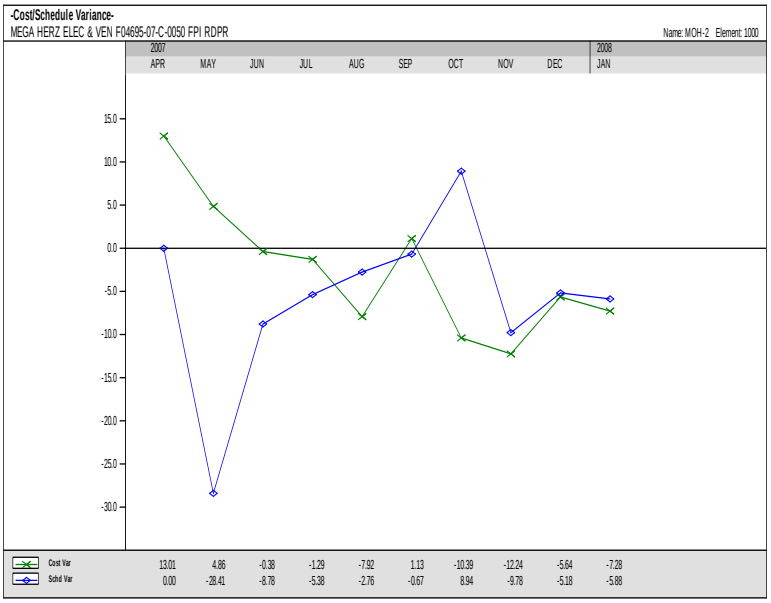
	WBS	Description	SV	CV	VAC	CPI	SV	CV
1	3600	PCC	G ↓	R ↑	G ↔	0.85	(11)	(296)
2	3200	COMMUNICATIONS	R ↑	R ↓	G ↔	0.84	(203)	(131)
3	2200	SYS ENGINEERING	G ↔	R ↓	G ↔	0.90	6	(26)
4	3800	I & A	G ↓	G ↓	G ↔	0.96	83	(24)
5	2300	FUNC INTEGRA	G ↓	Y ↓	Y ↔	0.95	(8)	(17)

Top LRE Issues

	WBS	Description	SV	CV	VAC	CPI	SV	CV
1	3200	COMMUNICATIONS	R ↑	R ↓	G ↔	0.84	(203)	(131)
2	3600	PCC	G ↓	R ↑	G ↔	0.85	(11)	(296)
3								
4								
5								

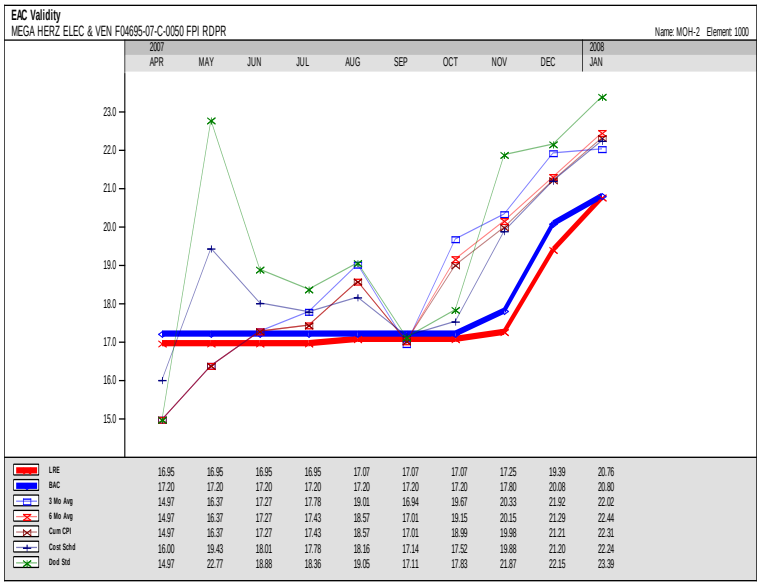
Cumulative to Date Dollars

Cost/Schedule Variance Trends



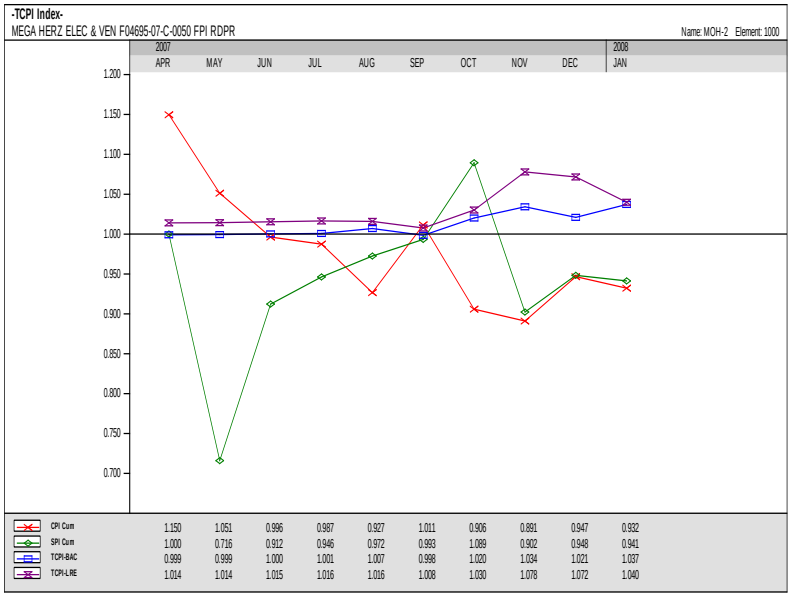
- The Cost/Schedule Variance Chart graphically depicts the cost and schedule variances in percentages, and provides the associated values in dollars (in thousands).
- Currently, the contractor has an unfavorable schedule variance of -427.8 (-5.9%) and an unfavorable cost variance of -499.0 (-7.3%)
- The Budget at Completion (BAC) is 20,796 and the effort is 33% complete.
- The contractor's Latest Revised Estimate (LRE), which depicts their Estimate at Completion (EAC), is 20,761, which is 35 less than the BAC.

Estimate at Completion Comparison



- The LRE Validity Chart compares the contractor's Latest Revised Estimate (LRE) to several statistically derived values for the Estimate at Completion (EAC). The LRE and EAC are terms that are often used interchangeably, representing the estimate of the total direct charges against the contract. The LRE should be somewhere within the range of the calculated values.
- Currently, MOH-2 - Mohawk Vehicle LRE of 20,761 is 35 less than the BAC
- The LRE appears to be below the range of the statistically derived values.

To Complete Performance Index (TCPI)



- The To-Complete Performance Index (TCPI) chart illustrates the efficiency rate that the contractor must accomplish to meet the BAC or LRE, based on the contractor's performance to date.
- To date, the cost performance efficiency has been 0.932. In other words, for each dollar spent, the contractor has accomplished $0.93 worth of the work budgeted.
- To meet the BAC, the contractor must accomplish $1.04 of work for each dollar spent.
- Given the performance to date, it does not seem likely that the contractor will be able to meet the BAC.
- To meet the LRE, the contractor must accomplish $1.04 of work for each dollar spent.
- Given the performance to date, it does not seem likely that the contractor will be able to meet the LRE.

