Acquisition Reform: Integrate Technical Performance with Earned Value Management

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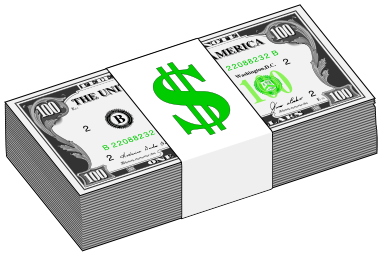
NDIA Systems Engineering Conference
San Diego **October 27, 2011**

Agenda

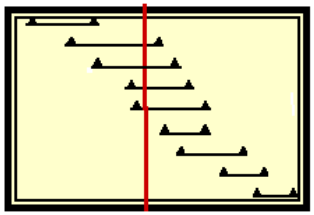
- Link EV to Technical Performance/Quality
- Government Needs and Acquisition Reform
- Standards, Models and DoD Guides
- Practical Application
- Proposed EVM Acquisition Reform

Does EVMS Really Integrate?

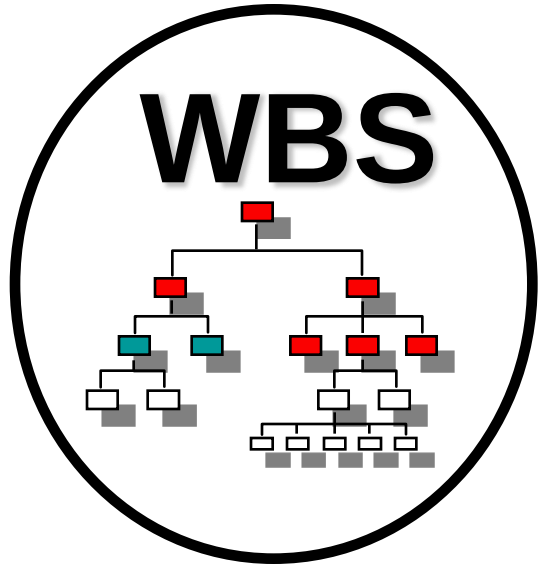
EVMS



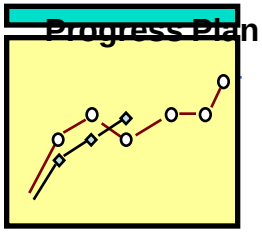
COST



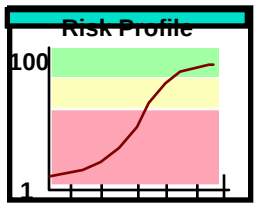
SCHEDULE



TECHNICAL PERFORMANCE



RISK



Value of Earned Value

"EVM data will be reliable and accurate only if:

- **The right base measures of technical performance are selected**

  and

- **Progress is objectively assessed" (a)**

(a) "Integrating Systems Engineering With Earned Value Management" in *Defense AT&L Magazine*, May 2004

Government Needs and Acquisition Reform

Office of Management and Budget (OMB)

- **OMB Circular No. A-11, Section 300**

  Planning, Budgeting, Acquisition and Management of Capital Assets

  - **Section 300-5**
    - ***Performance-based*** **acquisition management**
    - **Based on EVMS standard**
    - **Measure progress towards milestones**
      - **Cost**
      - ***Capability to meet specified requirements***
      - **Timeliness**
      - ***Quality***

DoD EVM Report to Congress

2009 Report: *DoD Earned Value Management: Performance, Oversight, and Governance* (1)

"Utility of EVM has declined to a level where it does not serve its intended purpose."

Findings and Recommendations:

- ***Inaccurate*** **EVM status data provided by vendors**
- **Use *Technical Performance Measures* (TPM)**
- **Integrate *Systems Engineering* (SE) with EVM**

(1) Required by Weapon Systems Acquisition Reform Act (WSARA)

DoD Report : TPM (1 of 2)

Use TPMs

- **EV process is reliable and accurate only if**
  - ***TPMs*** **are identified and associated with completion of appropriate work packages**
  - ***Quality of work*** **must be verified**
  - ***Criteria*** **must be defined clearly and unambiguously**

DoD Report : TPM (2 of 2)

