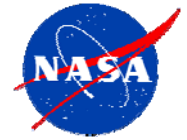


Implementing an In-house Solution for Earned Value Management

By

*Jonathan Bryson, NASA Goddard
Vanessa Johnson and Jeff Kottmyer,
SGT / NASA-Goddard*



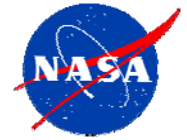
Acknowledgements

We appreciate the support and guidance from:

- Pilot Sponsors:
 - HQ OCE: Michael Blythe, Sandra Smalley, Dorothy Tiffany, and Staff
 - GSFC: Jonathan Bryson (Chief Policy and Standards Office)
 - GSFC Senior Management

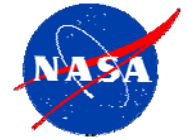
- GSFC EVM In-house Technical Working Group (TWG):
 - The codes and individuals from around the Goddard

- GSFC Technical Assistance:
 - Internal to GSFC
 - MSFC and other Centers



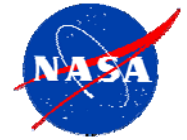
Discussion Topics

- What is EVM and Why Do it?
- Who manages EVM at NASA?"
- EVM Roles at the Centers
- NASA In-House EVM Pilots
- The Next Steps for Goddard
- Some Challenges



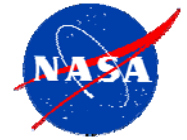
What is Earned Value Management?

- Earned Value Management (EVM) is a methodology for integrating **scope, schedule and resources**, and for **objectively measuring** project performance and progress.
- EVM's "early Warning" capability provides the project management team with objective, accurate and timely data for effective decision making and helps predict future performance based on past trends.



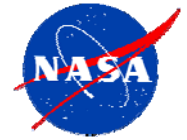
Why EVM?

- Proven integrated assessment of cost, schedule and technical progress
- Highly accurate predictor of final project/contract cost at completion, when used properly
- Provides early visibility into problems that are likely to have an unfavorable impact on schedule or cost outcomes
- Measures work performed, not just funds spent
- Required by OMB, NASA FAR Supplement and NPR 7120.5D to mitigate development risk



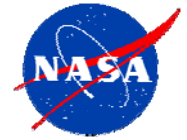
EVM is NOT:

- A financial or “cost management” discipline that sits along side “regular” project management
- A software tool or information system
- Something for “cost” people to worry about (while others worry about schedule and the technical work scope)
- A set of financial metrics and specific report formats
- An EVM System is not something that one can buy. It is made up of processes that must be built to fit each institution or environment

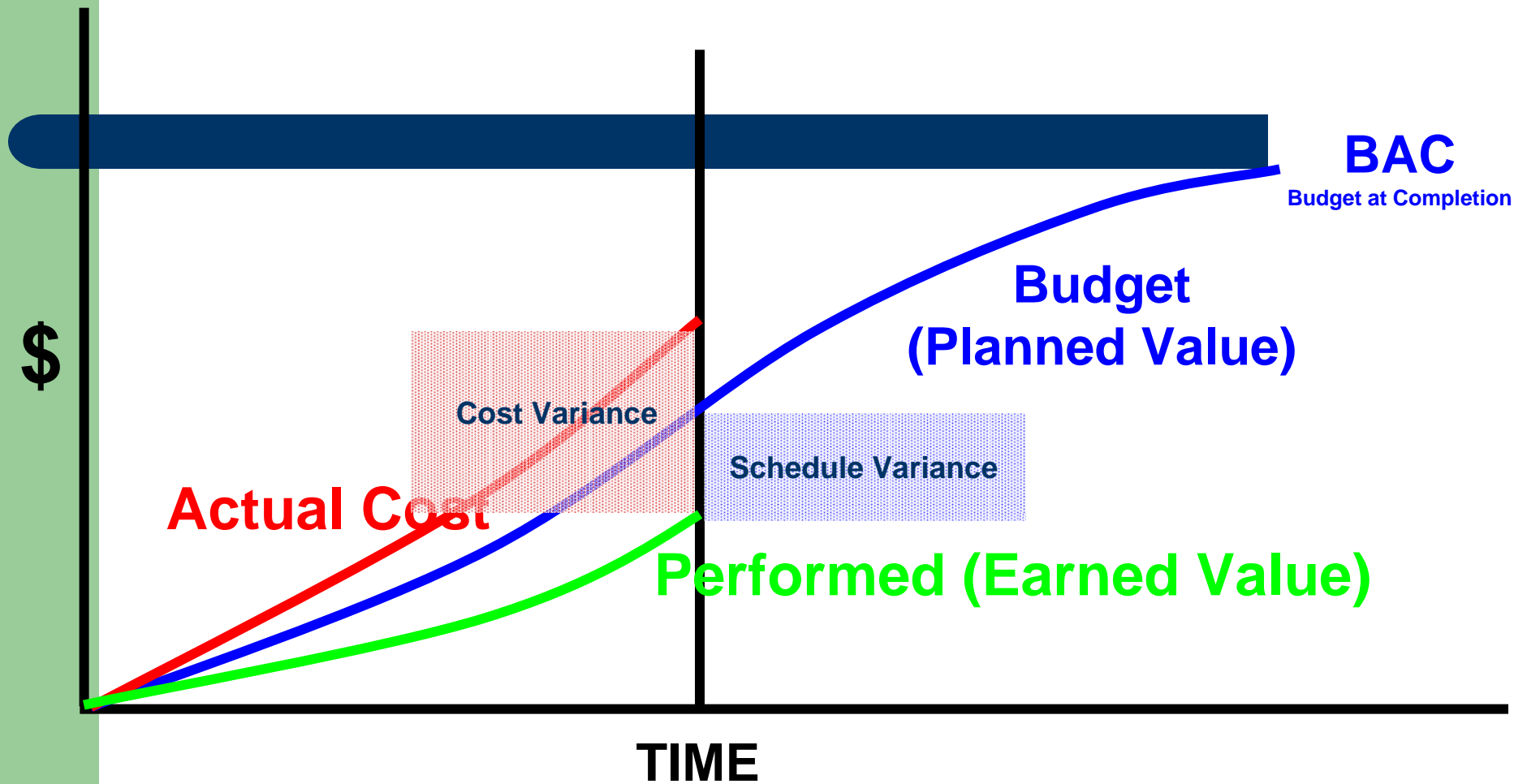


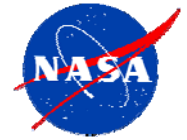
Activities involved in Earned Value Management