APPENDIX G. EVMS ACCEPTANCE PROCESS

1.1 Overview

The EVMS acceptance process applies to those NASA suppliers that require EVMS compliance and acceptance when the supplier does not have a current EVMS validation. 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 NASA's approach for validating a contractor's EVMS is shown in Figure G.1-1. A more detailed description of this process is provided in the NASA Acceptance and Surveillance Implementation Instructions and Job Aids, the Department of Defense Earned Value Management Implementation Guide (EVMIG) and the NDIA PMSC Earned Value Management System Acceptance Guide located at http://www.ndia.org/Divisions/Divisions/Procurement/Pages/Program_Management_Systems_Committee.aspx.

For those suppliers that DCMA is not delegated acceptance authority such as civilian agencies, universities, not for profits, etc. NASA will serve as the acceptance authority. The OCE will assign the Compliance Evaluation Team Lead with support of the program/project managers and/or Mission Directorate. The acceptance process will follow the same steps as the DCMA led compliance reviews.

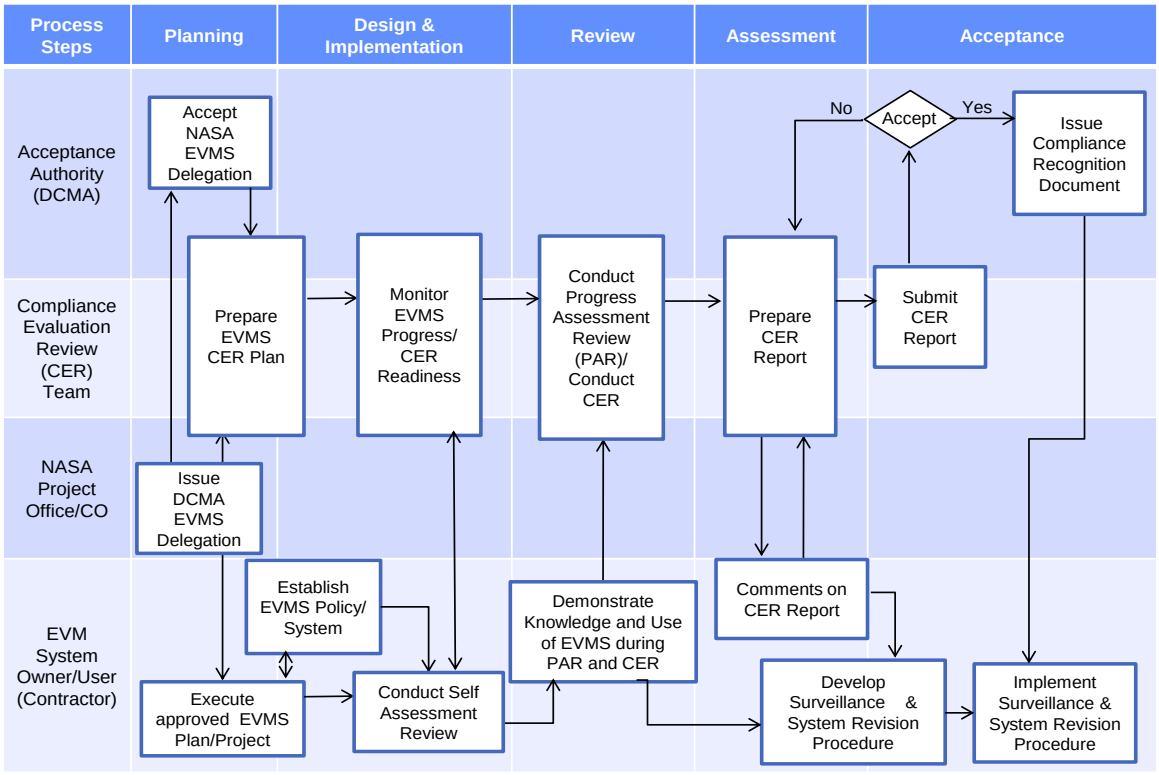


Figure G.1-1 Contractor EVMS Acceptance Process Overview

2.1 Roles and Responsibilities

The roles and responsibilities are summarized below.

- Defense Contract Management Agency (DCMA) serves as the "Acceptance Authority" DCMA is the DOD Executive Agent for EVM and Contractor EVMS Compliance with ANSI/EIA-748
    - Assigns the Review Director for the Compliance Evaluation Review (CER)
    - Issues Compliance Recognition Document (e.g. Advance Agreement or other document) with 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; applicable NASA Center EVMFP and/or Mission Directorate EVMFP; NASA Project Office; NASA EVMFP; and NASA support contractor EVM/Schedule Subject Matter Experts
    - Plans review approach/requirements with Contractor and NASA Project Office
    - Conducts the review and documents compliance

- The NASA Project Office and Contracting Officer (CO) serve as the "customer" for the contractor
    - 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
    - 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 ANSI/EIA-748

3.1 Contractor EVMS Acceptance Approach

3.1.1 Planning

Prior to contract award, the NASA CO with assistance from the Source Evaluation Board, the EVMFP 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 contractor Self-Assessment Review, Progress Assessment Review (s) 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.

If the NASA Project Office and CO do not delegate system acceptance and surveillance to DCMA (may not be appropriate for universities, government agencies, etc.) or DCMA is unable to accept the delegation, then the Project Manager is responsible for conducting the review and requesting the assistance of the Center EVMFP.

3.1.2 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 ANSI/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 ANSI/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 Review and will also finalize the CER Plan.

3.1.3 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 ANSI\EIA-748. It is typically conducted onsite within 90 days after implementation of the EVMS. The primary objectives are:

- Evaluate the management system capabilities against the ANSI\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.). 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 corrective action request (CAR). The CAR is a systemic or limited occurrence of an ANSI/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 certification 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. The CER Report should be finalized within 60 days of the exit briefing.

3.1.4 Acceptance

Before a final decision on acceptance is made, the contractor should provide documentation that all corrective actions for CARs have been completed. The Acceptance Authority reviews the CER Report and determines that the contractor's EVMS complies with ANSI/EIA-748 and the contract, project or program is using the compliant EVMS. The EVMS compliance recognition is a letter or Advance Agreement or other compliance recognition document that clearly indicates the system reviewed complies with ANSI/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. The NASA Project Office and applicable Center EVMFP should participate in the surveillance process. See Appendix H for an overview of the surveillance process.

APPENDIX H. EVMS SURVEILLANCE PROCESS

1.1 Purpose

Surveillance is the process of reviewing the health of the accepted EVMS process applied to projects. The purpose is to focus on using the Agency EVMS effectively to manage cost, schedule, and technical performance. An effective surveillance process ensures the key elements are maintained over time and on subsequent applications. This appendix describes the surveillance process for NASA projects with EVM requirements and assigns roles and responsibilities to assess the system's operation. The objectives of surveillance are to:

- Verify compliance with NASA policies related to EVM.
- Verify compliance with the EVM Systems Description and project EVM Implementation Plan.
- Verify project performance data reliability and consistency.
- Encourage continuous improvement and innovation of the EVMS to include people, processes, tools and training.
- Maintain a disciplined process using EVM, including effective teamwork between the project and customer.
- Effectively communicate surveillance findings and results including areas where the project demonstrates ineffective use of the EVMS.
- Follow-up on the Project's corrective action to assure the current and any foreseeable problems are eliminated.
- Maintain metrics to determine the effectiveness of the EVMS and to distinguish between systemic and non-systemic problems.
- Reduce the cost of surveillance by combining resources to achieve common goals.

