

# Earned Value Management (EVM) for Program Managers Keep it Simple



Certification Training



Knowledge Sharing



Continuous Learning

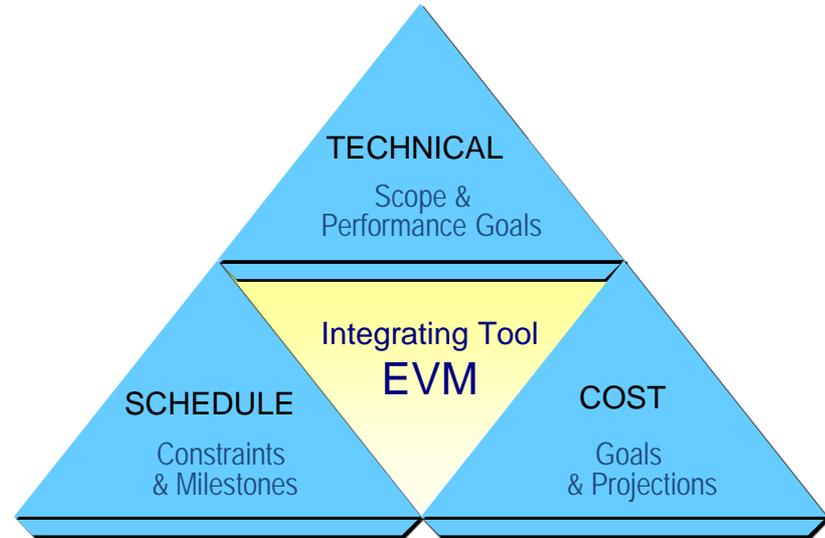


Mission Assistance

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- Introduction
- EVM Metrics
- IPMR/CPR
- Analysis
- Resources





# EVM Purpose

**Program Managers are responsible for using EVM to manage.**

## Questions

1. How Much Work Should Be Done?
2. How Much Work Is Done?
3. How Much Did The “Is Done” Work Cost?
4. What Was The Total Job Supposed To Cost?
5. What Do We Now Expect The Total Job To Cost?

## Answers

1. Budgeted Cost For Work Scheduled (BCWS)
2. Budgeted Cost For Work Performed (BCWP)
3. Actual Cost Of Work Performed (ACWP)
4. Budget At Completion (BAC)
5. Estimate At Completion (EAC)

***An effective contractor EVMS combined with EVM analysis and Technical Performance Measures (TPM) can answer all of these questions***

- The largest contract termination in DoD history - \$4.4B overrun
- Original planned buy:
  - Navy: 620 aircraft
  - Marine Corps: 238
  - Air Force: 400
  - Average cost estimated at close to \$100 million each
- January 1991, Secretary of Defense Richard Cheney canceled the program

Total 1258



- By one estimate the A-12 had become so expensive that it would have consumed up 70 percent of the Navy's aircraft budget within three years.



## A-12 Avenger II Example (Cont.)

- The A-12 program was unrealistically ambitious
- EVM data (budget, earned value, actuals) indicated negative trends on the A-12 program
- Someone at NAVAIR understood and reported the story
- Someone in authority didn't like the negative trends, put a spin on the story, and sent it up the chain in a very flawed reporting system
- By the time senior management recognized the magnitude of the problem, it was too late to fix at a cost that was acceptable
- DOD experience in more than 400 programs since 1977 indicates:
  - Cost Performance Index (CPI) – above 1.0 is positive cost performance
  - The cumulative CPI does not significantly improve during the period between 15% and 85% of contract performance
  - Actually cost performance tends to decline



***When you have a valid EVMS, believe the EVM indicators; They don't lie!***



## *EVMS - A burdensome, mandated requirement?*

- EVM is a management & planning process
- EVM is a widely accepted best practice for integrated project management (IPM)
- DoD requires contractors to use EVM on certain contracts to mitigate risk
  - Contractor management systems must meet the intent of the EVM Guidelines in the EIA 748-C
- A contractor's EVMS Integrates scope, schedule, and cost goals and objectively measure progress toward these goals
- Incorporates cost & schedule forecasts – Need to be tied to TPMs
- Basis of reporting to OUSD AT&L and Congress via DAES and SAR

