Practical Software and Systems Measurement

A foundation for objective project management

PSM Workshop: Integration of Systems and Software EVM

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PSM Users Group Conference

Department of Defense
U.S. Army

Integration of Systems and Software EVM

- ***Earned Value Management Systems (EVMS)***
  - ***Started in government by DoD***
  - ***Being picked up by other agencies/departments***
- ***Industry accepting responsibility***
  - ***Industry Standard ANSI/EIA-748, June 1998***
  - ***DoD adopted ANSI/EIA-748 in August 1999***
- ***Applies to both systems and software***
  - ***Limited to financial evaluation only***
  - ***Application to Program Management***

Integration of Systems and Software EVM Objectives of the Workshop

- ***Discuss common issues that impact the application of EVM to project management***
- ***Review examples and questions that <u>you</u> have concerning EVM***
- ***Develop potential recommendations for the more effective use of EVM within the PSM applications***

Integration of Systems and Software EVM Workshop Format

- Agenda
  - EVMS Summary
  - EVMS different for software and systems?
  - Common issues
- Techniques that will be used
  - Discussion
  - Examples
  - Sharing of issues

Integration of Systems and Software EVM Workshop Background

- PSM history in this area
  - Included in "Financial Performance" area
- Where we're heading
  - Need to follow DoD lead in EVMS application
  - Integrated Program Management
- Issues, questions, and topics
  - Changes:
    - C/SCSC to EVMS
    - Wider contract/in-house application
  - Update of PSM to expand EVM role

Integration of Systems and Software EVM Intended Output

- ***Summary of issues discussed***
- ***Compendium of examples provided by attendees***
- ***Recommendations or plans to make more effective use of EVM***

Integration of Systems and Software EVM

What is Earned Value Management?

- A disciplined approach to project organization;
- A disciplined approach to cost, schedule, and technical integration;
- A disciplined approach to the identification and measurement of work accomplishment;
- A disciplined approach to problem resolution;
- A disciplined approach to baseline maintenance.

DCMA

Managing Earned Value

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Background

- Dec 95, DCMA assigned as DoD Executive Agent for C/SCSC
- Oct 96, DCMA assigned with compliance authority
- Dec 96, DCMA Commander signed the EVM Implementation Guide (EVMIG)
- Dec 96, USD(A&T) directed replacement of 35 C/SCSC to 32 EVMS in DoD 5000.2-R

Background

- **What did it mean for Contractors?**
  - System validated under the old C/SCS Criteria is considered by DoD as acceptable under new EVMS criteria policy
  - Single Process Initiative (SPI) - Controlled method for transition
  - Systems, not previously validated, can be accepted in three ways:
    - Government review
    - Third party evaluation
    - Self evaluation with Government Oversight / participation

Background

What do the changes mean for DCMA?

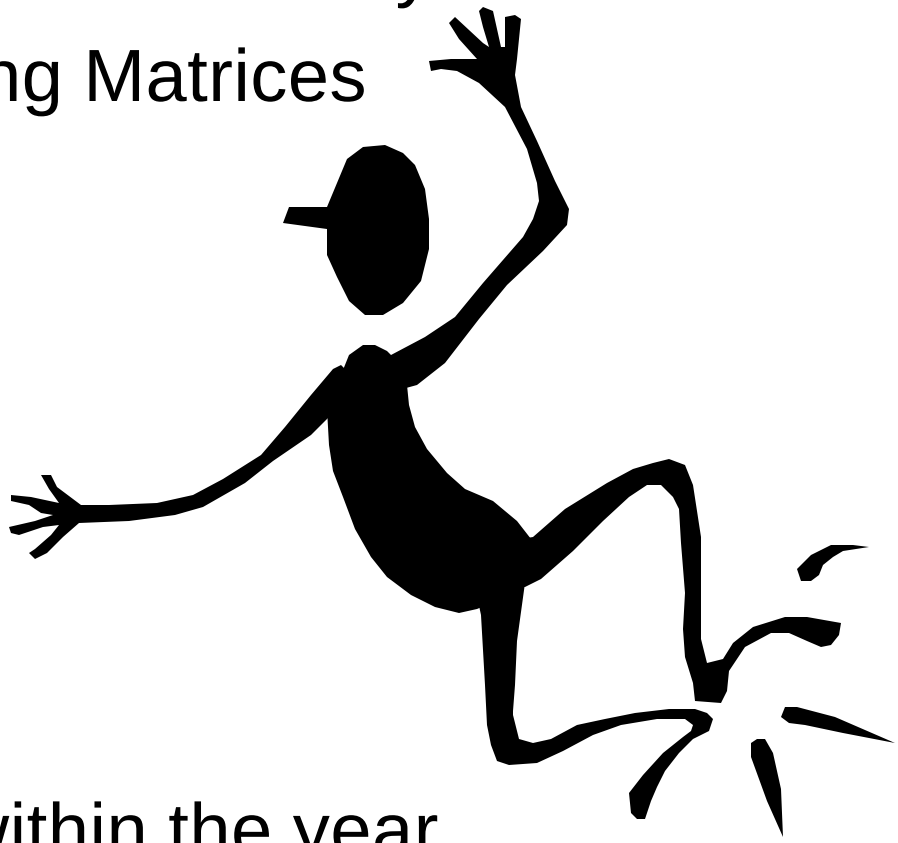
- New Policy
  - DoD 5000.2-R
  - EVM Implementation Guide
  - Revised DFARS clauses
- Oversight to insight surveillance
- Joint reviews/surveillance
- Contractor ownership
- Validation Reviews
- Measures of Effectiveness

