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A.J. CLARK SCHOOL OF ENGINEERING
Civil & Environmental Engineering Department



A CASE STUDY IN USING EVM TO IMPROVE PROJECT MANAGEMENT AND GAIN FUNDING: THE FEDERAL AVIATION ADMINISTRATION (FAA) STORY

Robert "Bob" Rovinsky

2018 Project Management Symposium



Contents

- Quick FAA Facts and a video
- The Challenge of Disciplined Project Management
- How FAA Got into Trouble
- How FAA got out of Trouble and How EVM Helped
- Lessons we Learned about Project Management and EVM
- “The Rest of the Story” – what happened since 2010
- Summary and Q&A



FAA – Quick Facts

- 12/17/1903 –1st sustained & controlled flight (Orville & Wilbur Wright)
- 07/01/1934 –Bureau of Air Commerce formed
- 08/23/1958 –Federal Aviation Act of '58 signed
- TODAY:
 - Safest System ever! (only 1 fatality in last 8 years in Commercial aviation)
 - 44,852 FAA Employees(FY17)
 - 19,576 U.S. Airports in 2016
 - 663 million revenue Passenger Miles Flown in 2016
 - 606,855 US Pilots



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A Short Video on the FAA

<https://www.facebook.com/FAA/videos/183210356683125>

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The Challenge of Disciplined Project Management

- We are not doing a good job of Managing Large and Small Projects in the Federal Govt and related sectors.
- The Problem is worse than we think or report.
- The Problem is not one of knowledge – we know how to do good project management
- The Problem is not one of Politics or Malfeasance.
- The Problem is not anyone's fault as everyone is doing the best that they can.
- The Problem is a Systems problem and will take systematic thinking to fix it
- Some Suggestions to start fixing the problem.



How FAA got into Trouble and on the GAO High Risk List 1980-1995

- Background to the FAA's Capital Investment Plan
- Project Management
- Early Signs of Problems
- The Advanced Automation System debacle
- What we learned about Fantasy Factors
- Our Cost Benefit Problem and Yours
- Budget Games and "Getting the Agency Pregnant"
- Inspector General and GAO reports
- Denial and Anger



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Consequences

- The long slow decline of funding
- Effect on Program Managers
- Response of Senior Managers
- Effects on Contractors
- The Rise of internal reviews
- The Move to a New Acquisition System
- Responses to GAO, OMB and IG audits



Early Steps to Recovery 1996-2003

- The New Acquisition Management System
- The Fantasy Factor Report and changes in cost estimation
- Progress in Process Improvement and Best Practices
- Enterprise Architecture Efforts
- Investment Analysis Teams
- Early collaborative efforts with GAO and the IG



The Role of Program Management and Capital Planning and Investment Control 2004-2009

- The Problem with Capital Planning (Exhibit 300s) and our Efforts to remediate
- The Commitment to institutionalize Best Practices in Project Management
- Early Feedback from OMB
- GAO interest and our involvement
- Contractor Involvement
- Progress 2006-2008
- GAO Audits in FY 2008
- Progress and Planning in FY 2009



Final Push 2007-2009

- The CIO takes charge
- The Plan emerges and is shared with GAO
- The Six Focus areas
- Progress in the first and second years
- A Critical Seventh area emerges
- The final meeting with GAO and statements from the Administrator
- GAO Decides



What factors GAO considers

- A demonstrated strong commitment and top leadership support to address the risks
- Capacity to address risks
- A Corrective Action Plan that addresses root causes, and that addresses the issues GAO raises and implements solutions
- A program to monitor and independently validate the effectiveness of the corrective measures
- The ability to demonstrate progress



Lessons Learned about the Program Management for your Organization

- Program Management occurs in an interrelated system involving budget, acquisition, personnel, IT, executive leadership, internal oversight and a toolset – and will fail if any of these parts are weak or the system is dysfunctional
- To improve program management, Agencies need three champions at three levels
- It is not necessary to be green – variances are good
- The secret to success – experienced skilled program managers, a healthy, committed support system, a quality toolset, and proactive oversight.