Use TPMs

- **If good TPMs are not used:**
  - **Programs could report 100 % of earned value..even though *behind schedule***
    - **Validating requirements**
    - **Completing the preliminary design**
    - **Meeting weight targets**
    - **Delivering software releases that meet the requirements**
- **Program Managers ensure that the EVM process measures the quality and technical maturity of technical work products instead of just the quantity of work performed**

National Defense Authorization Act for FY 2011

Sec. Def. to review defense acquisition guidance, including DoDI 5000.02

- **Consider "whether measures of *Quality* and *technical performance* should be included in any EVMS."**
- **Submit report to the Congress by Sept. 27**
  - **Changes in acquisition guidance, if needed**
  - **Actions to implement changes**

Pertinent articles:

- ***Defense AT&L Magazine*, May/June 2011: "Path to EVM Acquisition Reform**
- **DoD *Journal of Software Technology*, August 2011: "Improving the Quality of EVM Information"**

DoD Need: Integrated Testable Requirements

Memo: Test & Evaluation of DoD Programs (1)

1. **Improve relationship among testing, require-ments and program management communities**
2. **Well defined, testable requirements**

- Requirements development must be informed by technical feasibility and ***rigorous trade-off analysis***.
- Define requirements in ways that are clear and ***testable***…should be achieved as early as possible.
- Define requirements in ways that provide *meaningful* ***increments of operational capability.***
- Define requirements in ways that enable efficient program execution.

(1) 6/3/2011, signed by USD for AT&L, Ashton Carter and Director OT&E, J. Michael Gilmore.

EVMS Quality Gap

EVMS Standard, Federal Acquisition Regulation (FAR) and Defense FAR Supplement (DFARS) are deficient:

No **guidance or requirement to link**

- **Reported EV**

  with

- **Progress toward meeting *Quality/technical performance requirements***

EVMS Quality Gap

Quality Gap

EVMS Standard shortfall (3.8):

- **"EV is..measurement of *quantity* of work"**
- ***"Quality* and *technical* content of work performed are *controlled by other means" !?***

Defense Acquisition Program Support Methodology (DAPS) V2.0: EVMS (3.4.3.Q3):

"EVMS has no provision to measure quality"

EVMS Quality Gap

EVMS Standard shortfall (Guideline 2.2b):

Identify

- **physical products**
- **milestones**
- **technical performance goals**

"or"

- **other indicators**

that will be used to measure progress.

Quality Gap

"or" **not** ***"and"***

Guidance in Standards, Models, and DoD Guides

Guidance in Standards and Models

- Processes for Engineering a System (ANSI/EIA-632)
- Standard for Application and Management of the SE Process (IEEE 1220)
- Capability Maturity Model Integration (CMMI®)
  - CMMI for Development, Version 1.3
  - CMMI for Acquisition, Version 1.3
  - *Using CMMI to Improve Earned Value Management* , 2002
- Guide to the Project Management Institute Body of Knowledge (PMBOK Guide®), 4th Edition