EVMS Project Plan

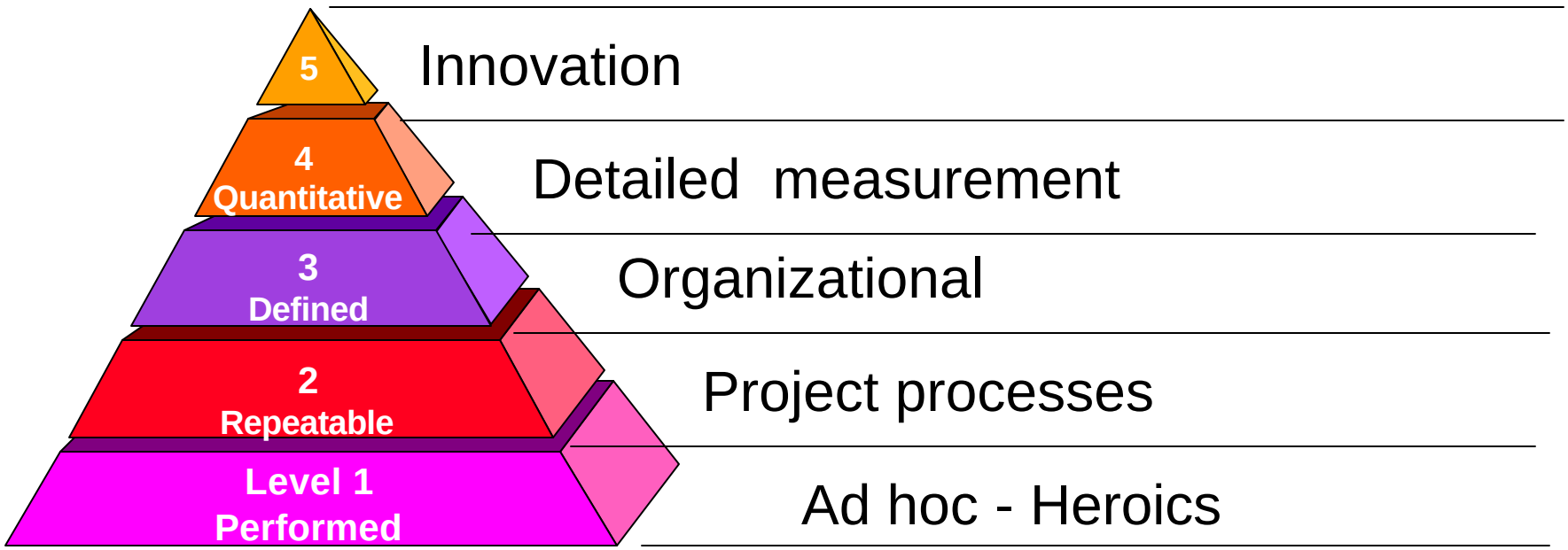
- **Policy**
  - One Book & Guidebook
  - EVMIG
- **Deploy EV Maturity Model**
  - Baseline CAO's
  - Establish plan
- **Apply predictive indicators**
  - wInsight
  - DIRAMS
- **Training Matrix**
  - Mentor/Protégé program
  - CBT
  - Conferences and Commercial Sources
- **Communication strategies**
  - EVMS IPT/PMAC
  - Management Councils
  - DCMA EVMS Web