The Critical Role of Earned Value Management

- Background – History and Drivers for EVM (2003-05)
- The Major Steps we Took
 - FAA EVM Council
 - Commitments to OMB and GAO
 - Assessing our programs against the EVM standard
 - The EVM Flag
 - Meeting with major contractors and support constructors
 - Revisions to FAA acquisition policy
 - Executive Briefings and Training



Background – History and Drivers for EVM

FY 03-04 FAA Business Case Failure and Recovery: The original driver for the EVM initiative

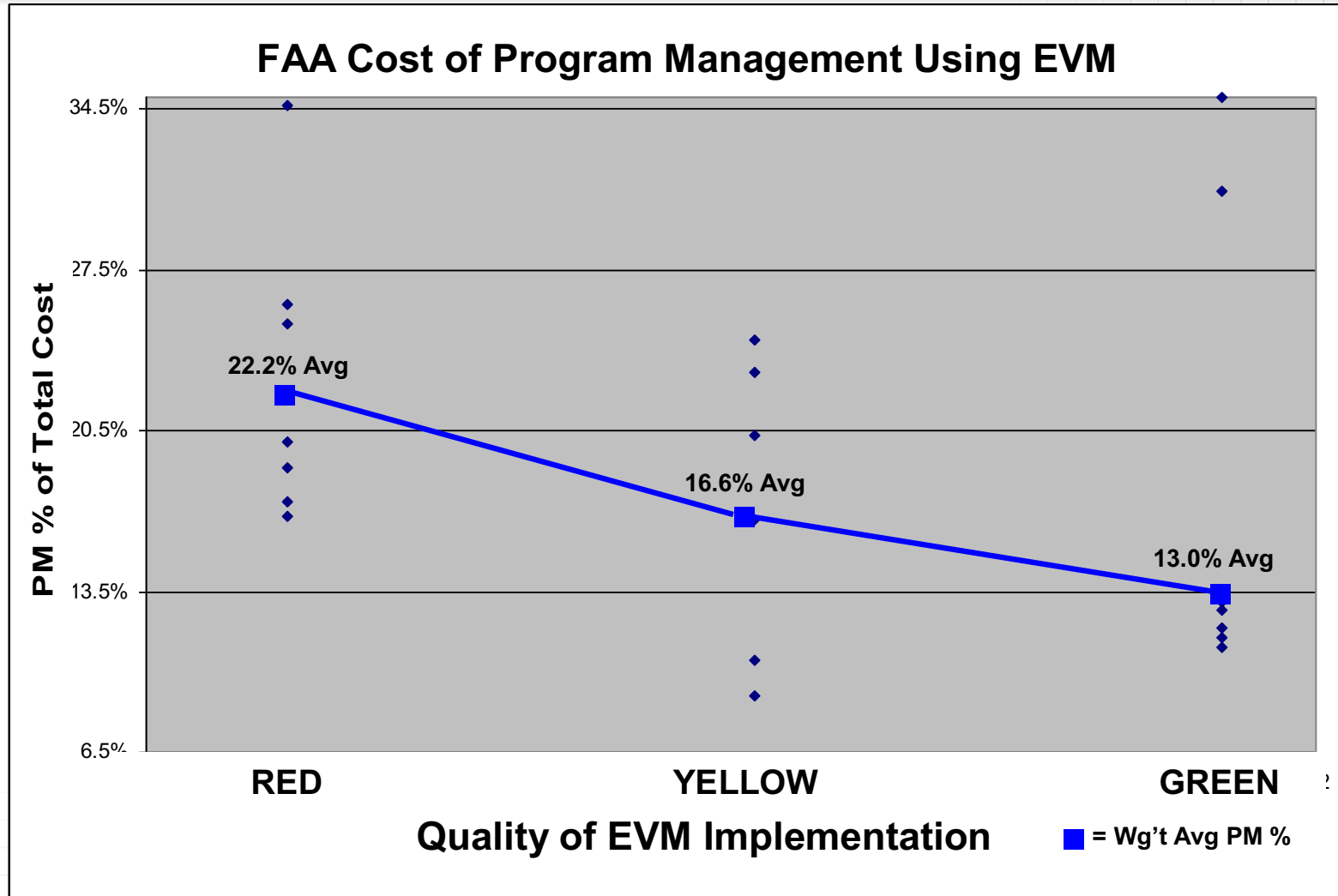
2005:

- We assessed our major investments (80% of FAA capital expenditures) against the industry EVM Standard and produced our “EVM Flag”.
- We committed to OMB and GAO that FAA would implement full EVM on our major acquisitions by the end of 2007.
- We established FAA’s EVM policy.