- Plan all project work
 - Create an integrated performance measurement baseline
- Objectively assess work progress at the level of performance
 - Compare to the plan and to actual costs
- Analyze significant deviations from the plan
- Forecast impacts to cost and schedule
- Take corrective actions as needed
- Summarize data for progressively higher levels of management
- Maintain performance measurement baseline
 - Update for work scope changes
 - Maintain realistic baseline for remaining work

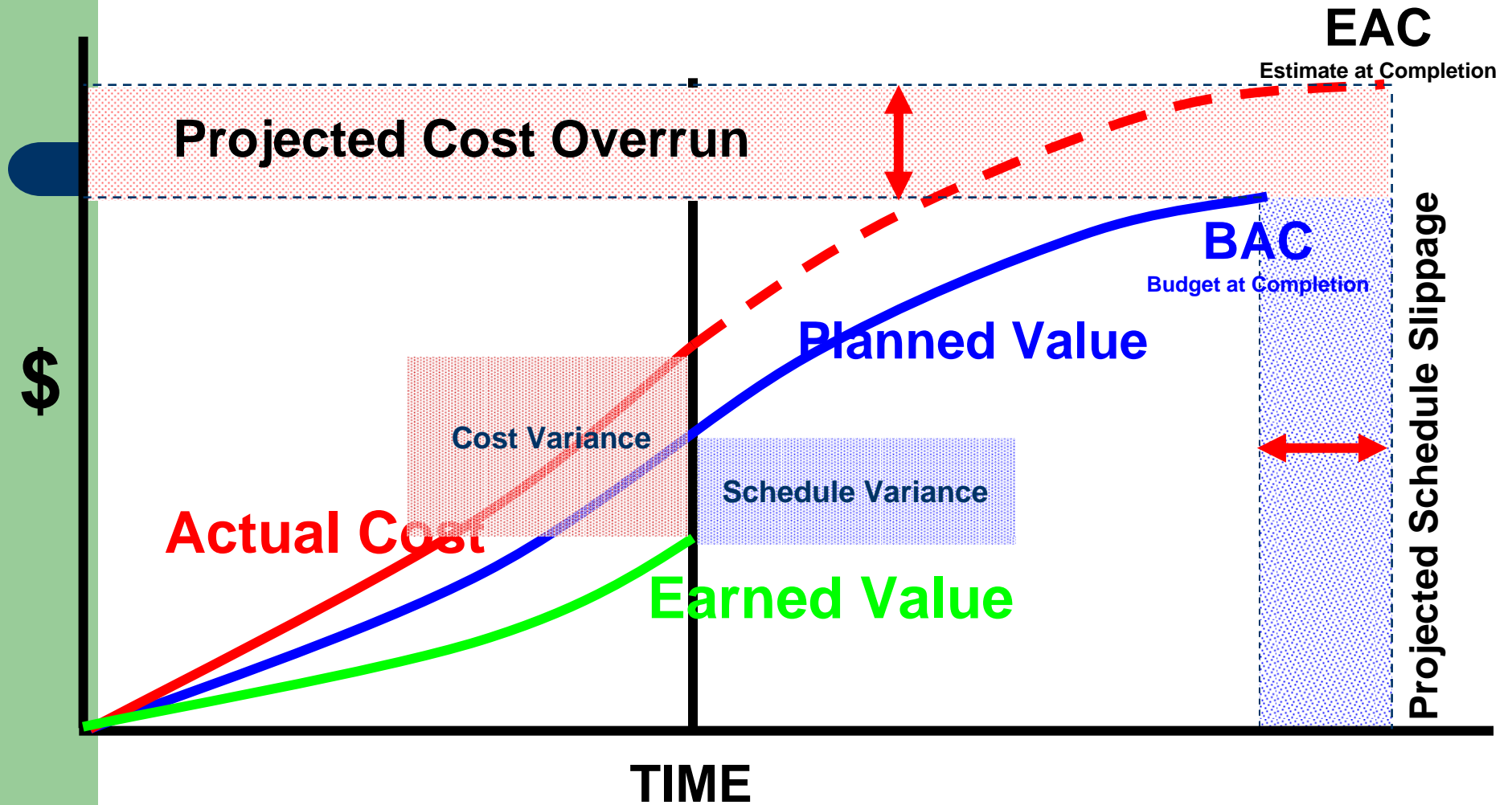


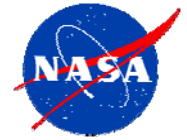
EVM Clarifies Past Performance...



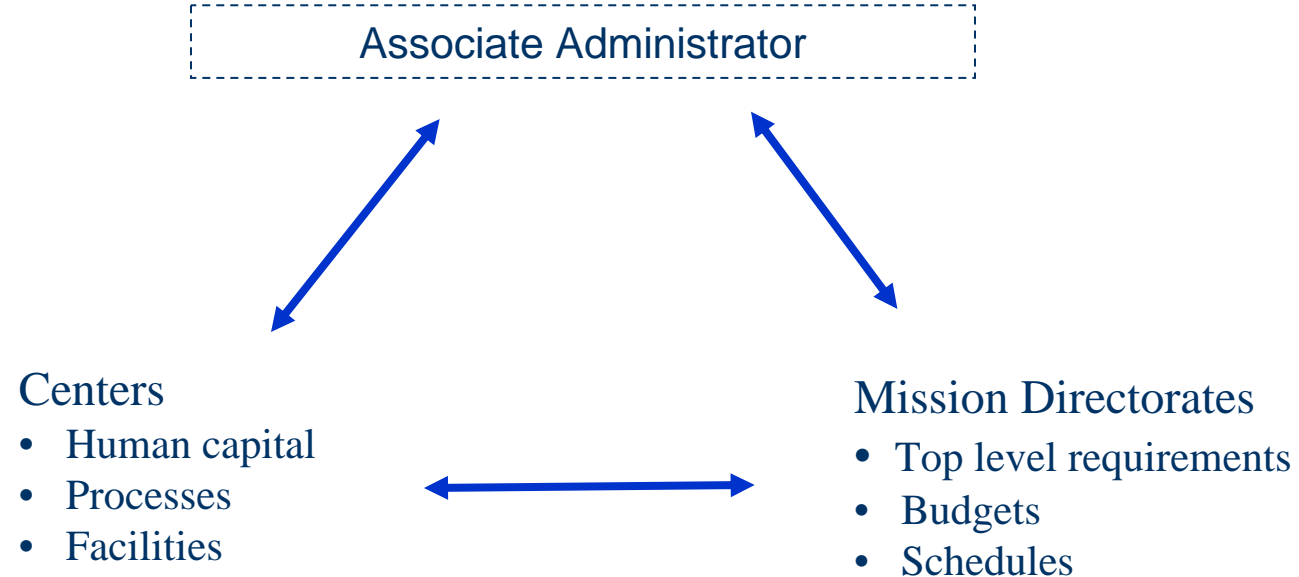


...and Helps Predict the Future Based on Performance



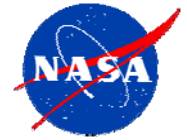


Agency Governance Model For Program/Project Management



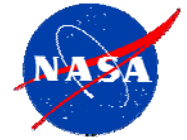
For Program/Project performance:

- Project Managers are accountable to Mission Directorates
- Project managers are accountable to Project Managers



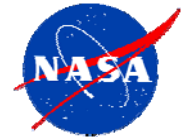
Summary of Responsibilities

	SMD	Project Office
Top Level	Define Level 1 requirements DPMC, RMS Monitor performance FPRs <i>one tool is EVM</i>	Plan and manage work to meet Level 1 requirements <i>one tool is EVM</i>
EVM	Understand the baseline Understand collection of actuals Understand variances Report to DAA-Programs	Develop the baseline Collect actuals Identify & analyze variances Report to HQ



EVM Governing Documents

- OMB Circular A-11 Part 7: Planning, Budgeting, Acquisition and Management of Capital Assets
- Flight Projects - NPR 7120.5D issued March 6, 2007
 - Applies to out-of-house contracts (the Integrated Baseline Review starts the process)
 - Applies to in-house efforts (this is evolving and why we are doing pilots)
- Institutional Projects (for IT and construction projects) - NPR 7120.7 under review in NODIS
- NASA FAR Supplement – Subpart 1834.2 defines contract requirements, issued November 13, 2006
- Industry Standard ANSI/EIA-748.....

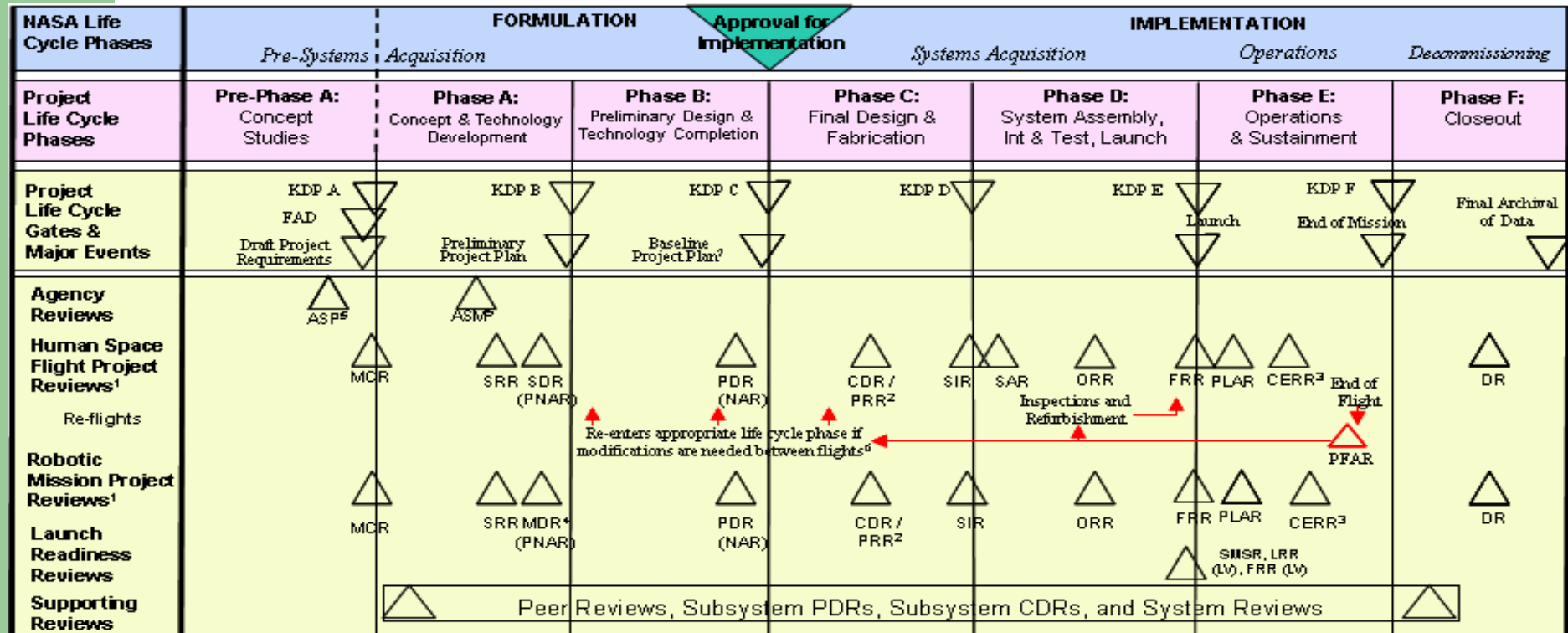


NPR 7120.5D – Excerpts Requirements EVM Requirements

- EVM approach must be in place by the Key Decision Point (KDP) C and implemented in Phase C through KDP E
- EVM principles as defined by ANSI/EIA 748, apply from KDP C to KDP E if the project's life cycle cost is at or greater than \$20M
- If the project's primary NASA Center has a fully validated EVMS, the project must use guidelines instead of principles
- Contracts over \$20M must comply with ANSI/EIA 748
- Contracts over \$50M must be formally determined compliant with ANSI/EIA 748 by the cognizant contract management agency
- EVM is not required for grants, non-developmental level-of-effort engineering services, basic and applied research



NPR 7120.5D –The NASA Project Life Cycle



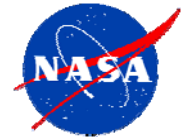
FOOTNOTES

- Flexibility is allowed in the timing, number, and content of reviews as long as the equivalent information is provided at each KDP and the approach is fully documented in the Project Plan. These reviews are conducted by the project for the independent SRB. See Section 2.5 and Table 2-6.
- PRR needed for multiple (≥4) system copies. Timing is notional.
- CERRs are established at the discretion of Program Offices.
- For robotic missions, the SRR and the MDR may be combined.
- The ASP and ASM are Agency reviews, not life-cycle reviews.
- Includes recertification, as required.
- Project Plans are baselined at KDP C and are reviewed and updated as required, to ensure project content, cost, and budget remain consistent.

