

**“It’s déjà vu all over again,”  
Yogi Berra**

**Integrating Systems  
Engineering, Risk and Earned  
Value Management**

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# Threats to Program Success

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- Inadequate Early Warning
- Schedules, Metrics Overstate True Progress
- Remaining Work Underestimated
- Product Will Not Meet User Needs



**CAN BE PREVENTED BY INTEGRATING:**

- **SYSTEMS ENGINEERING (SE)**
- **RISK MANAGEMENT (RM)**
- **EARNED VALUE MANAGEMENT (EVM)**

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# **Requirements Management Products**

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- **Concept of Operations**
- **System Integration Requirements Document (SIRD)**
- **Design Constraints / Key Drivers**
- **System Description Document (SDD)**
- **System Requirements Review (SRR) Documentation**
- **Functional Description Document (FDD)**
- **Specification / Document Tree**
- **Technical Performance Metrics (TPM) and Plan**
- **Trade Study Documentation**
- **Requirements Traceability Database (RTD)**
- **Configuration Baseline**



# Best Practices to Monitor Program Technical Progress with SE Tasks

- SE products, milestones on IMS
- Discrete SE work packages and EV measures
  - Track progress of key SE products
  - Track progress of completing RTD
- Monitor SE schedule variances
  - ~~Mirrors~~ program's overall technical progress
  - Small absolute value; high impact
- Use TPMs as a basis of PBEV for technical tasks
- Compare SE schedule variances with technical PBEV



# What Is Risk Management?

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- **Risk:** Uncertain event or condition that, if it occurs, has a negative (or positive) effect on a project objective
- Systematic process of identifying, analyzing and responding to project risk
- Part of the SE Process
- Proactively Working to Prevent an Unfavorable Event from Occurring which Threatens Objectives
  - Cost, Schedule, Technical

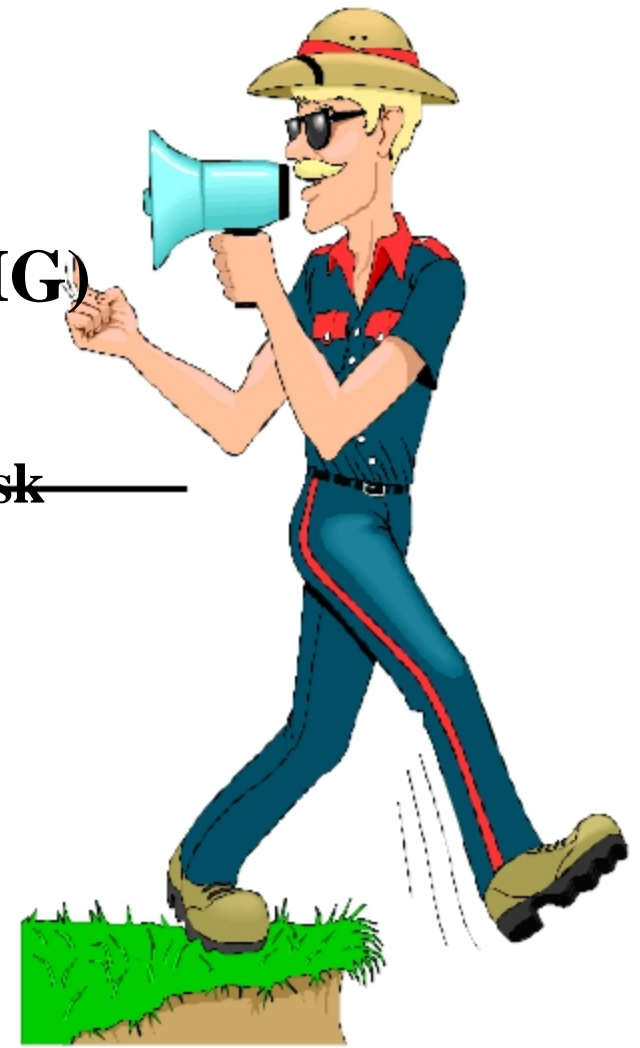


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# ~~EVM GUIDES SILENT ON RISK~~

- **Industry Standard**
- **EVM Implementation Guide (EVMIG)**
- **Company EVMS**
  - ~~Most EVM System Descriptions silent on risk~~
  - ~~Risk mitigation plans not always budgeted or scheduled~~
  - ~~Program projections inconsistent with risk assessments and risk mitigation plans~~



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# ~~Risk Inherent in Contractors' Practices~~

- **Integrated Master Plan and Schedule**
- **Performance Measurement Baseline (PMB)**
- **Management Reserve**
- **Integrated Baseline Review**
- **Establish and monitor TPMs**
- **Develop EAC**
- **Trade offs to meet cost constraints**



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# **~~Best Practices to Integrate RM with EV~~**

- **Include RM Activities on the Baseline Schedule**
  - **Define Exit Criteria for RM Decision Points**
  - **Establish Dependencies**
- **Budget the RM Effort, Track with EV**
- **Address RM in Performance Analysis**
- **Incorporate RM in EAC Development**
  - **If probability and impact are high (Most Likely)**



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# ACS EVM System Description (1)

## Linked to SE and Risk Procedures

- **CAM Responsibilities**
  - Integrate budget and schedule with technical SOW
  - Identify technical metrics
  - Use *TPMs* as a basis for *EV*
  - Incorporate *risk* assessment and corrective actions into EVMS
- **Program Manager Responsibilities**
  - Assess *EAC* based on pressures, *risks*, opportunities

1) Air Combat Systems Procedure DTM F208



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# ACS SE Procedure

## Links TPMs to EV

- SE Tracking and Oversight (E1-0401.9)
  - *TPMs* track key technical parameters
  - *EV* should be based on *TPMs* which best indicate progress towards meeting technical requirements



# ~~ACS Risk Procedure~~ ~~Links to EVMS and SE~~



- **Risk Management (D1-5002)**
  - Sources of risk identification:
    - Projected or actual adverse performance
      - Technical performance based on *TPMs*
      - Cost or schedule performance per *EVMS*
  - Significant *risk* management activities are *planned, budgeted and tracked in the EVM and scheduling systems*
  - If the *risk* cannot be fully mitigated, immediately:
    - Revise the *EAC*
    - Report *schedule* impacts on affected schedules

# SUMMARY FOR SUCCESS

- **Operational Needs: Define, Decompose, Validate, Verify**
- **Requirements Management Traceability**
- **Plan SE Tasks in PMB**
- **Use TPMs and Performance-Based Earned Value**
- **Correlate Progress of SE Tasks with Technical Progress**
- **Include Risk Management Activities in PMB**
- **Integrated, Documented Processes**