1.2 Scope

Surveillance is performed on projects with EVM requirements. It includes in-house efforts as well as major contracts with EVM requirements.

1.3 Applicable Definitions

NASA project EVMS surveillance leverages the NDIA PMSC Surveillance Guide to the extent practical. Relevant definitions from the 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 cognizant DCMA, and the customer).

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.

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.

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

2.1.1 Surveillance Overview

Figure H.2-1 shows the key elements of the NASA EVMS assessment strategy. It begins with the Agency EVM Capability that was developed by the OCE and tested on pilot projects. Surveillance is also performed on projects that were approved prior to availability of the NASA EVM capability. For these projects, surveillance will focus on compliance with the NASA requirements in place at that time and the latest Project Plan. The scope and requirements of each review will be described in the Surveillance Review Plan prepared by the IST.

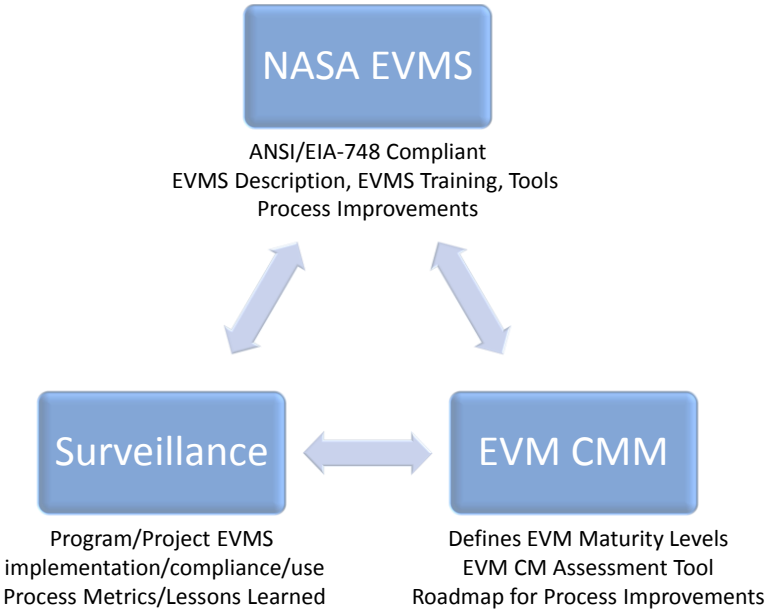


Figure H.2-1. NASA EVMS Assessment Framework

Project EVMS implementation and compliance is assessed through the surveillance process. Project EVMS surveillance begins during Formulation with the establishment of the preliminary Performance Measurement Baseline (PMB) for Phase C and conduct of the pre-approval integrated baseline review in preparation for KDP C. Figure H.2-2 is an overview of this process.

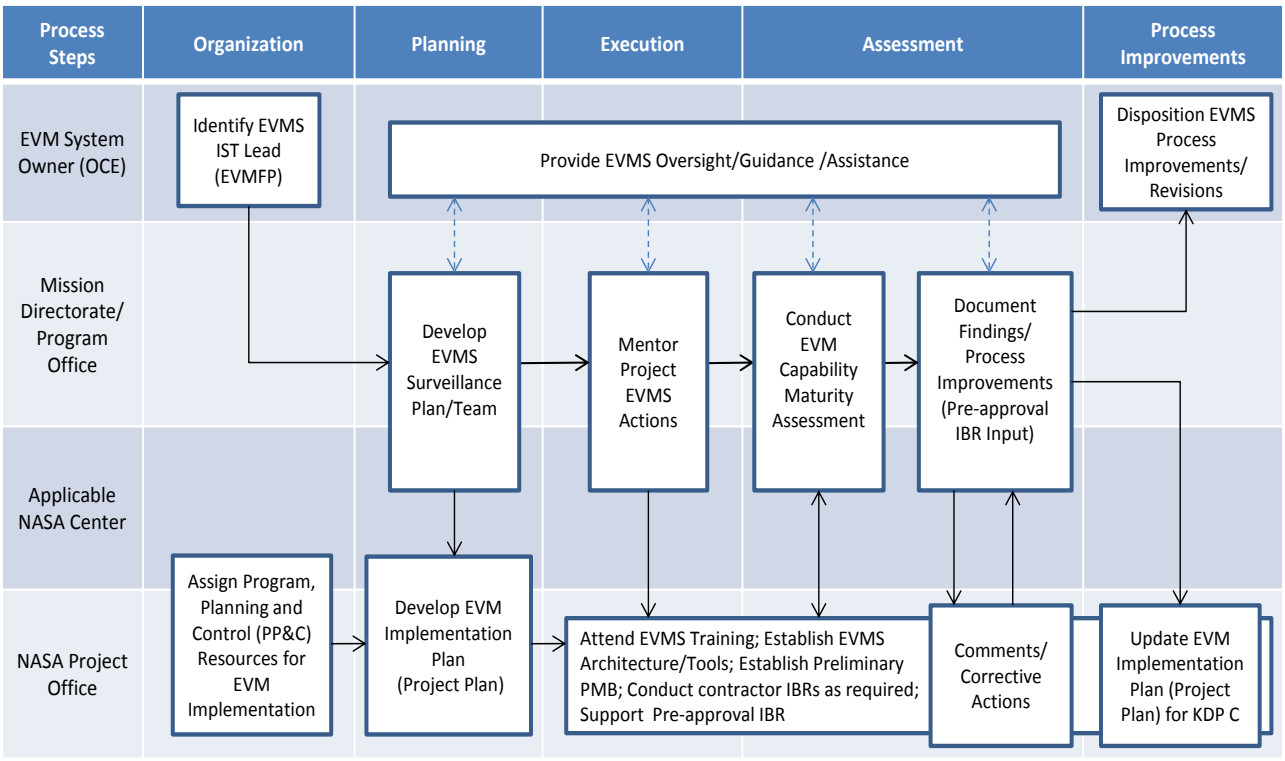


Figure H.2-2. NASA Project Pre Implementation EVMS Surveillance Overview

During Formulation, projects conduct EVM planning which includes obtaining EVMS implementation assistance from the Center and OCE EVMFP. Projects should use the Agency EVMS to meet their EVM requirements. The focus of project surveillance 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. The NPR 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. This review will be conducted in conjunction with the project SRB and PDR activities and include an EVM Capability Maturity Assessment by the assigned IST.

Project specific EVM application and tailoring should be documented in their EVM Implementation Plan which is included in their Project Plan (see Appendix J for more detailed instruction). This includes identification and management of suppliers with EVM requirements (contractors and Intra-Agency); tools used to facilitate EVM implementation and reporting; and establishing an EVM Training Plan for applicable project personnel.

Project surveillance continues at Phase C (Implementation) with EVM reporting (see Figure H.2-3). For contracts with EVM requirements, EVMS surveillance begins at contract award regardless of the 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. See paragraph 2.2 below for further guidance.