ACRONYMS

ASP—Acquisition Strategy Planning Meeting
 ASM—Acquisition Strategy Meeting
 CDR—Critical Design Review
 CERR—Critical Events Readiness Review
 DR—Decommissioning Review
 FAD—Formulation Authorization Document
 FRR—Flight Readiness Review
 KDP—Key Decision Point
 LRR—Launch Readiness Review
 MCR—Mission Concept Review
 MDR—Mission Definition Review
 NAR—Non-Advocate Review
 ORR—Operational Readiness Review
 PDR—Preliminary Design Review
 PFAR—Post-Flight Assessment Review
 PLAR—Post-Launch Assessment Review
 PNAR—Preliminary Non-Advocate Review
 PRR—Production Readiness Review
 SAR—System Acceptance Review
 SDR—System Definition Review
 SIR—System Integration Review
 SMSR—Safety and Mission Success Review
 SRR—System Requirements Review

SOURCE: NPR 7120.5D



Subpart 1834.2--Earned Value Management System

1834.201 Policy.

(a) Application of an Earned Value Management System (EVMS) is required for all acquisitions for development designated as major in accordance with OMB Circular A-11, and for development or production contracts and subcontracts, including those for flight and ground support requirements, and institutional requirements (facility, IT investment, etc.) as follows:

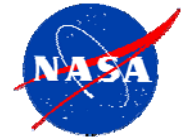
(i) For contracts and subcontracts valued at \$20M or more, and contracts and subcontracts for major acquisitions valued at less than \$20M, the EVMS shall comply with the guidelines in the ANSI/EIA-748 Standard.

(ii) For contracts and subcontracts valued at \$50M or more, the contractor shall have an EVMS that has been formally validated and accepted by the Government.

(iii) For contracts and subcontracts for other than major acquisitions valued at less than \$20M, earned value management application is optional and is a risk-based decision that is at the discretion of the program/project manager.

(iv) EVM is not required on contracts for non-developmental engineering support services, steady state operations, basic and applied research, and routine services such as janitorial services or grounds maintenance services. In these cases, application of EVM is at the discretion of the program/project manager.

(e) Contracting officers shall request the assistance of the cognizant Defense Contract Management Agency (DCMA) office in determining the adequacy of proposed EVMS plans.



Subpart 1834.2--Earned Value Management System

1834.202 Integrated baseline reviews.

(d) Use of pre-award IBRs is limited to the second or subsequent phases of a phased acquisition (see 1817.73). When a pre-award IBR is contemplated, the contracting officer shall include the instructions with respect to the schedule and conduct of the IBR in the proposal request.

1834.203 Solicitation provisions and contract clause.

The FAR EVMS solicitation provisions and contract clause are not used in NASA contracts. See 1834.203-70 for the NASA EVMS solicitation provision and contract clause.

1834.203-70 NASA solicitation provision and contract clause.

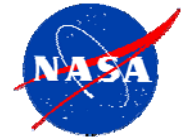
Except for the contracts identified in 1834.201(a)(iv), the contracting officer shall insert –

(a) The provision at 1852.234-1, Notice of Earned Value Management System, in solicitations for contracts for --

(1) Development or production, including flight and ground support projects, and institutional projects (facility, IT investment, etc.), with a value exceeding \$20M; and

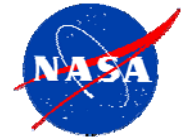
(2) Acquisitions of any value designated as major by the project manager in accordance with OMB Circular A-11; and

(b) The clause at 1852.234-2, Earned Value Management System, in solicitations and contracts with a value exceeding \$50M that include the provision at 1852.234-1. The contracting officer shall use the clause with its Alternate I when the contract value is less than \$50M.



EVM Working Group

- An Agency-level forum that facilitates consistent EVM policy, processes, implementation, training, and tools across the Agency
- Supports the Office of the Chief Engineer (OCE) in the formulation and implementation of Agency wide planning and policy designed to improve programmatic performance assessment and forecasting through the application of EVM methodologies.
- An advisory group to the Director of the Program and Project Management Policy Division and provides recommendations regarding Agency EVM policy, processes, initiatives, and systems.
- Supports NASA Program and Project Managers within their respective Centers, Mission Directorates, and Mission Support Offices by providing leadership, direction, and proactively addressing EVM needs, requirements, and issues.



NASA EVM Working Group

Dorothy Tiffany, NASA HQ/OCE Chair

Jerald Kerby, MSFC, Deputy Chair

David Graham, PA&E

Ken Sateriale, OP

Andrew Hunter, ESMD

Claude Frenner, SMD

Winifred Martin, SOMD

Bob Benedict, OCIO

John Lee, ARC

Mary Odom, DFRC

Peter McCallum, GRC

Garry Gaukler, GSFC

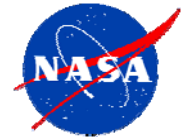
Kevin Rice, JPL

Sam Padgett, JSC

Kristen Kehrer, KSC

Gwen Leach, LaRC

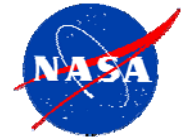
Deborah Norton, SSC



Center Level Role

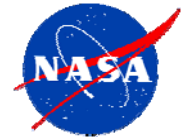
EVM Leads – (at Goddard)

- Serve as Center-level EVM Consultants who facilitate consistent EVM policy, processes, implementation, training, and tools
- Provide support to Projects in the implementation and designed of EVM to support programmatic performance assessment and forecasting through the application of EVM methodologies
- ❖ Support Project Managers within their respective projects by providing direction as it relates to EVM requirements and issues
- Provide RFP and SEB support – EVM requirements on Contract
- ❖ Serve as a Project / Contractor liaison for Contractor IBR's and EVM Reporting
- Support Maintain and Upgrades of EVM Tools and Interfaces
 - Coordinate and Manage Rates to Support Consistency Across Tools
 - Coordinate Servers, Software, and Interfaces with Respective Organizations