Progress in 2006

- We formed a multi-functional EVM Council
- We met with our major prime and support contractors on our plan and solicited industry best practices
- We conducted a “cost and benefits of EVM” study
- We revised FAAs Acquisition Policy to:
 - Establish Standard Program Milestones
 - Require Implementation Strategy and Planning (ISP) requirement for EVM plan
- Result: Significant traction toward FAA compliance targets
- We produced a Lay Guide to EVM
- All FAA Acquisition Executives received EVM Executive Briefing
- We developed standard program milestones for EVM



<http://pmsymposium.umd.edu>

- Quality of EVM implementation based on EVM assessments (FAA EVM Flag)
- PM% of total cost based on FY06 Resource Planning Document (RPD)



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FAA's EVM Council 2006-13

- Composed of representatives across the agency and all disciplines
- Lead the timely development, implementation and operation of FAA EVMS procedures, policies, training and tools to fully realize efficiencies and savings arising from the adoption and continuous improvement of a common EVMS employing best practices.
- Provided support to Agency wide program management with respect to implementation of EVM on FAA programs as required by Acquisition Policy and the FAA EVM Guide.
- Reviewed and evaluates draft EVM policy documents, including pertinent background information and special instructions or requirements to ensure all internal stakeholders are involved in the development and implementation of the FAA EVMS.
- Oversaw the implementation and application of common EVM methods throughout FAA.



Progress in 2007

- Achieved Green EVM assessments for the 2005 legacy programs
- Established Portfolio/Program Performance Metrics (P³M)
- Established requirement for product oriented WBS
- Conducted EVM Data and Tools Studies
- Conducted ANSI Accounting Guidelines EVM assessment
- Conducted more EVM industry days
- FAA Decides to try to get off GAO High Risk List; GAO sees our EVM effort as a step in right direction.



FAA Major Programs - EVMS Assessment Summary (November 2007 - Final)

http://pmsymposium.umd.edu

Program Name	Organizing						Planning						Performing						Analysis & Reporting					Change Management															
	1 WBS	2 OBS	3 WBS/OBS Integration	4 Overhead responsibility	5 WBS/OBS Reporting	Average	6 Schedule / interdependencies	7 Schedule Milestones	8 Time Phased Budget Baseline	9 Budget Elements of Cost (EOC)	10 Control Account WP & PP	11 Control Account Budgeting	12 LOE budgeting	13 Overhead Budgeting	14 MR & UB	15 Program Budgeting	Average	16 Record direct costs (3)	17 Summarize CAs into WBS	18 Summarize CAs into OBS	19 Record indirect costs	20 Identify unit costs (3)	21 MMA S	Average	22 Cost & Schedule Variances	23 Variance Analysis Reports	24 Indirect Cost Variances	25 WBS /OBS Variances	26 Corrective Actions	27 Estimates at Completion	Average	28 Timely Change Planning	29 Reconcile Change	30 Control Retroactive Changes	31 Limit to Authorized Changes	32 Document PMB Changes	Average		
Planning Programs																																							
ASR-9 Phase II																																							
Data Comm																																							
NAS Voice Switch																																							
NextGen																																							
Acquisition / Mixed Life Cycle																																							
ATOP																																							
ERAM																																							
SBS																																							
TMA																																							
ASDE-X																																							
ASR-9 1a																																							
ASR-9 1b																																							
ASR-11																																							
ASWON																																							
ATCBI-6																																							
ITWS																																							
STARS																																							
TAMR																																							
FTI																																							
IFPA																																							
NEXCOM																																							
SWIM																																							
VSCS																																							
WAAS																																							
ASKME																																							
RCISS																																							
SASO																																							
TFM																																							
FAA Average																																							

	Guideline Area and/or Guideline meets the intent of the EVMS Standard.
	Guideline Area and/or Guideline partially meets the intent of the EVMS Standard.
	Guideline Area and/or Guideline does not meet the intent of the EVMS Standard.
	Guideline Area and/or Guideline has not been assessed.