PMBOK® Guide

5 Project Scope Management

In the project context, the term scope can refer to

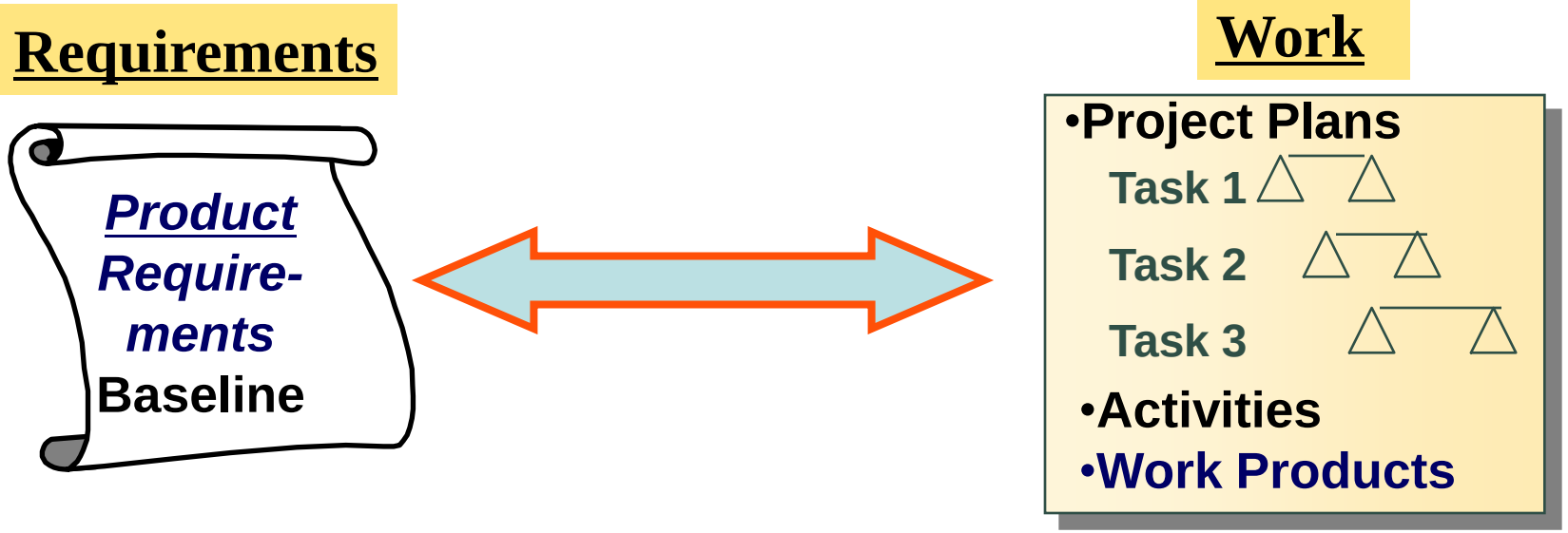
- ***Product scope.*** **The *features* and *functions* that characterize a product, service, or result**
- **Project scope. The *work* that needs to be accomplished to deliver a product, service, or result with the specified features and functions.**

11.6.2.4 Technical Performance Measurement

- **TPM compares technical accomplishments during project execution to the … schedule of technical achievement.**
- **It requires definition of objective, quantifiable TPMs which can be used to compare actual results against targets.**

Product Requirements Baseline

- **CMMI®, PMBOK Guide® : *Align***



Source: CMMI Requirements Management Process Area (PA), Specific Practice (SP) 1.5

CDR Success Criteria

IEEE 1220, (6.6): Success Criteria (CDR)
• Design solution meets: – *Allocated performance requirements* – *Functional performance requirements* – Interface requirements – Workload limitations – Constraints – Use models and/or prototypes to determine success

DoD Guides: Integrated Planning

DoDI 5000.02, Operation of the Defense Acquisition System (POL) 12/08
Defense Acquisition Guidebook (DAG)
Systems Engineering Plan (SEP) Preparation Guide 4/08
WBS Handbook, Mil-HDBK-881A (WBS) 7/30/05
Integrated Master Plan (IMP) & Integrated Master Schedule (IMS) Preparation & Use Guide 10/21/05
Guide for Integrating SE into DOD Acquisition Contracts (Integ SE) 12/06
DAPS V2.0 3/20/09

Derivation and Flowdown of TPMs

Source, Baseline, Measures	Technical Review	Parameter
Capabilities Development Document (CDD)		Key Performance Parameter (KPP)
Functional Baseline	System Functional Review (SFR)	Measures of Effectiveness (MOE)
Functional Baseline	SFR	Measures of Performance (MOP)
Allocated Baseline	Preliminary Design Review (PDR)	TPM
Integrated Master Schedule		TPM Milestones and Planned Values
Work packages		TPM-based % complete criteria