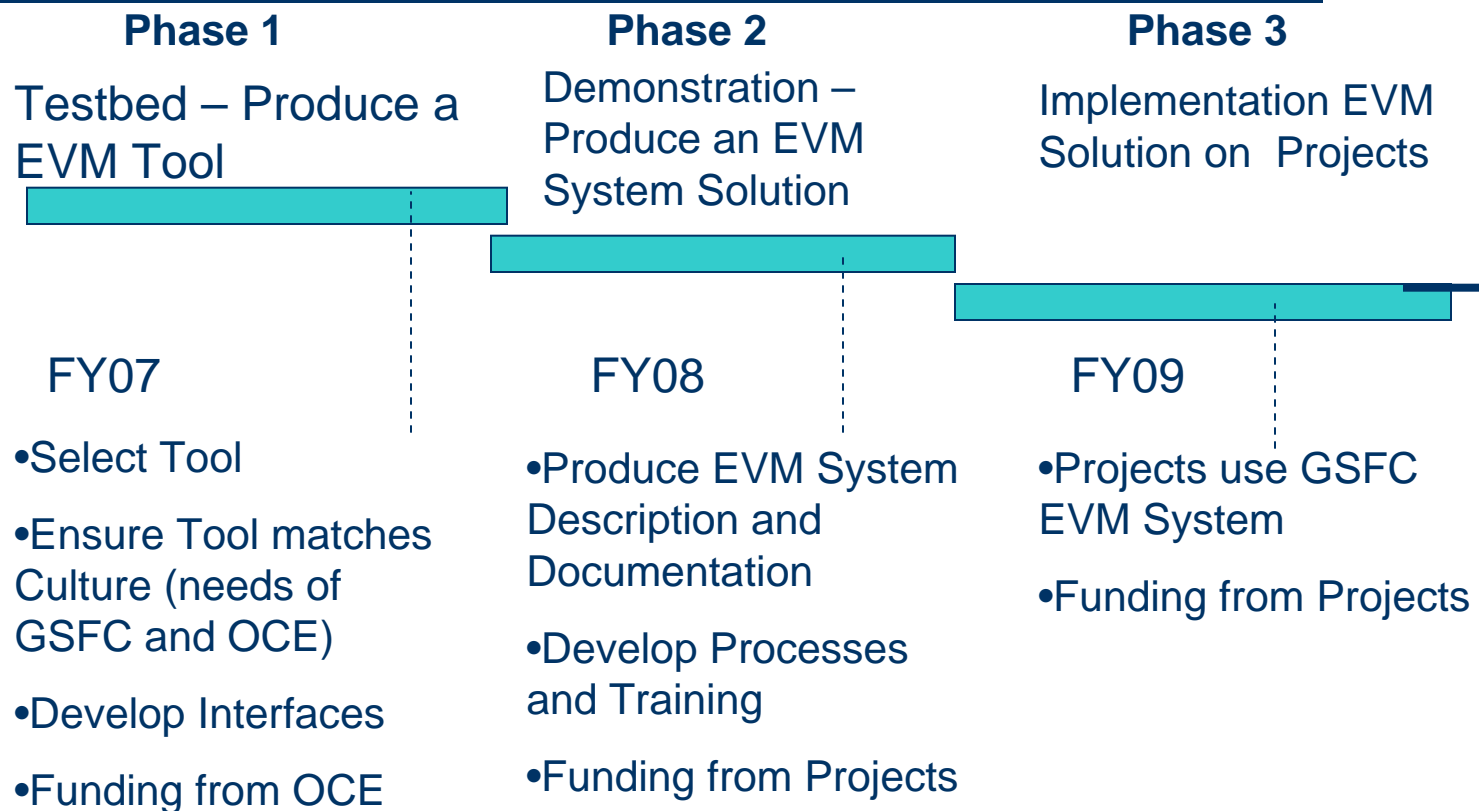
In-House EVM At GSFC and MSFC

- Integrated Asset Management (MSFC)
 - MPM and Primavera integrated on an operational IT project
- Testbed Project using real project data to generate EVM reports (GSFC)
 - MPM, wlnsight and MS Project integrated planning and performance reporting
- Reason for the pilots:
 - Encourage good EVM practices
 - Evaluate integrated EVM scheduling and performance reporting tools in NASA operating environment