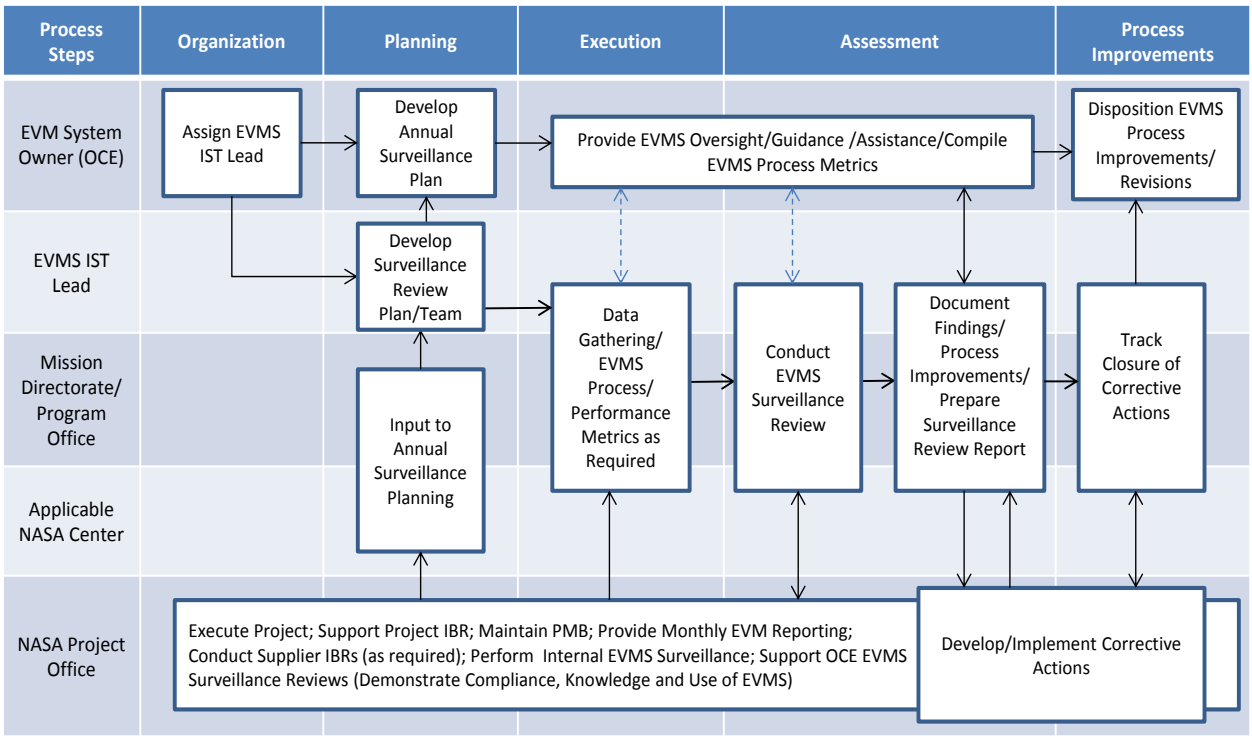


Figure H.2-3. NASA Project Post Implementation EVMS Surveillance

2.1.2 Surveillance Approach

The NASA surveillance process is designed to promote a common understanding of the expectations for compliance with the requirements of the 32 ANSI/EIA-748 EVMS guidelines.

Surveillance is structured to facilitate the exchange of information about the EVM process implementation and the project'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.

The OCE as the EVM System Owner will establish the annual surveillance plan with assistance of the Mission Directorate, Center EVMFP and other support and assign the Integrated ISTs to perform project surveillance reviews. The IST lead is appointed by the OCE. Qualifications of the IST members include:

- Multiple-disciplinary knowledge and experience
- Practical experience using EVMS
- Good working relationships (non-adversarial)
- Strong support of EVMS compliance to ensure a logical, practical implementation within the EVMS guidelines
- Independent of the project being surveilled

Responsibilities of the IST include:

- Provide input to the annual surveillance plan.
- Develop surveillance plan/requirements for assigned reviews (EVM Capability Maturity Assessment (CMA) prior to KDP C, OCE Requirements Compliance Surveys, other KDP reviews, etc.)

- Conduct, document and communicate results of surveillance to the project, customer, Center, OCE EVMFP
- Track corrective action plans for surveillance findings to closure.
- Develop and maintain surveillance databases and metrics to assess the systemic health of the EVMS processes as assessed across multiple reviews.
- Recommend EVMS process implementation and training changes to correct systemic findings.

The IST is responsible for documenting findings relevant to the key management processes and guidelines. Through data review/traces and manager discussions, the IST will assess the use of EVM data and documentation in the operation of the project.

2.1.3 Surveillance Methodology

Surveillance execution is similar to the IBR. The activities are comparable (planning to include scope, schedule, and documentation requirements, establishing the team, training, reviewing documentation, conducting discussions with the P-CAMs and other relevant project personnel, documenting findings and corrective actions, and tracking until closure). The major difference between the IBR and surveillance is the focus. The IBR is focused on assessing whether the PMB is executable and understood by the project personnel and customer. Surveillance is focused on ensuring that the underlying processes that support the PMB are in place, compliant with the EVMS guidelines, are routinely being used and providing reliable data. Key surveillance activities are discussed below. See the NASA Acceptance and Surveillance Instruction and Job Aids located at the NEN Program/Project Management/EVM Sub-Committee https://nen.nasa.gov/web/pm/evm for detailed instructions.

Develop Annual Surveillance Plan. This plan, prepared by the Agency EVM Program Executive with support of the IST(s) and project inputs, defines an approach for reviewing all major EVM processes over the year on multiple projects, allowing flexibility for incorporating changes based on project dynamics.

Surveillance Reviews. For NASA projects, surveillance is basically a two-step process: (1) New projects with EVM requirements will be reviewed to ensure the Agency EVMS processes and procedures are properly tailored to the project and are implemented prior to entering KDP C. The IST will review the project EVM Implementation Plan and preliminary PMB planning in performing this assessment; and (2) Routine surveillance commences when the project enters Implementation (Phase C). This consists of monitoring the Project's process/performance metrics and conducting reviews no more than annually. The project surveillance review should be combined with other reviews such as the OCE Requirements Compliance Surveys and IBRs to minimize disruption to the project.

Discussions. Project Managers, Business Managers, P-CAMs and other key personnel are typically interviewed as part of the surveillance review activities to ensure that they conform to an acceptable level of comprehension and application of the EVMS. An exception may be the EVM Capability Maturity Assessment performed prior to KDP C as part of the pre-approval IBR. Example questionnaires are included as part of the NASA Acceptance and Surveillance Instructions and Job Aids to facilitate effective surveillance. Results from these discussions may reveal weaknesses in understanding of the process and actual practice. If so, additional training may be recommended to improve his/her understanding.

Project Data Reviews. Project EVMS documentation will be reviewed to verify that the required reports are current and conform to the EVMS process. There are two types of data reviews. The first review involves the routine review and monitoring of common metrics typically prepared by the project and submitted to the Center/Program Office/Mission Directorates and OCE as required. The second type of documentation review involves the review of project EVMS documentation and supporting data during the specific surveillance review conducted in conjunction with other project reviews such as the life cycle reviews/KDP reviews and the OCE Requirements Compliance Survey. The IST will leverage the data, reviews and presentations required by these reviews. Examples of additional project EVMS documentation required include:

- Project EVM reports (internal contract performance report (CPR) in native file).
- EVM Variance Analysis and corrective action.
- Project schedules (native file)
- Risk management plan and risk register
- Project EVM Implementation Plan, other Project instructions
- WBS/OBS and the related Dictionary; RAM
- Work Authorization Documents (WAD)
- Control Account Plans (CAPs)
- Project Budget Baseline (PBB), MR and UB logs; baseline change requests
- Staffing plans; Training Plan
- EAC supporting documentation
- IBR Results
- Project Management Review presentations

The NASA Acceptance and Surveillance Instructions and Job Aids also include an EVMS Compliance Evaluation Template that can be used by the IST to document their review findings/assessments. These Job Aids are similar to those that DCMA uses for contractor surveillance but have been updated to reflect NASA's terminology and processes.