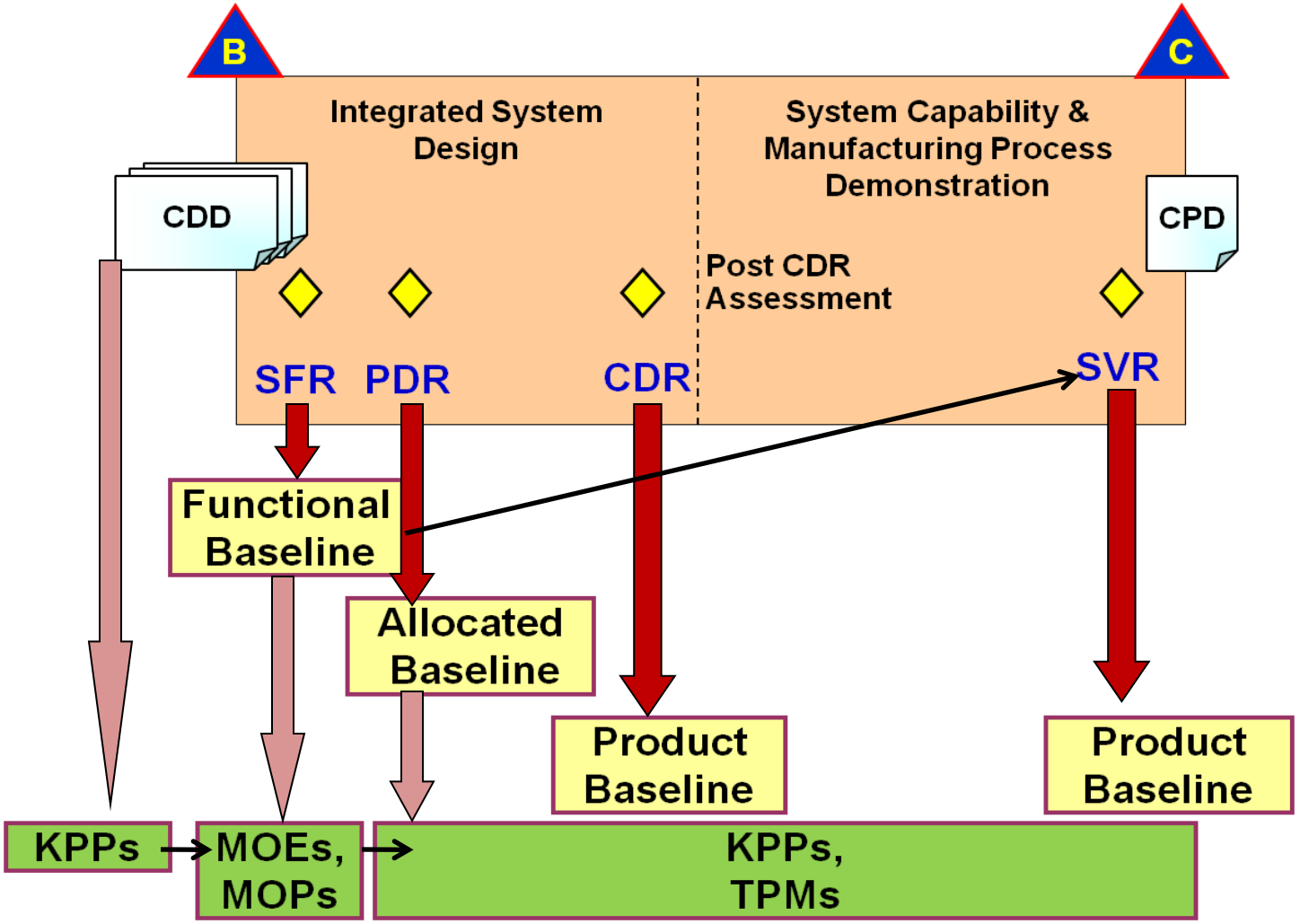
DoD: Technical Baselines And Reviews

DoD Policy or Guide	POL	DAG	SEP	WBS	IMP/ IMS	Integ SE	DAPS
Technical Baselines in IMP/IMS (Milestones): • Functional (SFR) • Allocated (PDR) • Product (CDR)		X				X	X
Technical Reviews:							
• Event-driven timing of technical reviews	X	X	X	X	X	X	X
• Success criteria of technical reviews	X	X	X	X	X	X	X
• Include entry and exit criteria for technical reviews in IMP and IMS		X	X			X	X
• Assess technical maturity in technical reviews		X	X	X		X	