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Progress in 2008

- Completed EVM Guides for Project Managers and Contracting Officers
 - Integrated Baseline Reviews
 - Surveillance Guides
 - EVM System Acceptance Guide
- Revised EVM assessment criteria – consistent with NDIA Intent Guide
- Formulated product oriented WBS using standard program milestones
- EVM progress reported to GAO as part of High Risk Initiative



Progress in 2009

- FAA Gets off the High Risk List!
- Acquisition Executive Board formed to institutionalize best practices including EVM
- Developed methodology/criteria for “fee for service” projects
- FAA one of only two federal agencies to certify contractors not already DCMA certified
- FAA EVM approach adopted by Dept of Transportation



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FAA Major Programs - EVMS Assessment Summary (October 2008- Final)

Program Name	Organizing					Planning					Performing					Analysis & Reporting					Change Management					Overall														
	1 WBS	2 OBS	3 WBS/OBS Integration	4 Overhead responsibility	5 WBS/OBS Reporting	6 Average	6 Schedule / interdependencies	7 Schedule Milestones	8 Time Phased Budget Baseline	9 Budget Elements of Cost (EOC)	10 Control Account WP & PP	11 Control Account Budgeting	12 LOE budgeting	13 Overhead Budgeting	14 MR & UB	15 Program Budgeting	16 Average	16 Record direct costs (3)	17 Summarize CA's into WBS	18 Summarize CA's into OBS	19 Record indirect costs	20 Identify unit costs (3)	21 MMAS	22 Average	22 Cost & Schedule Variances		23 Variance Analysis Reports	24 Indirect Cost Variances	25 WBS /OBS Variances	26 Corrective Actions	27 Estimates at Completion	28 Average	28 Timely Change Planning	29 Reconcile Change	30 Control Retroactive Changes	31 Limit to Authorized Changes	32 Document PMB Changes	33 Average		
Acquisition / Mixed Life Cycle																																								
FAA Program - A																																								
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FAA Program - T																																								
FAA Program - U																																								
FAA Program - V																																								
FAA Average																																								

IN 2010 we were: 82% Green, 17% Yellow and 1% Red



EVM at the FAA, 2009-2013

- Many of the Program Management Metrics reported to senior executive board used EVM data.
- Standard Program Milestones improved completion criteria and mapped to FAA standard WBS.
- EVM defined Program Baseline WBS used for Final Investment Decisions
 - Our OMB Exhibit 300 format used the same Program Baseline WBS
- We used EVM for DOT program performance “Bubble Chart” reports to OMB
- We used Primavera for the Corporate Workplan – it is the enterprise schedule management solution for EVM
- Our Implementation Strategy & Planning document used to document the program EVM plan.



- **Program manager, Dieter Thigpen,**

“earned value data clearly identified schedule performance variances and got management attention quicker as compared to the traditional approach not using EVM”.

- **Kevin Sharrett, Program Manager,**

“Implementing EVM provides early visibility into future schedule risks that we did not have before. As a result of the schedule risk assessment the ASR-11 EVM plan, we accelerated 5 system deliveries from 2007 to 2006 to mitigate our schedule risk for the last site Operational Readiness Demonstration which is baselined for 9/30/2009. We also had the schedule analysis to justify construction and systems acquisition funds in the first quarters of 2007 under the CR that had become critical for Last ORD if delayed. Implementing EVM has provided the ASR-11 team members more insight and involvement into the overall program cost and schedules.”



- **Dan Watts, Program manager,**

“Earned value data is the only true indicator I have to obtain insight for cost and schedule performance for a large scale complex program like ERAM”.

- **Program manager, Bill Boyer,**

“EVM is one of the more powerful tools in my PM toolbox. EVM allows me to see the variations in program execution that enable me to take action to resolve issues that are often beyond the capability of the prime contractor to handle. With EVM, I am better able to manage planning and execution of program funds, better able to track program progress against a benchmark, and better able to work with the prime contractor and the support contractors to apply resources when needed...and where needed.”