Policy

- **Onebook:**
  - Risk Management
  - Executive Agent, System & Program Surveillance
  - Formalizes Maturity Model into Policy
  - Linkage to EVMS Training Matrices
  - Early CAS Language
- **EVMIG**
  - Being Revised again
  - Industry comments
  - Service coordination
  - Linked to EVMS IPT
  - Expected to be signed within the year



Maturity Model Structure



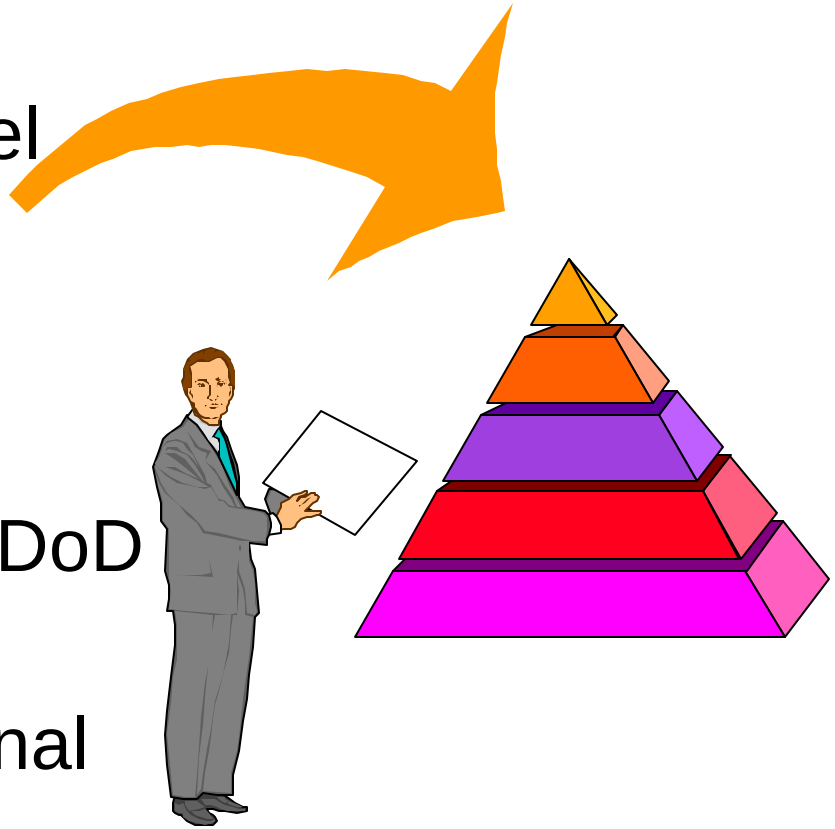
- Determines EMVS <u>process</u> capability
- Based on Defacto Government/Industry Standard

Key Processes

- **Performed Level (1)**
  - Surveillance Management
  - System Surveillance
  - Program Analysis and Reporting
- **Repeatable Level (2)**
  - Surveillance Planning
  - Surveillance Management
  - System Surveillance
  - Program Analysis and Reporting
- **Defined Level (3)**
  - System Surveillance
  - Program Analysis and Reporting
  - DCMC Risk Management
- **Quantitative Level (4)**
  - Quantitative EVMS
- **Optimized Level (5)**
  - Continuous Process Improvement

Maturity Model Insight

- **What:**
  - Continuous Process Evaluations
  - Primarily based upon daily observations
  - Organized per the Model
- **Why:**
  - Common Language - Government & Industry
  - Consistent application (DoD Wide Problem)
  - Eliminate/Reduce external process reviews



wInsight

- Targeted Training
- wInsight has become defacto standard
- Presentation Wizard
- Risk Plus/C/S Glue
- Used hand-in-hand with Performance Plan Philosophy
- Corporate Web Views

DIRAMS

- Field collects data using:
  - wInsight
  - Performance Analyzer
  - Excel Spreadsheet
- Direct data transfers (ANSI X-12)
  - Eliminates a layer (at least) of data entry
  - Less Errors
  - More consistent (more data points)
  - More timely input
- Creates environment for “Global” EVMS Views
- Allows DCMA to be more proactive with Program performance

Training

- wInsight (targeted)
- 3-Day PI Course to be extended
- CBT Training
  - CD-ROM Site License
  - BCF-102 (Now Online!)
  - DCMA EVMS Web site (and others)
- Project Management Course
- IPMC (and others)
- EVMS Reviews (on the drawing board)
- Commercial Courses
- *All geared to raise the general level of knowledge*

EVMS IPT

- OSD Led PAT
- Chartered by the Executive Steering Group
- Seeking to make improvements