Surveillance Results. The results of the review will be discussed with the project and customer and documented. The IST will issue Concern Area Reports (CARs) or equivalent document depending on the specific review requirements to document non-compliance findings and require corrective action plans. All CARs will be tracked by the project and IST and reported on a monthly basis to the OCE.

Surveillance Products. Table H.2-1 includes a description of typical surveillance products. See the NASA Acceptance and Surveillance Instruction and Job Aids for additional information.

Surveillance Products	Description
NASA Annual Surveillance Plan	The plan identifies the projects/contracts, IST Lead/members, schedule, approach and documentation required. Includes focus areas and programs/projects that are Agency priorities.
NASA Acceptance and Surveillance Instruction and Job Aids	Provides the specific instructions for conducting EVM system acceptance and surveillance reviews to include applicable job aids to facilitate consistent and effective assessment and reporting.
Project Planning and Control (PP&C) Metrics	The standard metrics required for reporting of project technical, schedule and cost performance to Programs/Mission Directorates/Center/OCE
EVM Validity Reports	Tool – wInsight report that identifies data inconsistencies/issues with monthly project/contractor EVM reports
Schedule Validity Reports / Health Assessment	Tool – NASA's Schedule Test and Assessment Tool (STAT) or other schedule assessment tool that identifies data inconsistencies/issues with monthly contractor/project IMS and schedule health metrics.
Project Surveillance Plan	Internal project surveillance approach for in-house and contract EVMS surveillance (included in EVM Implementation Plan)
IST Surveillance Review Plan	Prepared by the responsible IST and identifies the approach, scope, objectives, team, data requirements, schedule, etc. for the specific surveillance review.
Surveillance Findings, Recommendations, CARs	Self explanatory
Final Surveillance Report	Prepared by the IST and includes a summary of the review approach, scope, findings/recommendations, lessons learned, etc.
DCMA Contractor Surveillance Reports	Reports provided by DCMA documenting surveillance performed/issues and recommendations and project performance metrics and assessment to include independent EAC.

Table H. 2-1. NASA EVMS Surveillance Products

2.2 Contractor EVMS Surveillance

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

- System Acceptance: Reviewing contractor EVMS plans and verifying initial compliance with ANSI/EIA-748, Industry Guidelines for Earned Value Management Systems.
- System Surveillance: Conducting system surveillance activities that verify the contractor's EVMS complies with and meets the full intentions of ANSI/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 intends to 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. Selected IST members such as the Center EVM FP should also supplement the DCMA surveillance team.

2.3 The EVM Capability Maturity Model (CMM)

The EVM CMM is a tool developed by the NASA OCE. This tool is derived from features within the Management Technologies' five step Earned Value Management Maturity Model®, or EVM3®, to assess the extent to which NASA projects have implemented EVM in accordance with NASA policy, EVM Systems Description, other related guidance and best practices.

The EVM CMM provides a framework for standardizing and improving the use of EVM within NASA. Figure H.2-4 provides an overview of the EVM CMM based on the EVM3®. The levels are building blocks. The goals of each level must be met before the next level may be achieved. To facilitate Agency wide EVMS effectiveness, NASA organizations (programs/projects, Centers, and Mission Directorates) should be aware of the established goals for performance and what is required to achieve that goal.

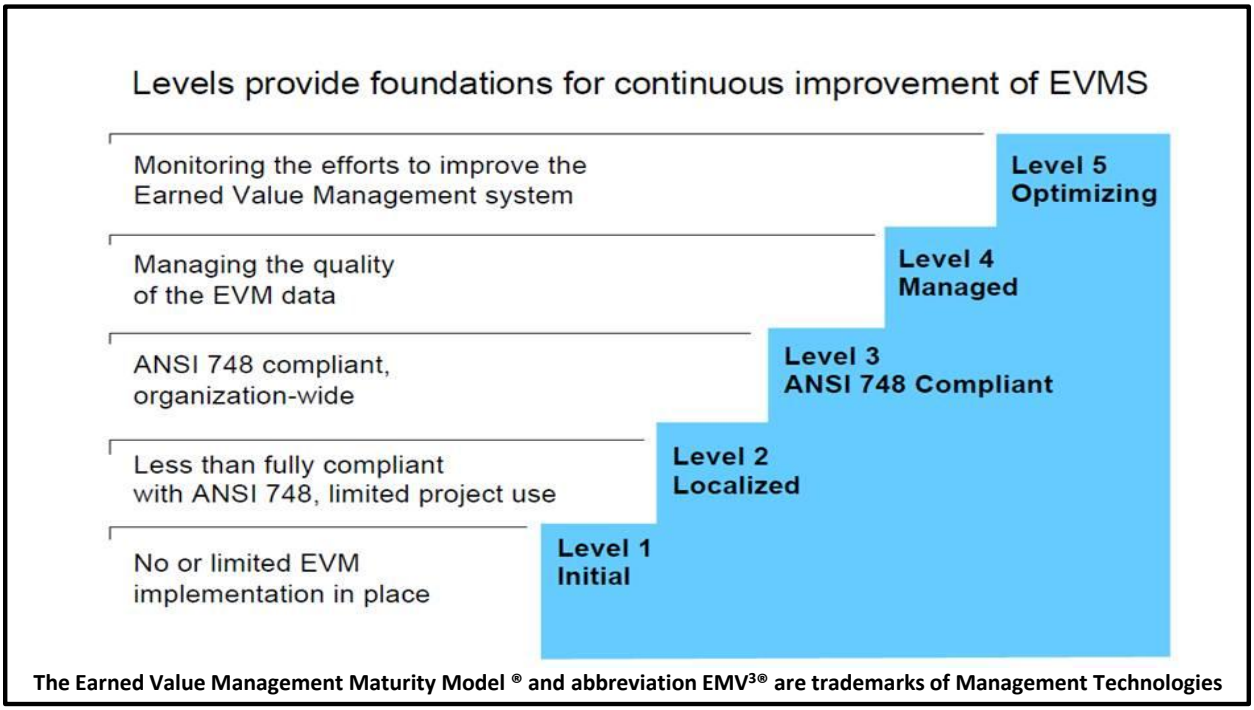


Figure H.2-4. NASA EVM CMM (Source: Earned Value Management Maturity Model®, or EVM3®, CPM Spring Conference 2001, Ray W. Stratton, Management Technologies, May 2001. Reprinted with Permission.)

Level 3 applies to the "Agency" and should be achieved by all Projects with EVM requirements (ANSI/EIA-748 compliance). The EVM CMM target level for all NASA projects is level 3.

Each level contains Key Process Areas (KPA), goals and applicable features/measurement. KPAs for levels 1-3 are similar to the major categories of the ANSI/EIA-748 32 EVMS Guidelines:

- Organizational (Organization)
- Planning (Planning, Scheduling, and Budgeting)
- Accounting (Accounting Considerations)
- Analysis (Analysis and Management Reports)
- Revisions to the Performance Measurement Baseline (Revisions and Data Maintenance)

Additional KPAs such as EVMS Training, Surveillance and Tools are also included.