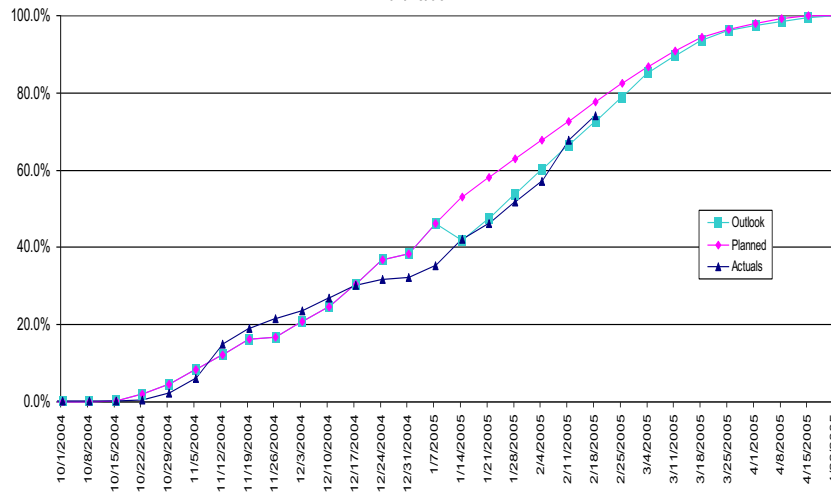


- EVM Training and Reporting was customized

- We made extensive use of FAA standard program milestones
 - Program Baseline WBS
 - Program phases / useful segments
 - Schedule completion criteria
 - Control account definitions
- We included FAA enterprise tools (SPIRE, WorkLenz, and Primavera) in training
- EVM training is consistent with FAA Accounting Order 2500.8B: FAA funding types tightly linked to EVM and training included accounting system examples
- Acquisition program baseline definitions used, and EVM tightly linked to program life cycle
- FAA risk management process used
- FAA program examples & best practices are used



ERAM
ESI Drop 2 Progress
02/18/05



	Weight	Plan	Actuals	Outlook	Delta	Prev Delta	Delta AO
Testcase Dev	30.0%	100.0%	100.0%	100.0%	0.0%	0.0%	0.0%
Testcase Exe	70.0%	68.0%	62.9%	61.0%	-5.1%	-6.9%	1.9%
Total	100.0%	77.6%	74.0%	72.7%	-3.6%	-4.8%	1.3%