DoD: Integrated Plans

DoD Policy or Guide	POL	DAG	SEP	WBS	IMP/ IMS	Integ SE	DAPS
Integrate SEP with: • IMP/IMS • *TPMs* • EVM		X	X		X	X	X
Integrate WBS with • *Requirements specification* • Statement of work • IMP/IMS/EVMS		X		X	X	X	X
Link risk management (including risk mitigation plans), technical reviews, *TPMs*, EVM, WBS, IMS		X				X	X

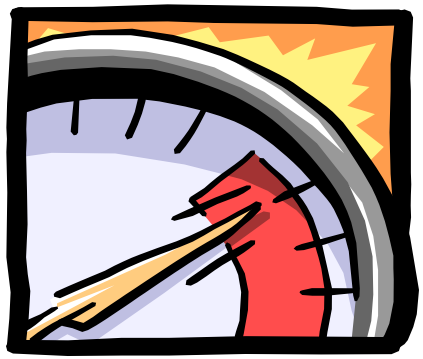
Technical Reviews, Baselines, Measures



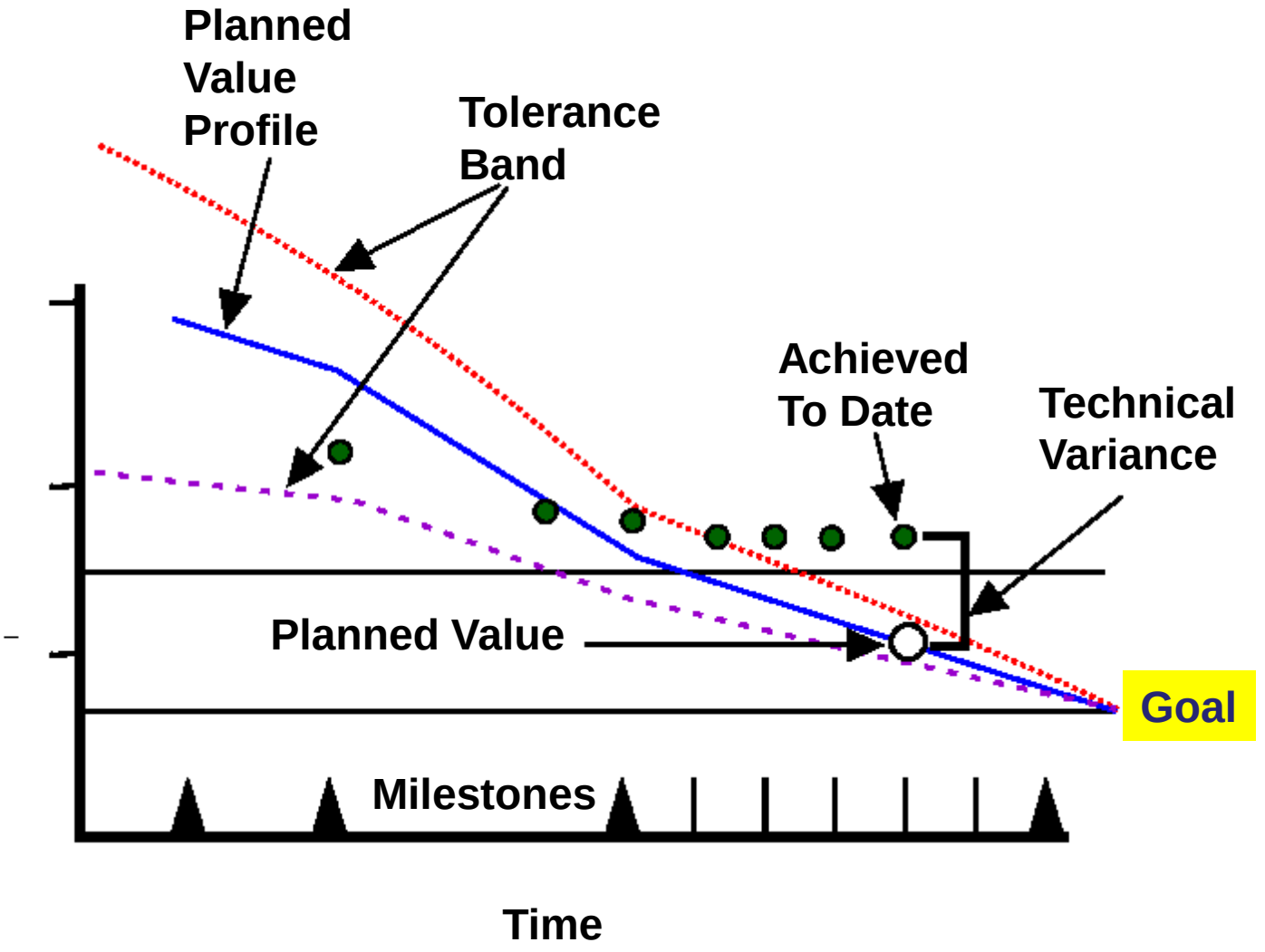
Practical Application

TPM

- How well a system is achieving performance requirements
- Use actual or predicted values from:
  - Engineering measurements
  - Tests
  - Experiments
  - Prototypes
- Examples:
  - Payload
  - Response time
  - Range
  - Power
  - Weight



TPM Performance vs. Baseline



Example 1: EV Based on Drawings and TPMs

- SOW: Design a subsystem with 2 TPMs:
  - Maximum (Max.) weight
    - Planned Value (PV): 200 lb. (May)
  - Max. diameter
    - PV: 1 inch (when 80% drawings complete, April)
- Enabling work products: 50 drawings
- BAC: 2000 hours
  - Drawings: 40 hours/drawing @ 50 2000
  - If TPM PVs *not* met on schedule:
    - Negative adjustment to EV
      - Weight: -100
      - Diameter -200

Example 1: EV Based on Drawings and TPMs