***No! EVM is a tool to manage your program***



# EVM Data Elements

BCWS	Budgeted Cost for Work Scheduled <b>PLANNED VALUE</b>
BCWP	Budgeted Cost for Work Performed <b>EARNED VALUE</b>
ACWP	Actual Cost of Work Performed <b>ACTUAL COST</b>
BAC	Budget at Completion
EAC	Estimate at Completion



# Measuring Performance (BCWP)

- Key Data Point for Earned Value Management
  - Basis of Schedule and Cost Variances
- Make Work Measurement as Objective as Possible
  - Discrete vs. Level of Effort
    - Discrete effort is measurable – completed 1 of 5 drawings that represents 20% of a Control Account (CA)
    - Goal is to minimize LOE (time passes & EV is taken)
  - Tie to Technical Performance
    - E.G., Successful Completion of Test
  - Typical Ways To Measure
    - Units Complete, Resourced Milestones, Percent Complete
- Establish method of measurement during baseline planning – Take Earned Value the Way it Was Planned

**Earned Value Should Represent Real Performance**



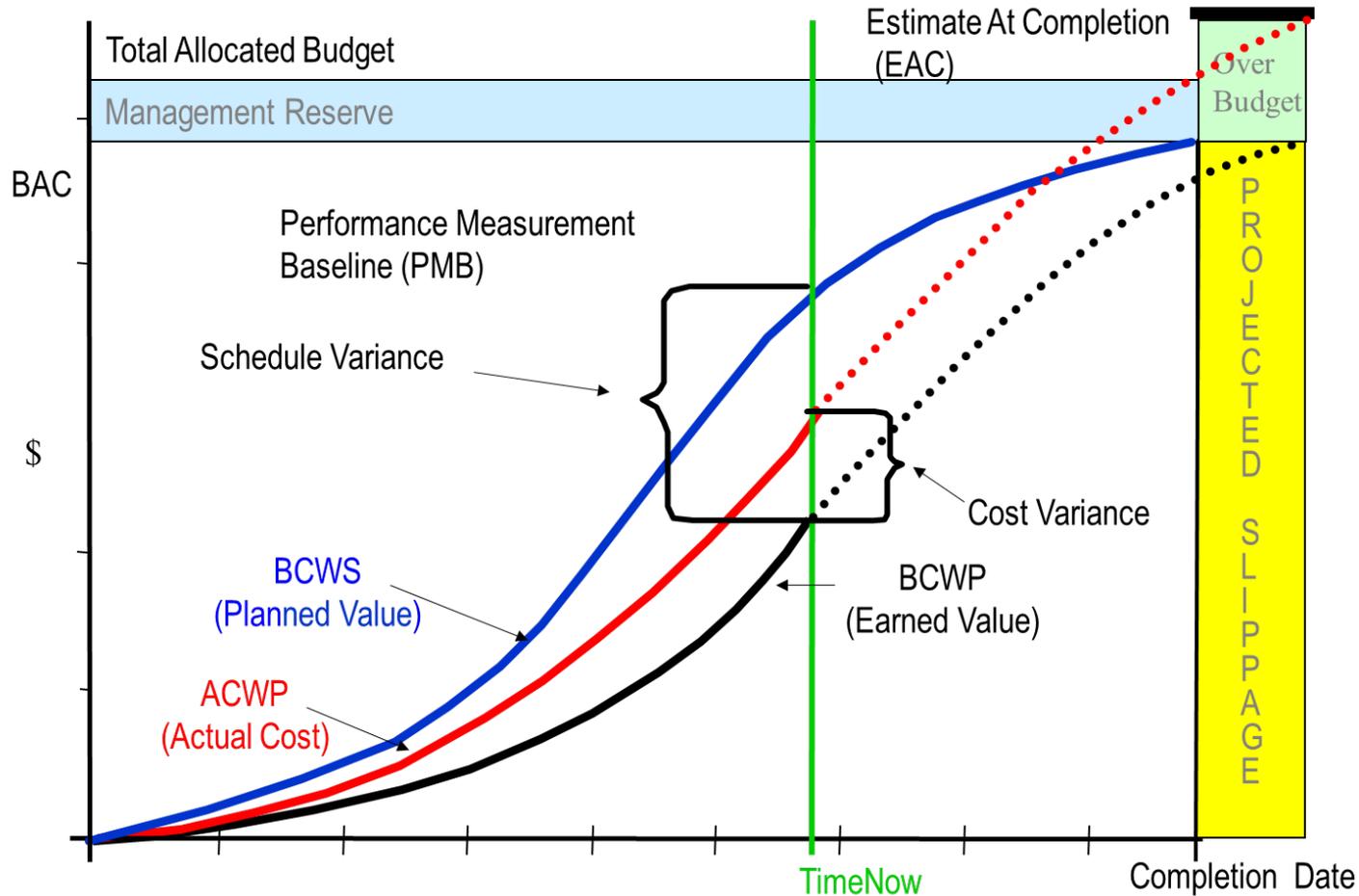
# EVM Metrics

- **Variiances**
  - Cost \$\$ and %
  - Schedule \$\$, %, and weeks
  - Current Month and Cumulative
  - By WBS and OBS
  - Variances At Completion
- **Performance Indices**
  - Cost Performance Index (CPI)
  - Schedule Perf. Index (SPI)
  - To Complete Perf. Index (TCPI) – CPI needed to meet (BAC or EAC)
- **Overall Status**
  - Percent Scheduled
  - Percent Completed
  - Percent Spent
- **Provide:**
  - An Integrated Method for Planning, Budgeting, Program Management, and Control
  - Insight into Program Performance
  - Reduced Management Risk to Meet Program Objectives
  - Management by Exception
  - Fosters Accountability
  - Objective Information for Managing the Program