	New	Regr
Testcase Dev # Exit Criteria	167	
Testcase Exe # Exit Criteria	185	56

EVM reporting integrated with monthly PMRs

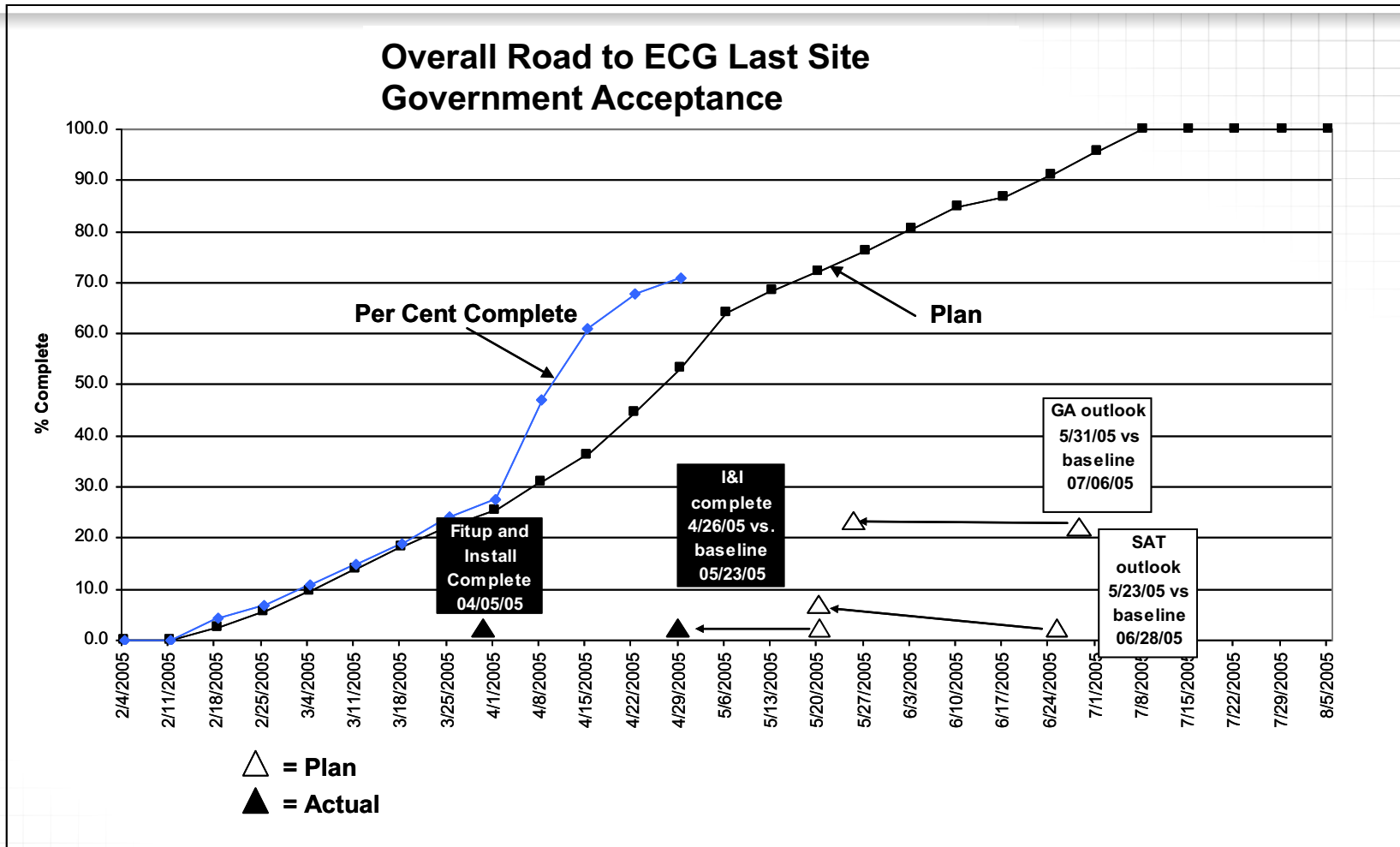
Drop 2 ESI Progress

Successes:

- Able to load all processor types and roles. ELOM functionality working well
- Can display Target, track, & strobe data on glass
- Can display an active flight plan in the Aircraft List. Can amend it and remove strip.
- SAR data already being used for debugging defects. Initial set of EOPD reports working.
- ELOM onboard cache working
- Can load/unload and configure a single OpSim session

Still Working

- Multiple OpSims & Adaptation variations
- Continue testing Surveillance & Wx threads
- Release Management Threads
- Continue with EOPD report testing
- Continue with dynamic library testing



FFP EVM reporting using performance based payments



Program Summary Metrics

Cost	Schedule	Performance	Resources	External Interest	Program
G	G	Y	Y	Y	G

Supporting Metrics

Portfolio Metric	Cost	Schedule
Definition	Measure of cost performance of work performed	Measure of schedule performance of work performed
EVM Metrics		
- Cost Performance Index (CPI)	G	
- Program Cost Reserve	G	
- To-Complete Performance Index (TCPI)	G	
- Cost Variance-At-completion (CVAC) %	G	
- Schedule Performance Index (SPI)		G
- Program Schedule Reserve		G
- Schedule Variance-At-Completion (SVAC) %		G
Level 1 AMS Milestones		
- Negative Deviations		G
Flight Plan Acquisition Program Goals		
- Schedule		G

Portfolio Metric	Performance
Definition	Measure of technical metrics and milestones of work performed
Level 1 AMS Milestones	
- Negative Deviations	G
Technical Metrics	
- Requirements Stability	G
- System Defects	Y
- Test Results	n/a
- Deployment	G
- Value of remaining High Risks	G**
- Technical Variance At-Completion (TVAC)	G

Portfolio Metric	Resources	External Interest
Definition	Measure of current funding and staffing	Assessment of External Reviews
Resource Metrics		
- Prime Contractor	Y	
- Support Contractors	G	
- FAA	G	
- Funding	G	
- Obligations	G	
Flight Plan Acquisition Program Goals		
- Cost	G	
External Reviews		
- IG		Y
- GAO		G
- OMB		Y



“FAA has taken important steps to oversee program compliance with EVM policies, but its oversight process lacks sufficient rigor.”