Schedule	Total	Jan	Feb	Mar	Apr	May	Total
	Drawings						
Drawings/ period	**50**	**8**	**10**	**12**	**10**	**10**	**50**
Meet requirements:							
Weight	**1**						
Diameter	**1**						

Example 1: Status

Date	April 30	May 31
Drawings completed	41	49
Weight met	No	No
Diameter met	Yes	Yes

Example 1: EV Based on Drawings and TPMs

Design (drawings)	Jan.	Feb.	Mar.	Apr.	May	Total
Planned drawings cur	8	10	12	10	10	50
Planned drawings cum	8	18	30	40	50	
BCWS cur	320	400	480	400	400	2000
BCWS cum	320	720	1200	1600	2000	2000
Actual drawings completed cur	9	10	10	12	8	
Actual drawings completed cum	9	19	29	41	49	
EV (drawings) cum	360	760	1160	1640	1960	
Negative EV Reqs cum				0	-100	
Net EV cum	360	760	1160	1640	*1860*	*1860*

SV = - 140

Example 1: Variance Analysis

May variance analysis (drawings and requirements):

- **1 drawing behind schedule** **- 40**
- **Diameter requirement met** **- 0**
- **Weight requirement *not* met:** **- 100**

Schedule variance **- 140**

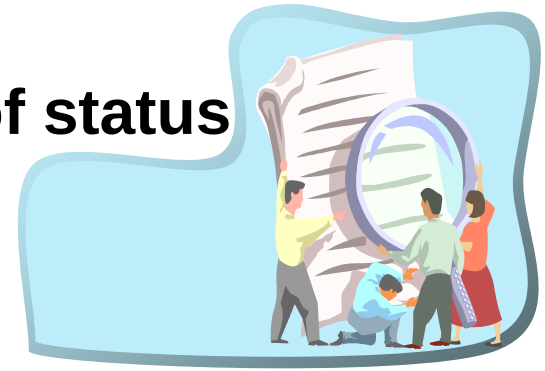
Proposed EVM Acquisition Reform

Revise Acquisition Policy and Regulations

- Federal
  - OMB policy and FAR
- DoD
  - DFARS
  - DoDI 5000.02
  - DoD acquisition and SE guides