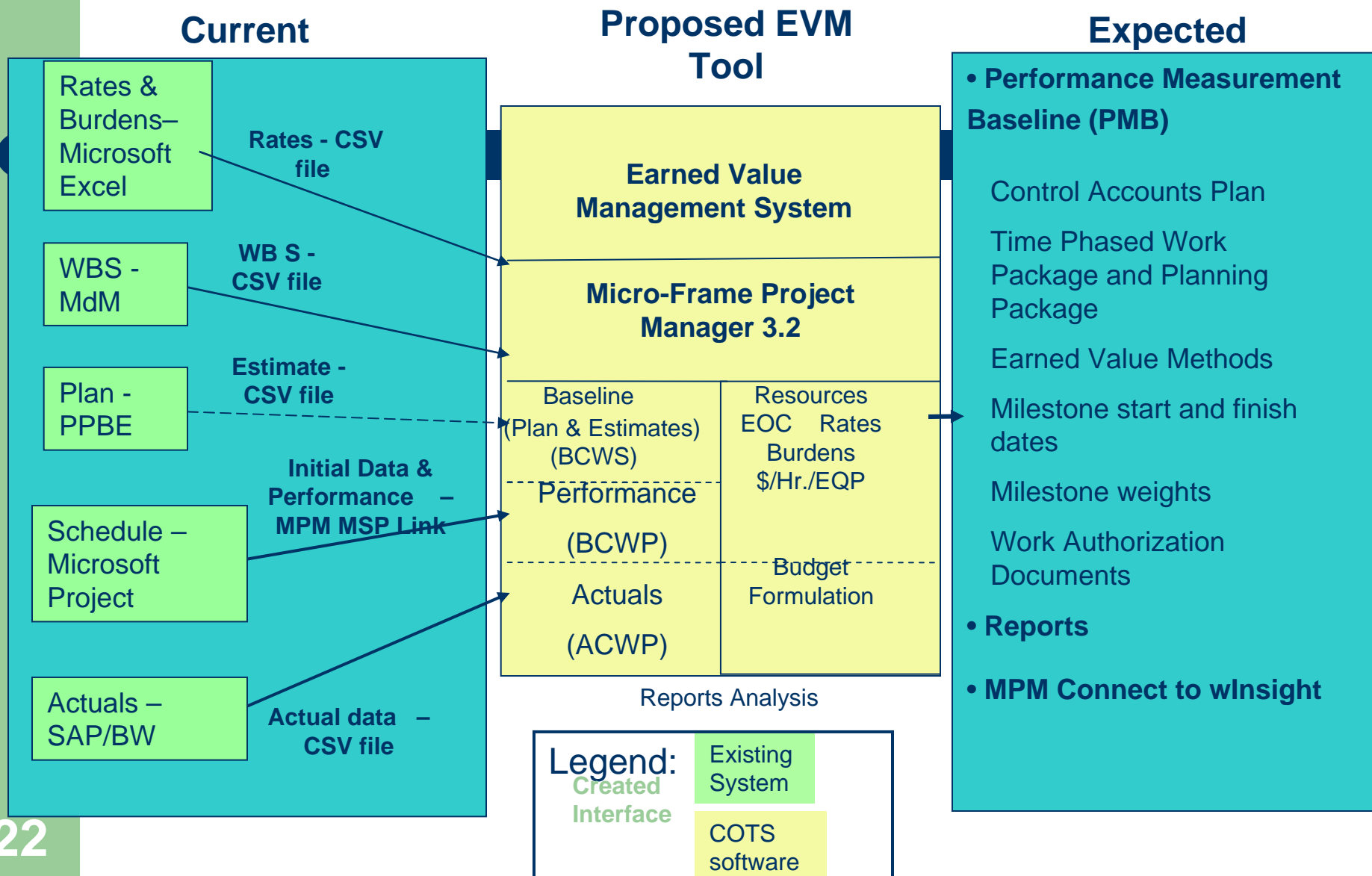
Building the GSFC EVM System

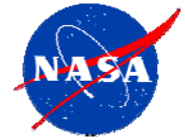
Getting to a Certified System by FY10





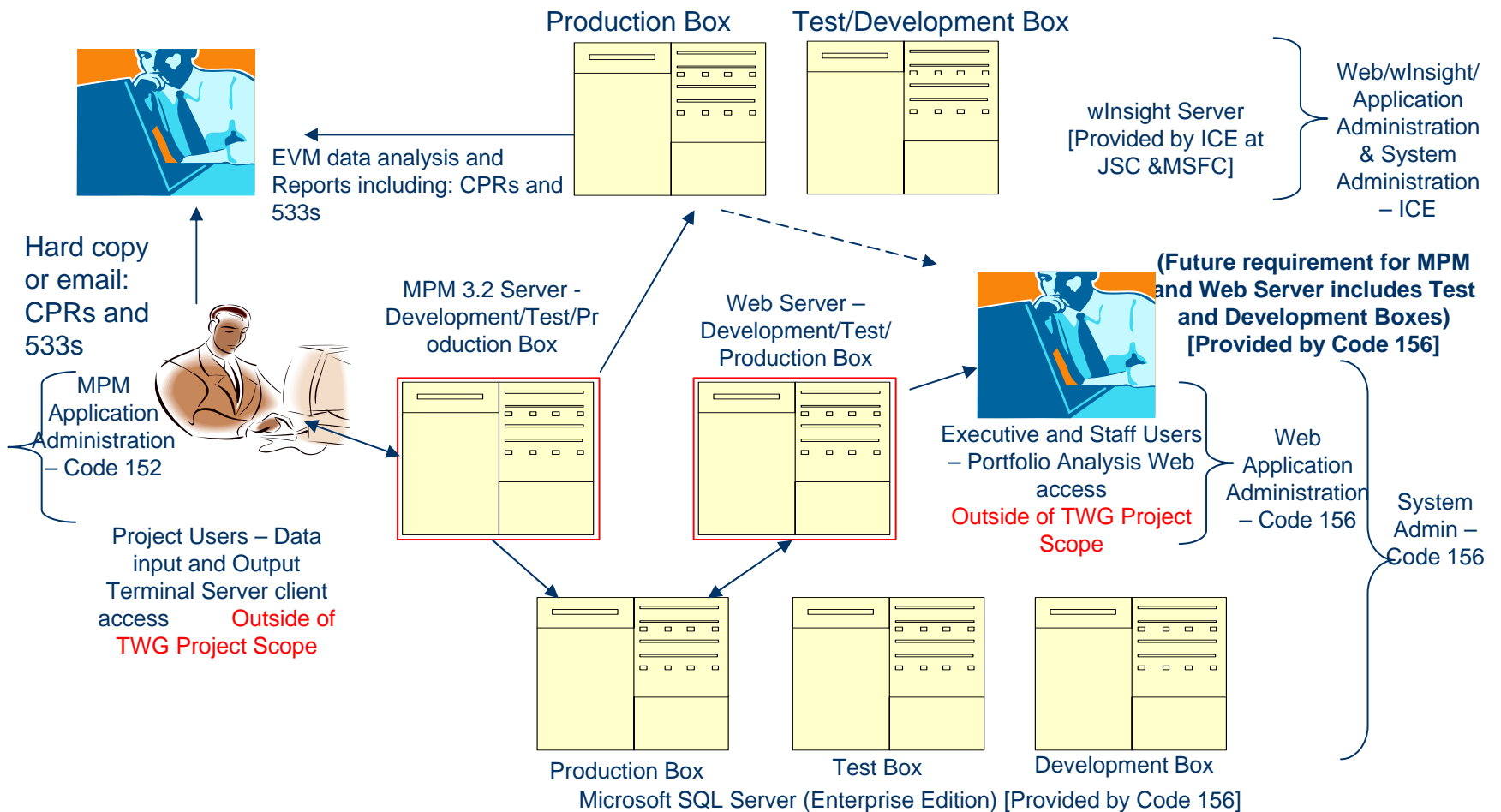
GSFC EVM Tool Architecture and Interfaces

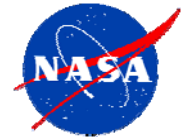




Project Managers and Control
Account Managers – EV Data
Analysis
Web access
Outside of TWG Project Scope

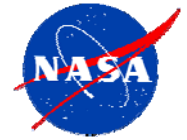
System Layout – Full Production





Major Accomplishments as part of Phase 1 Testbed (FY07)

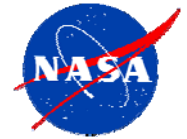
- Support from Upper Level Management
- Completed an Institutional Gap Analysis
 - Internal GSFC
 - JPL and Other Centers
- Establish an in-house EVM Working Group (core team for IPT)
Initial Products following NPR7120.5D release:
 - Flow down of Agency requirements
 - Review of Institutional gap analysis
 - Recommended steps and timeline for implementation
- Developed Mock Data (utilize live data for test bed evaluation)
 - Plan
 - Performance
 - Actuals



Major Accomplishments as part of Phase 1 Testbed (FY07)

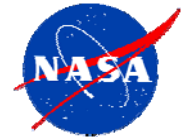
- **Meeting with Technical Working Group (TWG) (GSFC community)**
 - meeting monthly, or bi-weekly as required
 - performance tradeoffs
 - prioritized activities
 - communicate accomplished and operational impacts
 - Document Lessons Learned

- **Identified hardware and software required to support EVM at Goddard**
 - Fully Installed MPM to Support Testbed
 - 7 licenses of MPM 3.2 (LRO, 2 P&S, 2 LDCM, MMS, GPM)
 - 1 license of wInsight 6.3 software (transferred/on loan from MSFC)
 - 1 license of MPM Connect
 - 1 license of wInsight Administrator
 - Under Discussion
 - Code 600 (Sciences) and 500 (AETD)
 - 2nd concurrent license for GPM