  - Comparative Analysis against Completed Projects
  - Uses industry standard EIA-748-C

**Augment EVM Metrics With Technical Performance  
For a Complete Integrated Picture**



# EVM Metrics - Graphed





# Integrated Program Management Report (IPMR)/Contract Performance Report (CPR)

- Keep in mind this is the contractor's data
- The data is summarized – a starting point for analysis
- Each format gives you a different point of view
  - IPMR has 7 Formats
  - CPR has 5 Formats
- Keep reference material handy (gold card etc...)
- Take a long look at Format 5
  - Do variance explanations provide:
    - Nature of the problem
    - Root causes
    - Effects on immediate tasks
    - Impacts on total contract
    - Corrective actions taken or planned
  - Does it dial in on the root cause?
  - Can you articulate the contractor's reasoning?
  - Are the explanations the same as in past months?
  - Is the information consistent with independent analysis and with technical performance?



# IPMR Formats Guidance & Terminology

**IPMR (DI-MGMT-81861) is only for post 2012 contracts, so you will primarily see CPRs for the most part, formats 1-5 are the same for both**

Reporting Format Number	DI-MGMT-81466A	DI-MGMT-81650	DI-MGMT-81861	Guide Terminology
1	Work Breakdown Structure	N/A	Work Breakdown Structure	Format 1 WBS
2	Organizational Categories	N/A	Organizational Categories	Format 2 OBS
3	Baseline	N/A	Baseline	Format 3 Baseline
4	Staffing	N/A	Staffing	Format 4 Staffing
5	Explanations and Problem Analyses	N/A	Explanations and Problem Analyses	Format 5 Data Analysis
6	N/A	Integrated Master Schedule	Integrated Master Schedule	Format 6 IMS
7	N/A	N/A	Electronic History and Forecast File	Format 7 CA Data