The following definitions apply to EVM CMM:

Goals: A summary of the key practices of a KPA that can be used to determine whether an organization or project has effectively implemented the KPA. The goals signify the scope, boundaries, and intent of each KPA.

Key Process Areas (KPAs): A cluster of related activities that, when performed collectively, achieve a set of goals considered to be important for establishing process ability.

The following describes uses by the various stakeholders:

- Projects
  - Internal assessment of strengths/weaknesses related to EVM implementation and EVMS compliance.
  - Facilitates the development of a roadmap for achieving EVM CMM level 3.
- ISTs/Mission Directors/Programs/Centers
  - Initial independent assessment completed during Formulation (in conjunction with the SRB/PDR) prior to Phase C for new projects
  - Facilitates identification of focus areas for EVM and EVMS improvement
  - Facilitates development of roadmap for achieving Agency EVM CMM levels (3-5)
- NASA (OCE)
  - Facilitates assessment of EVMS implementation across the Agency.
  - Identify/prioritize EVMS process improvements (EVMWG, etc.).
  - Update EVM policy, EVMS procedures/guidance, and best practices.
  - Facilitates development of roadmap for achieving EVM CMM Levels (3-5).

The NASA EVM CMM approach emphasizes project management expectations during each of the phases, gates and major events of NASA's project life cycle, as shown in the NPR 7120.5 project life cycle overview Figure H.2-5:

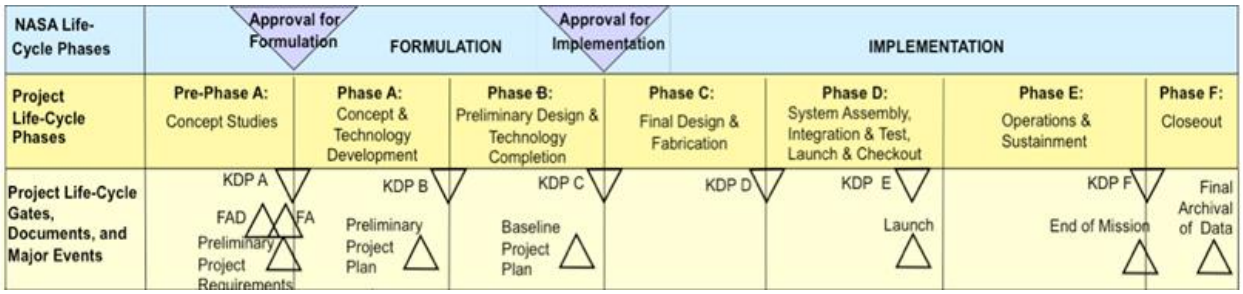


Figure H.2-5. NASA Project Life Cycle Phases

The EVM process/product maturity tables in Figure H.2-6 below provide an overview of the expected project management processes and products by KPA of each project phase, and the maturity level of those processes and products in each phase. Each phase builds upon the processes and products generated in the preceding phase with the goal of implementing a compliant EVM system by Phase C. This tool, or roadmap, serves as an aid for project managers, their staffs and their customers in implementing best practices for EVM.

Organization	Process/Product Maturity				
	Pre-Phase A	Phase A	Phase B	Phase C	Phase D
Work Definition	Extend the Work Breakdown Structure (WBS) to Level 2 for planning, scheduling budgeting and analysis. Identify organization responsibilities for all effort contained in the lowest levels of the WBS.	Extend the WBS to Level 3/4 for planning, scheduling, budgeting and analysis. Preliminary WBS Dictionary required to Level 3/4. Identify organization responsibilities for all effort contained in the lowest levels of the WBS.	Extend the WBS and WBS Dictionary to reflect Control Accounts. Determine the WBS reporting levels for Phase B. Finalize Phase B Responsibility Assignment Matrix (RAM).	Extend the WBS and WBS Dictionary to reflect Phase C Control Accounts and Work Packages. Identify major contracted effort in the WBS and describe it in the WBS Dictionary. Determine WBS reporting levels for Phase C and finalize the Phase C RAM.	Continue to extend the WBS and WBS Dictionary to reflect Phase D Control Accounts and Work Packages. Continue to identify major contracted effort in the WBS and describe it in the WBS Dictionary. Determine WBS reporting levels for Phase D. Finalize the Phase D RAM.
Project Organization	Develop the top Level project organization chart.	Expand the project organization chart.	Expand the project organization chart to include identification of Project Control Account Managers (P-CAMs), major contractors and supporting Centers.	Continue to expand/update the project organization chart to include identification of P-CAMs, major contractors and supporting Centers.	Continue to expand/update the project organization chart to include identification of P-CAMs, major contractors and supporting Centers.
Project Integration	N/A	Develop preliminary WBS/OBS/Control Account/Charge Code Structure to facilitate linkage between the planning, scheduling, budgeting, work authorization, cost accumulation and perfromance measurement processes.	Maintain WBS/OBS/Control Account/Charge Code Structure to facilitate linkage between the planning, scheduling, budgeting, work authorization, cost accumulation and perfromance measurement processes.	Maintain WBS/OBS/Control Account/Charge Code Structure to facilitate linkage between the planning, scheduling, budgeting, work authorization, cost accumulation and perfromance measurement processes.	Maintain WBS/OBS/Control Account/Charge Code Structure to facilitate linkage between the planning, scheduling, budgeting, work authorization, cost accumulation and perfromance measurement processes.
Planning	**Process/Product Maturity**				
	Pre-Phase A	**Phase A**	**Phase B**	**Phase C**	**Phase D**
Risk	Develop and refine the initial risk assessments at a top level.	Baseline the Risk Mitigation Plan	Update and maintain the Risk Mitigation Plan.	Update and maintain the Risk Mitigation Plan.	Continue to update and maintain the Risk Mitigation Plan.
Schedule	Establish a project-level Master Schedule with key development, integration, test and delivery milestones. Establish high-level summary tasks reflecting estimates for requirements development, hardware design, fabrication, integration and test, and operational capability development. At least quarterly progress should be reflected in the schedule.	Establish a systems-level logic-driven Master Schedule with key development, integration, test and delivery milestones and products. Include: requirements development, preliminary/critical design, long lead items, fabrication, software development, integration & testing. Progress schedule monthly. Develop the preliminary Integrated Master Schedule (IMS).	Refine the logic-driven IMS to reflect all authorized effort, all Control Accounts & lower-level detail tasks. Tasks should be discrete/measurable for near-term effort. The IMS should contain major contracted effort, critical interface milestones, high-dollar or critical material items, forecast dates for all activities & critical path. Monthly progress should be measured based on physical accomplishments.	Maintain IMS reflecting all authorized effort, all Control Accounts, and lower-level detail tasks. Task durations of two months or less are preferred for near-term effort. The IMS should contain major contracted effort, critical interface milestones, high-dollar or critical material items, forecast dates for all activities, and the critical path. Monthly progress should be measured based on physical accomplishments.	Continue to maintain IMS that reflects all authorized effort and contains all Control Accounts, and lower-level detail tasks as appropriate. The IMS should also contain major contracted effort, critical interface milestones, high-dollar or critical material items, forecast dates for all activities, and the critical path. Monthly progress should be measured based on physical accomplishments.
Budget	Establish a time phased budget for each Level 2 element of the WBS.	Establish a time-phased budget for each Level 3/4 element of the WBS.	Establish a Performance Measurement Baseline (PMB) for all Control Accounts. Establish Management Reserve (MR) based on risk assessments. Use Undistributed Budget (UB) in the change management process.	Maintain time-phased PMB at Work Package/Planning Package level. Use Planning Packages as place holders for far term work. Establish MR based on risk assessments. Use UB in the change management process.	Continue to maintain time-phased PMB at Work Package/Planning Package level. Establish MR based on risk assessments. Use Undistributed Budget UB in the change management process.
Work Authorization	Authorize work using the "Draft" Formulation Authorization Document (FAD) or equivalent.	Authorize work using the FAD, the Formulation Agreement (FA) and the Management Agreement (MA).	Authorize work at the Control Account level using the Work Authorization Document (WAD).	Authorize work at the Control Account level using the WAD, and at the work package level using a Control Account Plan (CAP).	Continue to authorize work at the Control Account level using the WAD, and at the work package level using the CAP.