Seven Key Components of an Effective EVM Policy

Policy component

Assessment of
FAA policy

Establish clear criteria for which programs are to use EVM

Fully met

Require programs to comply with national standards

Fully met

Require programs to use a standard structure for defining the work products that enables managers to track cost and schedule by defined deliverables (e.g., hardware or software component)

Partially met

Require programs to conduct detailed reviews of expected costs, schedules, and deliverables (called an integrated baseline review)

Fully met

Require and enforce EVM training

Partially met

Define when programs may revise cost and schedule baselines (called rebaselining)

Partially met

Require system surveillance—routine validation checks to ensure that major acquisitions continue to comply with agency policies and standards

Fully met



FAA's EVM Transformation Major Accomplishments 2005-2010

- ALL major programs implemented EVM
- More than 50% of Program Managers used EVM as an integral part of managing their programs
- FAA Executives understanding and using EVM as part of critical investment decisions
- OMB, GAO recognized FAA as leading federal agency for EVM
- Funding reduced in 2003-6 slowly restored in 2006-10, resulting in over 100 Million dollars more available for FAA programs
- Fewer and less painful audits for FAA PMs using EVM
- Industry sees FAA as their partner and shares best practices



Keys to success

- **We obtained and have kept Executive Management Support**
 - EVM protects FAA's Capital Investment funding
 - EVM helped remove FAA from the GAO high risk list
 - Our EVM Leadership position helps convince our vendors, aviation partners and stakeholders that FAA is a good steward of the taxpayers and airline user fees money
- **We obtained and have Project Management Support**
 - We tailored EVM implementation based on type of contract and scope and avoided legacy EVM Problem areas
 - We provided clear, and concise ANSI/EIA 748 criteria
 - We adapted the NDIA EVM Intent Guide using FAA terms, processes, and documents
 - We reached out to our major PMs and our prime contractors



Keys to success (continued)

We kept our stakeholders and the industry fully engaged.

- Contractors and Program Managers see this as a win-win.
- We did constant socialization with GAO, OMB, the Department of Transportation and other agencies.
- We provided our materials – policies, guidelines, best practices, training materials, guidebooks and analyses – to everyone.

**We focused on improving project performance rather than EVM.
It was the transformation caused by EVM, not EVM itself.**

We focused on fixing the problems with our projects, not fixing the blame, and on continuous improvement.

We involved everyone, both inside and outside the agency.

We never declared victory, but we always demonstrated concrete progress.

We were not afraid to show our costs and to be transparent about what our problems and challenges were and are.



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What we learned and want to share with you

- The proper balance between oversight and engagement is critical
- The involvement of staff and contractors with program management experience and empathy is key
- Constant pressure is needed to make change.
- EVM must evolve to broader program management excellence
- Constant education for and use by senior managers is required
- Program teams must be encouraged or forced to employ the right folks
- Standard tools/data/methods are critical and usually more acceptable to program teams.
- Deciding when to do it for them vs teaching them to do it for themselves is an art form.
- Metrics and measurement and transparency is critical
- The external reviewers can be your best friends
- You are never done and the “elephant walk” may always return.



The Empire Strikes Back, 2010-2012

- Some senior program managers questioned use of EVM and sought to reduce “overhead” and oversight
- EVM staff reduced and reporting decreased
- Results: some major “surprises” costing over 100 million dollars starting in 2011



Slow Recovery 2013-Present

- EVM staffing increased slowly
- New Project Management Office and Acquisition Offices returned to using metrics including EVM
- EVM seen as a good use of resources
- Slow re-emergence of Management oversight and Executive Leadership



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Thank You for Inviting me!

Are there Any Questions?

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