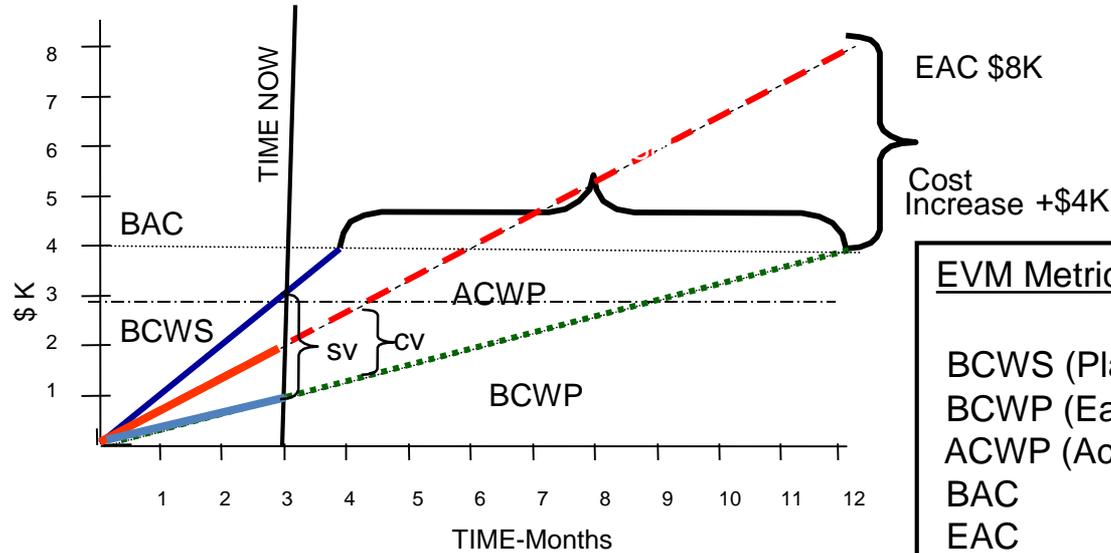
# How do we know the contractor data is good?

- EVMS Validation helps
- What do you hear from DCMA?
  - Do you have a Memorandum of Agreement with DCMA?
  - Is DCMA actively auditing the EVMS? Read their last audit report. Ask questions about their conclusions, are there any Corrective Action Requests (CARs)?
  - Does the last DCMA PI's monthly report make sense, is it giving you independent insight?
  - Are you getting a 14 Point Schedule Assessment – does it make sense based on your view of the contract?
- Ask a lot of questions – Look at TCPI(EAC) contractor, DCMA, PM, etc... if 5% higher than CPI ask a lot of questions if 10% higher probably unrealistic
- Read through the IPMR/CPR – Does Format 5 actually go into root cause analysis? Does it say the same thing month after month?

- **Trend Analysis**
  - Where have we been?
- **Projection of future**
  - Where are we going?
- **Focus on problems**
  - What are the significant drivers?
- **Variance Analysis**
  - What are we doing about it?