Major Accomplishments as part of Phase 1 cont. Testbed (FY07)

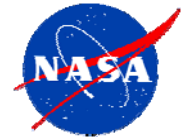
- **Identified tools for Integrating EVM scheduling, budgeting, and performance reporting in an operational environment,**
 - Develop System Interfaces
 - MPM to wlnsight (complete) [MPM Connect – wlnsight Administrator – wlnsight]
 - MdM to MPM (complete) [Excel export – Excel – MPM import]
 - MS Project to MPM (complete) [MPM Microsoft Project Link]
 - SAP to MPM (complete) [Excel export – Excel – MPM import]
 - Goddard Planning Rates into MPM (complete) [FCB Excel – MPM import]
 - Published 7 Work Instructions
 - Setting up Client Computer to Use EV Tools (complete)
 - Logon to MPM Server (complete)
 - Using MPM (complete)
 - MdM to MPM (complete)
 - SAP to MPM (complete)
 - MS Project to MPM for Scheduler (complete)
 - MS Project to MPM for EV Analyst (complete)
 - Goddard Planning Rates into MPM (complete)



Major Accomplishments as part of Phase 1 cont. Testbed (FY07)

- **Identified tools that will support integration and analysis of Project and Contractor data,**
 - Microsoft Project - supports the Master, Intermediate and Detailed schedules by which project performance is measured
 - MPM – is the basis for performance measurement supporting earned value methodologies, import of actual cost and cost schedule integration (MS Project)
 - wInsight – supports EVM reporting (C/SSR, CPR, NASA 533, CCDR) and can serve as the tool for integrating contractor data

- **Identified a tool that has the capability to incorporate data to support Life Cycle Cost Estimate projections,**
 - MPM will support EAC and variance analysis
 - Developed Mock Data in MPM to Support Testbed System Testing
 - Identified Control Accounts within PMB
 - Plan, Performance and Actuals thru June 07(S/P/A equal)
 - Produced schedule and earned value data reports for July, August, and September

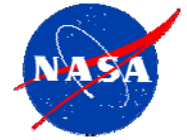


Major Accomplishments as part of Phase 1 cont. Testbed (FY07)

- **Designed a organizational model for deployment of in-house EVM,**
 - Provided a server based system that uses Remote Desktop Connection and identified roles and responsibilities for system integrity and maintenance

- **Identified required EVM skills and training,**
 - EV Analyst, Resource Analyst, Scheduler and Control Account Managers
 - MMS and LRO have EV Analysts on staff
 - Pending mission selection MAVEN may staff up in this area
 - GOES-R has NOAA EV Analysts on staff
 - Training
 - Internal Training (Project Management Team, Schedules, Control Account Managers)
 - GSFC Code 401 Training
 - APPEL Training

- **Identified tools that can support State of the Agency Reporting, Program, and External Performance Reporting requirements.**
 - The GSFC base tool MPM support estimate at complete reporting
 - CPR and NASA 533 (M&Q)



Additional Accomplishments

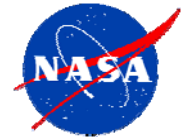
In support of Goddard Standards:

- **System Rates and Calendars**
 - Use of Productive Work Year
 - Budget/Planning- assume ~1747 productive hours per year
 - Actuals = recorded regular hours from ALDS

- **Full Cost Rates:**
 - Settling down to uniform Agency structure
 - Non Reimbursable and Reimbursable Rates for Projects
 - CAAS and CM&O applied to reimbursable
 - Other Charges will continue into FY08, but will be entered as a dollar amount instead of being a calculated rate

- **Visibility into Support Service Contractor Rates**
 - Incorporated composite Contractor Rates into Global Files to support planning
 - Composite rate helps with proprietary concerns

- **Visibility into Support Service Contractor Performance is under discussion**
 - One WBS with One Task order may be used



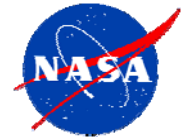
Expectations in Phase 2 (FY08 and FY09)

- **Plan ahead to FY08 Demonstration with projects**
 - Begin Working closer with Projects
 - Continue existence of Working Group

- **Publish EVM System Description**
 - This documents processes and procedures
 - Roles and Responsibilities
 - Define Planning Levels and Thresholds
 - Reporting Requirements
 - Define Relationship to SAP Actuals

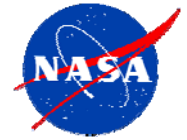
- **Continue Development and Instruct EVM Training**

- **Set-up Demonstration Projects (Scaled to meet Project Requirements)**
 - MMS
 - GPM
 - LDCM



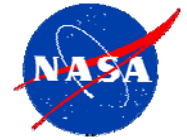
Expectations in Phase 3 (FY09 thru FY10)

- **Implement EVM on all new Projects**
 - Based on System Capabilities
 - Maximum achievable compliance to EIA-748-B
 - Conduct Internal Surveillance
 - Get Ready to Support Agency Compliance



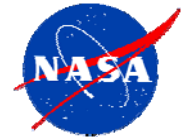
Lessons Learned High Level Summary

- Conduct a Gap Analyst (Culture, Disciplines, Processes and Tools)
- Designed a organizational model for deployment that supports your in-house Model,
- Understand Current Process and Procedures
- More diligence needed in the planning process: define deliverables early, build estimates at a lower level of detail with documentation of all assumptions and involve appropriate team members in the planning process
- WBS should be a true-product-oriented WBS
- Must get EV reporting requirements in contracts, mapping reporting categories to WBS
- Ensure Project Analyst and Contract Cost Administrator are educated in cost application and its impact on EV
- Ensure thorough and continuous communications between all team members and sponsors
- Keep focused on the State of the Agency Reporting, Program, and External Performance Reporting requirements



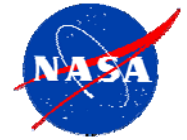
APPEL EVM Courses

- ✓ EVM Overview (6 hours)
- Integrating Cost and Schedule (16 hours)
- ✓ Understanding EVM (16 hours)
- Understanding Project Scheduling (8 hours)
- ✓ Beyond Basics EVM: Baseline Control, Risk Considerations and Performance Indicators (16 hours)
- Beyond Scheduling Basics: Analysis, Control and Reserve Planning (8 hours)
- ✓ Advanced Earned Value Techniques: Recognizing Gaming, Data Abuse and Manipulation (8 hours)
- ✓ Assessing Project Performance (16 hours)
- The NASA Project Budget Process (6 hours)
- Integrating EVM with Acquisition (2 hours)
- Project Management & Systems Engineering – A: Integrated Project Management (20 hours)