Accounting	Process/Product Maturity				
	Pre-Phase A	Phase A	Phase B	Phase C	Phase D
Cost Collection	Develop a cost collection method that will support future expansion and reporting for the entire project life cycle.	Refine the cost collection methodology to support future expansion and reporting needs.	Revise and expand the cost collection methodology to support future expansion and reporting needs.	Revise and expand the cost collection methodology to support future expansion and reporting needs.	Continue to revise and expand the cost collection methodology to support future expansion and reporting needs.
Material and Contracts	Develop an acquisition strategy that includes a make/buy list, an initial master equipment list, and potential contracted efforts (including those requiring EVM flowdown.)	Update acquisition strategy/plan, finalize make/buy decisions, identify high value/critical need material list, identify long-lead requirements, maintain current material/contract estimates. Include NFS EVM clauses and reporting in contracts and conduct Integrated Baseline Review (IBRs) on contracts with EVM.	Update acquisition strategy/plan and make/buy decisions, high value/critical need material list and long-lead requirements, maintain current material/contract estimates. Include appropriate NFS EVM clauses and reporting in contracts and conduct IBRs on contracts with EVM. Plan all material in Control Accounts and manage and account for all material.	Update and maintain the acquisition strategy/plan, the make/buy and high value/critical need material list, and major contractor estimates. Ensure NFS EVM clauses are included in new contracts. Conduct IBRs as appropriate to assess significant changes to contractors' PMB. Plan all material in Control Accounts and manage and account for all material.	Continue to update and maintain the acquisition strategy, the make/buy and high value/critical need material list, and major contractor estimates. Ensure NFS EVM clauses are included in new contracts. Conduct IBRs as appropriate to assess significant changes to contractors' PMB. Plan all material in Control Accounts and manage and account for all material.

Analysis	Process/Product Maturity				
	Pre-Phase A	Phase A	Phase B	Phase C	Phase D
Performance Measurement	Update the master schedule quarterly to reflect project-level status.	Report progress monthly for each level 4 WBS element in the master schedule.	Report progress monthly for each Control Account in the IMS, including contractor performance. Include contractor performance reporting. Assign earned value techniques at the work package level for Phase C PMB.	Report progress monthly for each work package. Assign earned value techniques at the work package level when converting planning packages to work packages to use in reporting accomplishment in the IMS. Include contractor performance reporting.	Continue to use earned value techniques at the work package level in reporting accomplishment in the IMS, including contractor performance.
Variance Analysis	On a quarterly basis, compare level 3 WBS budgets to actuals and analyze significant variances. Incorporate analysis into quarterly activity/status reports.	On a monthly basis, compare level 4 WBS budgets to actuals, analyze significant variances, and correlate to the IMS status. Incorporate analysis into monthly activity/status reports.	For the preliminary PMB, establish variance thresholds for reporting on the Contract Performance Report (CPR). On a monthly basis, analyze all variances that exceed thresholds and evaluate impact to EAC. Propose and document corrective actions as appropriate. Perform critical path analysis on the IMS. Integrate earned value performance and variance analysis into the monthly project review.	Continue to establish variance thresholds for reporting on the CPR. On a monthly basis, analyze all variances that exceed thresholds and evaluate impact to EAC. Propose, document and track to closure the corrective actions as appropriate. Perform critical path analysis on the IMS. Integrate earned value performance and variance analysis into the monthly project review.	Continue to establish variance thresholds for reporting on the CPR. On a monthly basis, analyze all variances that exceed thresholds and evaluate impact to EAC. Propose, document and track to closure the corrective actions as appropriate. Perform critical path analysis on the IMS. Integrate earned value performance and variance analysis into the monthly project review.
Estimate to Complete (ETC) and Estimate at Completion (EAC)	N/A	Update the Basis of Estimate (BOE) forms which were developed during the time-phased budgeting process.	Monthly, as part of the variance analysis process, evaluate the adequacy of the ETC/EAC at the Control Account level. Use EAC data to support the Planning, Programming, Budgeting and Execution (PPBE) process.	Monthly, as part of the variance analysis process, evaluate the adequacy of the EAC. Annually, conduct a comprehensive EAC. This comprehensive EAC should support the PPBE process. Use Schedule and Cost Performance Indices (SPI and CPI) as sanity checks against forecasted estimates. Document approved EACs.	Monthly, as part of the variance analysis process, evaluate the adequacy of the EAC. Annually, conduct a comprehensive EAC. This comprehensive EAC should support the PPBE process. Use SPI and CPI calculations as sanity checks against forecasted estimates. Document approved EACs.

Revisions	Process/Product Maturity				
	Pre-Phase A	Phase A	Phase B	Phase C	Phase D
Change Management	N/A	Record Phase A changes in funding, budget and schedule.	Document and record changes in budget and schedule amounts. Maintain traceability between the FAD/FA/MA and the PMB. Establish project level logs for tracking authorized changes to PMB (for Implementation/Phase C).	Maintain project level logs for tracking authorized changes to the PMB at the Control Account level. Authorize changes using a baseline change request. Maintain traceability between the Management Agereement (MA) and the PMB.	Maintain project level logs for tracking authorized changes to the PMB at the Control Account level. Authorize changes using a baseline change request. Maintain traceability between the Management Agereement (MA) and the PMB.

Other	Process/Product Maturity			
	Pre-Phase A	Phase A	Phase B	Phase C/D
Software Tools	Basic MS Office Tools (Excel; MS Project, etc.) or other Center specified scheduling tool	Define EVMS Architecture and tools; implement tools, e.g. scheduling, wInsight, etc.	Finalize EVMS Architecture and implement all tools (EVMS engine such as Cobra or MPM, wInsight, scheduling, etc.)	Maintain EVMS Architecture and software tools (EVMS engine such as Cobra or MPM, wInsight, scheduling, etc.)
Training	Attend basic training (Introduction to Project Management, EVM, WBS)	Define Project Training and Plan (Basic Project Management, EVM, Planning/Scheduling, WBS) and Center specific software tool training	Implement Project Training and Plan; include EVM System Description Training, Project CAM Training, Advanced EVM and Scheduling, Software tools training.	Continue to implement Project Training Plan; conduct refresher training as needed.
Surveillance	N/A	Develop initial Project Surveillance Plan (EVM Implementation Plan); Perform surveillance on contracts with EVM as required.	Support customer surveillance reviews (EVM Capability Maturity Assessments, etc.); Develop Corrective Action Plans for findings/Ensure closure. Perform surveillance on contracts with EVM as required/monitor corrective actions to closure.	Support customer surveillance reviews (OCE Compliance Requirements Surveys, etc.); Develop Corrective Action Plans for findings/Ensure closure. Perform surveillance on contracts with EVM as required/monitor corrective actions to closure. Implement process improvements.