# Analysis Example



## EVM Metrics

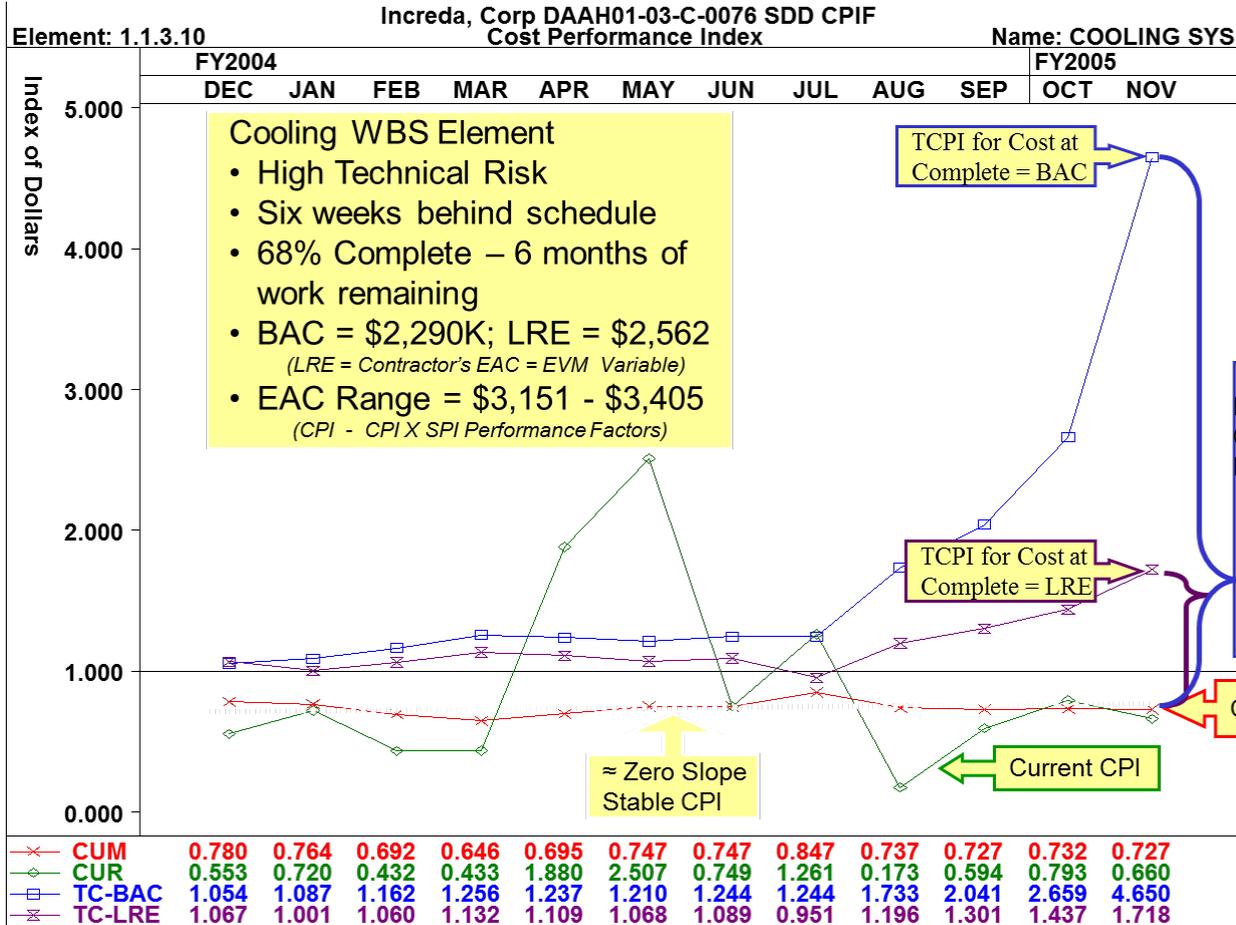
BCWS (Planned Value) = \$3K  
BCWP (Earned Value) = \$1K  
ACWP (Actual Cost) = \$2K  
BAC = \$4K  
EAC = \$8K  
SV = -\$2K      SPI = 0.33  
CV = -\$1K      CPI = 0.50  
TCPI = 150% (Efficiency Needed)