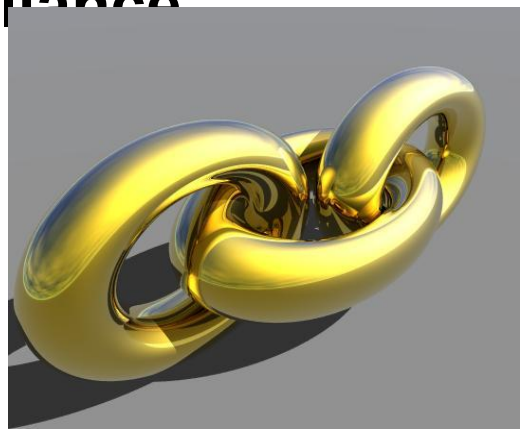
Program Management Tips

- Require SE and Project Management best practices in Request for Proposal
- Confirm contractor's proposal includes integration of SE work products, success criteria, and TPMs with EVM
- Verify integration in Integrated Baseline Review (IBR)
- Confirm achievement of success criteria in technical reviews
- Monitor consistency and validity of status reports, variance analyses, EAC

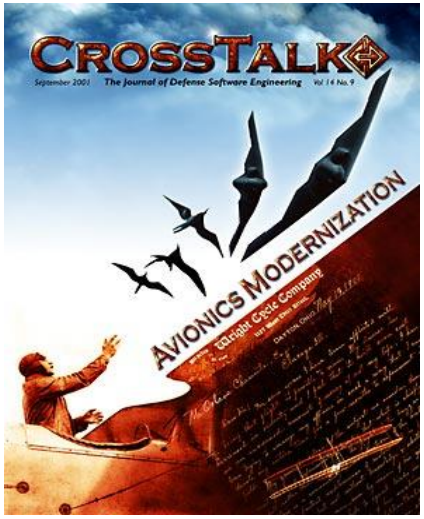


Close the EVMS Quality Gap

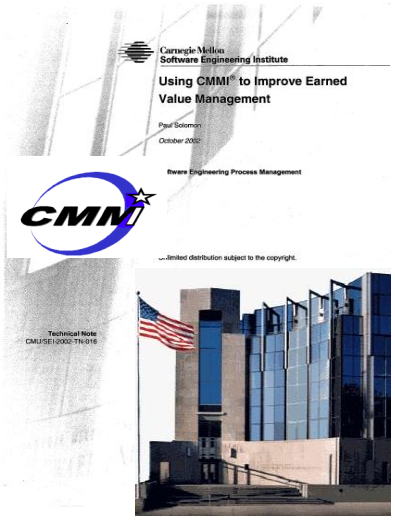
- **PMB includes testable requirements with technical/quality parameters**
- ***Valid* contract performance reports**
  - **Objective technical/schedule status**
  - **Credible EAC**
- **Early detection of problems**
  - **Program performance**
  - **EV measurement and compliance**



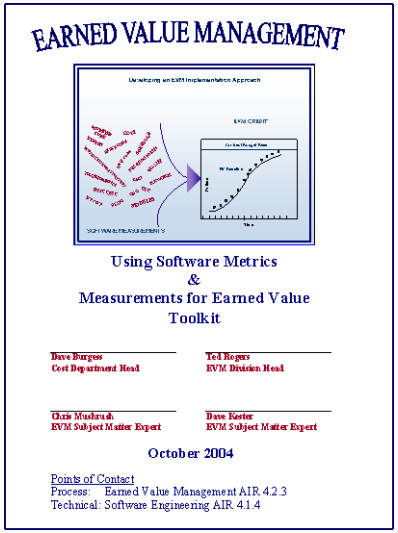
Resources Online



DOD



SEI



NAVAIR

DOD DAU

ICFAI U. Press, India

PMI Community of Practice

“Measurable News”

DoD Data & Analysis Center for Software

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CDR: Critical Design Review

EAC: Estimate at Completion

EVM: Earned Value Management

IBR: Integrated Baseline Review

IMP: Integrated Master Plan

IMS: Integrated Master Schedule

KPP: Key Performance Parameter

MOE: Measure of Effectiveness

MOP: Measure of Performance

OMB: Office of Management and Budget

PDR: Preliminary Design Review

PMB: Performance Measurement Baseline

SE: Systems Engineering

SFR: System Functional Review

TPM: Technical Performance Measure (or Measurement)