Figure H.2-6. NASA EVM CMM Process/Product Maturity by KPA and Project Phase

2.4 EVMS Improvement and Coordination

Initiation of system improvements will result primarily from continued project surveillance and stakeholder comments. Improvements may be indicated by repeated non-compliance with the EVMS procedural disciplines that are surfaced during surveillance reviews or other reviews such as IBRs, OCE Requirements Compliance Surveys, GAO audits, etc.

Once a proposed change has been defined and justified, the EVM System Owner (OCE) should test its validity. If the assessment indicates that the proposed change will significantly improve the EVMS operation, the change will be formally documented and processed according to the system revision process described in the NASA EVM Systems Description.

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

Requirements: Any waiver request submitted to NASA headquarters OCE 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 ANSI/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 CPR, IMS, WBS, and other EVM-type reporting, intra-Agency work agreements, Program or Project plan, Acquisition Plan or other.

4. A point of contact should additional information or assistance be required to support review of the request.

Figure I-1: EVMS Guideline Compliance Review Checklist

Guideline - ANSI/EIA-748-B (*Note: Check with EVMFP for latest version of ANSI/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, 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 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 J. 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 ANSI/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 ANSI/EIA-748 standard and allows tailoring to match the individual needs of the program or project, while still meeting the ANSI/EIA-748 guidelines. NASA's EVM Capability can be found on the Program and Project Management Community of Practice 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 Capability, 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 ANSI/EIA-748 Earned Value Management System (EVMS). See the NASA EVM Systems Description https://nen.nasa.gov/web/pm/evm 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 PMSC EVMS Intent Guide, as an aid in verifying their compliance with the ANSI/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 Systems Description), management system architecture, business process timelines, etc.

Projects should coordinate with their EVM Focal Point (refer to http://evm.nasa.gov/council.html for the applicable EVM Focal Point) 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 - contractors name, scope, value, period of performance, flowdown requirements to include EVM, date of validated EVMS or plan for validation if applicable, other reporting, etc.), COTR/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 K. ACRONYMS

AA	Advance Agreement
ABC	Agency Baseline Commitment
ACO	Administrative Contracting Officer
ACWP	Actual Cost of Work Performed
ANSI/EIA	American National Standards Institute/Electronic Industries Alliance
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
CBB	Contract Budget Baseline
CCB	Change Control Board
CFO	Chief Financial Officer
CMA	Capability Maturity Assessment
COTS	Commercial-off-the-Shelf
CPAF	Cost Plus Award Fee
CPFF	Cost Plus Fixed Fee
CPI	Cost Performance Index
CPIF	Cost Plus Incentive Fee
CPR	Contract Performance Report
CV	Cost Variance
CWBS	Contract Work Breakdown Structure
DCMA	Defense Contract Management Agency
DI-MGMT-81466	Data Item Description for the Contract Performance Report
DM	Data Manager
DRD	Data Requirements Description
EAC	Estimate at Completion
ETC	Estimate to Complete
EVM	Earned Value Management
EVMFP	Earned Value Management Focal Point
EVMIG	Earned Value Management Implementation Guide

EVMS	Earned Value Management System
EVMWG	Earned Value Management Working Group
EVM3®	Earned Value Management Maturity Model®
EVMS	Earned Value Management System
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
IPT	Integrated Product Team
IST	Integrated Surveillance Team
IT	Information Technology
JPL	Jet Propulsion Laboratory
KDP	Key Decision Point
KPA	Key Process Area
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
OCE	Office of Chief Engineer

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
SASR	Summary Assessment Summary Report
SEB	Source Evaluation Board
SOW	Statement of Work
SP	NASA 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 L. 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.

Advance Agreement (AA). The agreement between the Administrative Contracting Officer (ACO) and the contractor that documents the contractor's commitment to use the accepted EVMS as an integral management process on current and future contracts and maintain the EVMS compliant system for current and future contracts through an internal surveillance program.

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 added by the mission directorates with the concurrence of the Independent Program Assessment Office (IPAO) to ensure a reasonable amount of funding margin/reserve is available for unforeseen problems beyond the program's control.

American National Standards Institute/Electronic Industries Alliance (ANSI/EIA). The Institute that oversees the creation, promulgation and use of thousands of norms and guidelines that directly impact businesses in nearly every sector. ANSI is also actively engaged in accrediting programs that assess conformance to standards—including globally-recognized cross-sector programs such as the ISO 9000 (quality) and ISO 14000 (environmental) management systems. The Earned Value Management System guidelines have been published as an ANSI/EIA standard. The set of 32 guidelines, established by ANSI/EIA-748, define the requirements the contractor's EVM system should meet.

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 Performance Report (CPR). A contract data requirement when EVM is required. This report consists of five formats containing data for measuring contractors' cost and schedule performance on Government acquisition contracts:

- Format 1 provides data to measure cost and schedule performance by product-oriented WBS elements, the hardware, software, and services the Government is buying.
- Format 2 provides the same data by the contractor's organization (functional or Integrated Product Team (IPT) structure).
- Format 3 provides the budget baseline plan against which performance is measured.
- Format 4 provides staffing forecasts for correlation with the budget plan and cost estimates.
- Format 5 is a narrative report used to explain significant cost and schedule variances and other identified contract problems and topics.

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.

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 ANSI/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 (EVMFP). 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 EVMFP is responsible for effective policy implementation within their component, ensuring consistency with NASA policy and the provisions of this guide.

Earned Value Management Maturity Model®, or EVM3®. Developed and trademarked by Management Technologies (http://www.mgmt-technologies.com/evmtech.html), the five step EVM3® is a maturity model for organizations to use in implementing and improving their EVM Systems. Organizations with an ANSI/EIA-748 compliant EVMS can use the EVM3® to establish EVM process metrics and create EVMS improvement plans.

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

Earned Value Management Working Group (EVMWG). A group consisting of the EVM Subject Matter Experts from each center other subject matter experts 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 ANSI/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.

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.

Joint Cost and Schedule Confidence Level (JCL). (1) The probability that cost will be equal to or less than the targeted cost AND schedule will be equal to or less than the targeted schedule date. (2) A process and product that helps inform management of the likelihood of a project's programmatic success. (3) A process that combines a project's cost, schedule, and risk into a complete picture. JCL is not a specific methodology (e.g., resource-loaded schedule) or a product from a specific tool (e.g., @RISK).

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 the Chief Engineer (OCE). The Chief Engineer is the principal advisor to the NASA Administrator on the technical readiness, review, and execution of NASA programs and projects. The OCE ensures that NASA missions are planned and conducted with sound engineering practices and proper controls and management. The OCE 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.

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 ANSI/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.

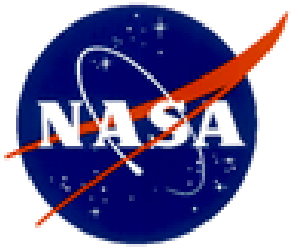
Undistributed Budget (UB). Budget associated with specific work scope or authorized changes that have not been assigned to a control account or lower level WBS element.

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, statement of work, 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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