*Estimate at Completion (EAC) is:  
\$8K and 8 Months Late!*

% Planned = 75%  
% Completed = 25%  
% Spent = 50%

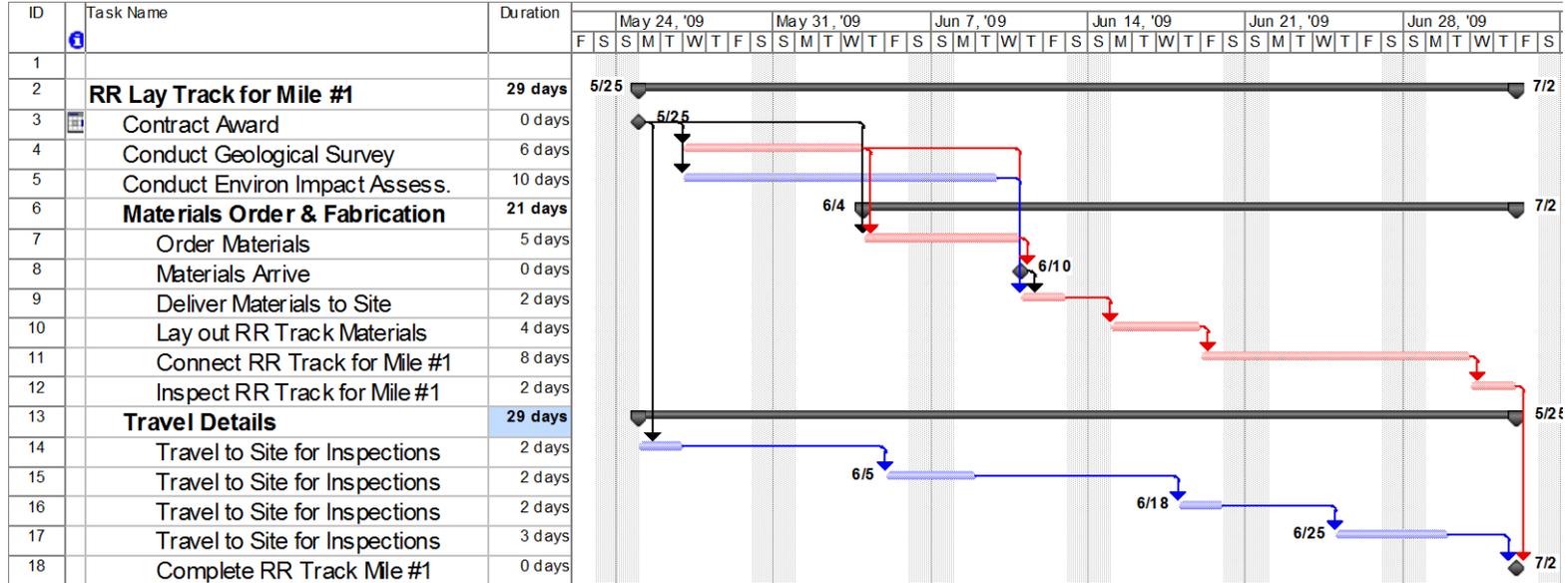


# Cost Analysis





# Schedule Analysis



- **Identify Critical Path**
- **Identify Schedule Drivers and Risk Areas**
  - What is causing delays?
  - Will additional resources be needed?
  - What is the future impact?



# Analysis – Root Causes

+CV / CPI > 1.0	-CV / CPI < 1.0	+SV / SPI > 1.0	-SV / SPI < 1.0
<p><u>Work is costing less than planned:</u></p> <ul style="list-style-type: none"> <li>- More efficient &amp; using fewer hours/mat'l</li> <li>- Using less expensive labor category/mat'l</li> <li>- Achieved a technical breakthrough</li> </ul> <p><u>Delay in payment.</u> Work complete but actuals have not hit ledger yet</p> <p><u>Incorrect status.</u> Took credit for work not actually completed</p> <p><u>Improper charging.</u> Took credit for work yet actuals were charged against the wrong account</p>	<p><u>Work is costing more than planned:</u></p> <ul style="list-style-type: none"> <li>- Less efficient &amp; using more hours/mat'l</li> <li>- Using a more expensive labor category/mat'l</li> <li>- Additional travel (ODCs)/Rework incurred</li> <li>- Rates (OH, G&amp;A, inflation) increased</li> <li>- Encountered Technical problems</li> </ul> <p><u>Incorrect status.</u> Did not take credit for work actually completed</p> <p><u>Improper charging.</u> Actuals were incorrectly charged against the account</p> <p><u>Requirements Change.</u> In scope contract requirement changed</p>	<p><u>Work is being accomplished faster than planned:</u></p> <ul style="list-style-type: none"> <li>- More efficient &amp; taking less time</li> <li>- Achieved a technical breakthrough</li> </ul> <p><u>Work has been accelerated in the schedule.</u> Due to programmatic events, work has shifted forward</p> <p><u>Incorrect status.</u> Took credit for work not actually completed</p> <p><u>Baseline Mistake.</u> Incorrectly set work to occur later than it was supposed to</p>	<p><u>Work is being accomplished slower than planned:</u></p> <ul style="list-style-type: none"> <li>- Less efficient &amp; taking more time.</li> <li>- Encountered Technical problems</li> </ul> <p><u>Work has slipped in the schedule:</u></p> <ul style="list-style-type: none"> <li>- Due to programmatic events (late GFE, GFI, predecessor priorities, etc.), work has shifted right</li> <li>- Due to lack of resources, work has shifted right</li> </ul> <p><u>Incorrect status.</u> Did not take credit for work actually completed</p> <p><u>Baseline Mistake.</u> Incorrectly set work to occur before it was supposed to</p> <p><u>Requirements Change.</u> In scope contract requirement changed</p>