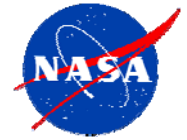
Applied EVM Courses

- ✓ EVM Management Overview Training
- ✓ IBR Training
- Microsoft Project Interface Training
- WBS Development Training (Draft)
- Scheduling Training
- PMB Development Training (Draft)
- ✓ Control Account Management Training
- Work Authorization Process Training (Draft)
- Change Control Training (Draft)
- Project Visibility Training (Draft)
- EAC Development Training (Draft)
- wInsight Trainings (Draft)
- EVM Tool Overview Training (Draft)
- ✓ MPM Training (Vendor Training)



BACK-Up Charts

**EVM Related Websites
Quick Reference Acronym List
Contact Info**



EVM Related Websites

OMB Directives

OMB Circular A11, Part 7: Planning, Budgeting, Acquisition and Management of Capital Assets:

http://www.whitehouse.gov/omb/circulars/a11/current_year/s300.pdf

OMB Circular A 11 Part 7 Supplement - Capital Programming Guide:

http://www.whitehouse.gov/omb/circulars/a11/current_year/part7.pdf

EIA 748

ANSI-EIA 748 Guidelines:

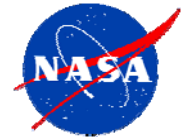
<http://webstore.ansi.org/ansidocstore/product.asp?sku=ANSI%2FEIA-748-A-1998>

NDIA EIA 748 Intent Document:

http://www.ndia.org/Content/ContentGroups/Divisions1/Procurement/EVMS_Intent_Guide_Nov06.pdf

NDIA Surveillance Guide:

http://www.ndia.org/Content/ContentGroups/Divisions1/Procurement/PDFs10/NDIA_PMSC_Surveillanceguide_Oct2004.pdf



EVM Related Websites

NASA Directives

NPR 7120.5D Program and Project Management Requirements:

http://nodis3.gsfc.nasa.gov/displayDir.cfm?Internal_ID=N_PR_7120_005D

NPR 7120.7 Institutional Requirements: not available at publication date

NPR 7120.8 Research and Technology: not available at publication date

NPR 7102.4C Program/Project Management:

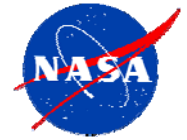
<http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPD&c=7120&s=4C>

NASA FAR Supplement:

<http://www.hq.nasa.gov/office/procurement/regs/nfstocA.doc>

NASA FAR EVM Policy: <http://www.hq.nasa.gov/office/procurement/regs/pn04-19.doc>

NASA Contract Performance Report Formats: <http://evm.nasa.gov/reports.html>



EVM Related Websites

Related NASA Websites

NASA EVM Website: <http://evmnasa.gov/index.html>

NASA APPEL Curriculum Website: <http://appel.nasa.gov/node/28>

NASA PM Challenge Website: <http://pmchallenge.gsfc.nasa.gov/>

NASA PM Knowledge Website: <http://pmknowledge.gsfc.nasa.gov>

DOD EVM Websites and Documents

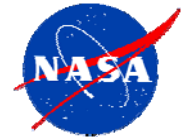
DOD Integrated Baseline Review Guide:

http://www.acq.osd.mil/pm/ibrmats/IBR%20Documents/IBR_PM_Guide_April_2003.doc

OSD EVM Website: <http://www.acq.osd.mil/pm/>

DOD Over Target Baseline Guide:

<https://acc.dau.mil/CommunityBrowser.aspx?id=19576>



EVM Related Websites

Related NASA Websites

DOD CPR DID:

http://www.acq.osd.mil/pm/currentpolicy/cpr_cfsr/CPR%20Final%203-30-05.pdf

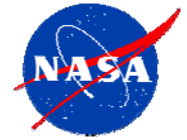
DOD Integrated Master Plan(IMP)/Integrated Master Schedule (IMS)
Preparation Guide:

http://www.acq.osd.mil/se/ed/publications/IMP_IMS_Guide_v9.pdf

Other Relevant Links

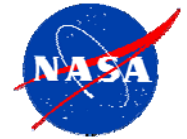
Performance Management Institute: <http://www.pmi.org/info/default.asp>

College of Performance Management: <http://www.pmi-cpm.org/pages/home/index.html>



Quick Reference Acronym List

- AC – Actual Cost
- ACWP – Actual Cost of Work Performed
- ANSI – American National Standards Institute
- BAC – Budget at Completion
- BCWP – Budgeted Cost of Work Performed
- BCWS – Budgeted Cost of Work Scheduled
- CA – Control Account
- CAP – Control Account Plan
- CAMs – Control Account Managers
- CCB – Change Control Board
- CPI – Cost Performance Index
- CPR – Cost Performance Report
- CV – Cost Variance
- DOD – Department of Defense
- EAC – Estimate at Completion
- EIA – Electronic Industries Alliance
- ETC – Estimate to Completion
- ESMD – Exploration Systems Mission Directorate
- EV – Earned Value
- EVM – Earned Value Measurement
- EVMS – Earned Value Management Systems
- GPRA – Government Performance and Results Act
- IBR – Integrated Baseline Review
- LRE – Latest Revised Estimate
- MOA – Memorandum of Agreement
- MOU – Memorandum of Understanding
- NPR – NASA Procedural Requirements
- OBS – Organizational Breakdown Structure
- OCE – Office of the Chief Engineer
- ODC – Other Direct Cost
- OMB – Office of Management & Budget
- PCA – Program Commitment Agreement
- PMB – Performance Measurement Baseline
- PMO – Project Management Office
- PV – Planned Value
- QA – Quality Assurance
- RAM – Responsibility Assignment Matrix
- SOW – Statements of Work
- SPI – Schedule Performance Index
- SV – Schedule Variance
- WBS – Work Breakdown Structure



Points of Contact (POC)

- **Office of Chief Engineering OCE**
 - Dorothy Tiffany (NASA)
Dorothy.J.Tiffany@nasa.gov
301-286-5917
 - Walter.Majerowicz (CSC)
Walter.Majerowicz.1@gsfc.nasa.gov
(301) 286-5622
- **GSFC Earned Value Lead**
 - Vanessa Johnson (SGT)
Vanessa.G.Johnson@nasa.gov
301-286-4683
- **GSFC Earned Value Tools Support**
 - Jeff Kottmyer
 - Jeffrey.T.Kottmyer@nasa.gov
 - 301-286-1572