Root cause needs to explain Who, What, Why, How

When the EVM index equals 1.0, means as planned, below 1.0 means not going as well as planned, & above means better than planned



# Management Tips

- **Understand the details of the IPMR/CPR reports**
  - Gold Card explains basic calculations, apply with common sense
  - Integrate technical knowledge for full insight into your program's status
  - The EVM Reference for PMs (is this reference provided) provides good rules of thumb on issue indicators, how/when to dig deeper, and questions you should be prepared to answer
- **Identify and investigate issues**
  - Always use data, not opinion, continue to focus on the root cause, impact, and what can be done to fix the issue
    - What are the trends?
    - Have trip wire metrics been tripped?
    - Provide examples of why you see a problem (root cause not being addressed in Format 5 for example)
    - Don't stop digging until you understand



# Courses of Action

- Apply Management Emphasis
  - Discuss mitigation with your contractor
- Use DCMA:
  - They can talk to the contractor, or take an independent look at data
  - DCMA is responsive and loves having a problem from the customer to dig into
  - Take a look at their monthly reports, EVMS review documents, and ask what they think about specific issues you are seeing
  - Call up your DCMA Program Integrator & ask them to follow up with a particular CAM about a variance you see in the data
- Use the carrot as well as the stick when working with the contractor:
  - Carrot: Bad news doesn't get better with age, help me understand etc...and let's work together to mitigate – with a mature Contractor EVMS contractor identified issues can be tracked to closure without CARs (lots of coordination needed to put this in place, no under the table deals)
  - Stick: Contractor non responsive – raise issues up the chain, write a letter of concern, or an Award Fee Letter (even a draft or interim letter with get a lot of attention) – work with DCMA on writing CARs (can lead to EVMS reviews) – Have an independent review team from another division take a look at the data



# Summary

- EVM is a tool for managing a program
  - Show you where you have been, where you are going, and provide insight into where the problems are
  - It is not something FM or the contractor does – it should be something the PM uses
  - Use EVM as a tool to help you manage your program and quantify the impact of issues
  - Think about Issues (present problems) and Risks (potential problem that is in the future) in terms of \$ (Cost) and days (Schedule) – key for an accurate EAC & ECD
- Keep your eye on trends
  - Are you seeing wild oscillations in the data? This could indicate inaccurate EV, or that there are not enough measures being taken
  - Is the contractor consistently using MR on a particular CA? They might be masking CV, see where MR is being used
  - The point of an EVMS is to accurately report on contract status – do the trends reflect what is going on with your program? If yes then the EVMS is working
  - Multiple replans – Baseline Change Request
- Know your contract thresholds (\$ and %)
  - If too high you don't get any VARs explained in Format 5
  - Too low and the contractor has to explain everything
  - In either case you lose insight into root cause issues for variances



# Resources

- SMC Resources – FM (EVM Issues) & PMAG (Program Mgt. Issues)
- DFARS 252.242-7005 Contractor Business Systems
  - When the Contractor is not responsive
- DCMA – PI & EVM/EVMS Specialist
- DAU <http://www.dau.mil/default.aspx>
  - Targeted training for IBR prep & execution
  - Consulting/Advisory services for IBRs
  - Online & Resident Courses
- Recommended Readings
  - Beech Report (Navy A-12 Program)
  - Project Advocacy and the Estimate at Complete-Christensen
  - PM's Guide to the IBR
  - Format 5 Report on the monthly IPMR
  - NGA Report, Better Schedule Performance; Bachman - Link →  NGA Schedule Metrics Report
- NDIA/EIA 748-C EVMS Intent Guide - Link →  NDIA/EIA 748-C EVMS Int Guide
- PARCA Guidance - <http://www.acq.osd.mil/parca/>



# Questions

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