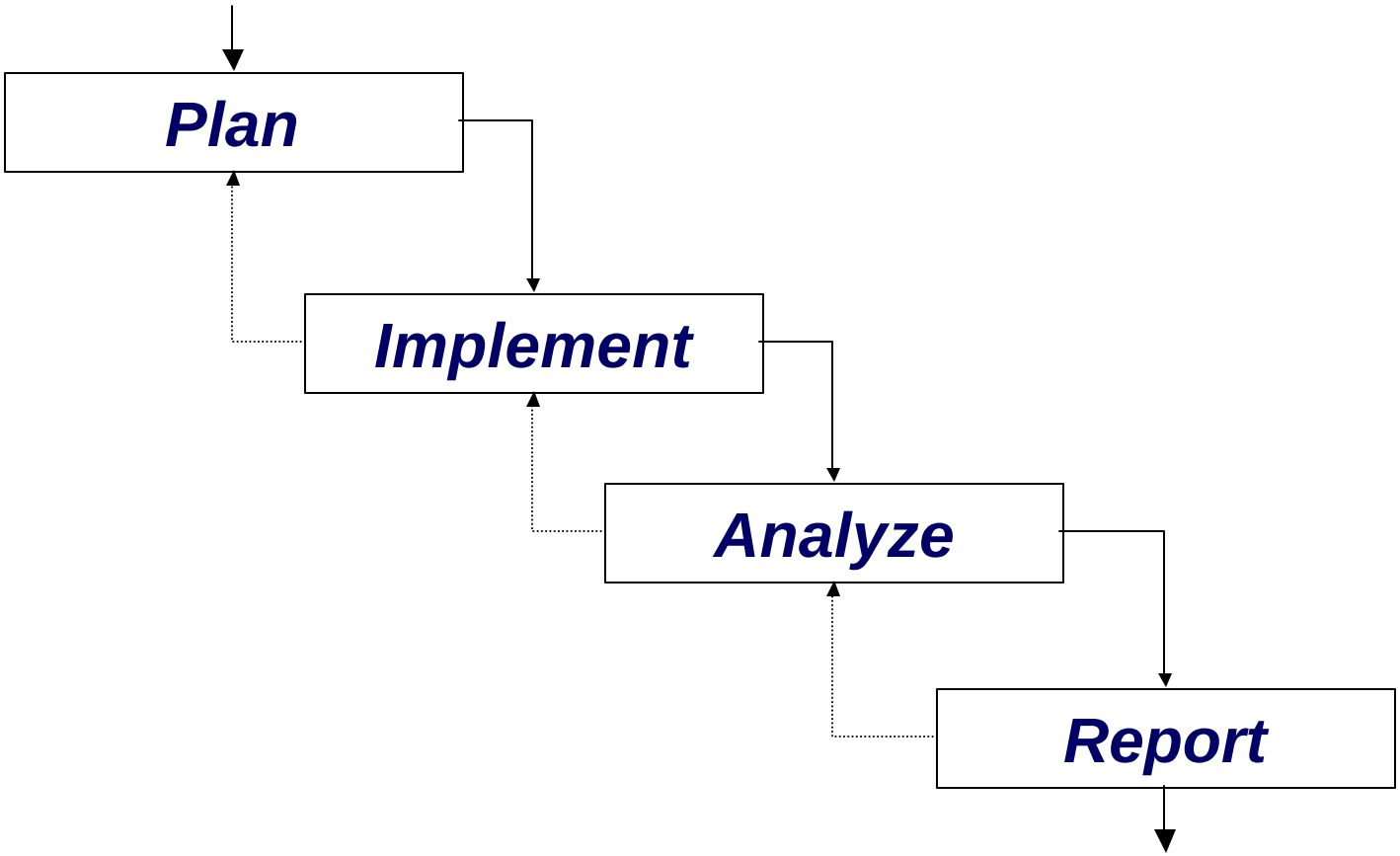
- Task 1 - Identify obstacles or institutional barriers to effective EVM use within the Department
- Task 2 - Evaluate the current level of EVM expertise in DoD
- Task 3 - Review the IBR process to determine whether it is meeting the stated goals and purposes.
- Task 4 - Review the functions and structure of the PMAC

DCMC Web

- **http:/www.dcma.mil**
- **Industry Standard**
- **EVMS Tutorials**
- **Maturity Model, Onebook, Guidebook**
- **Validation List**
- **Current Events**
- **EVMS Monitor List**
- **Presentations**
- **Web Links**

Integration of Systems and Software EVM

Four Basic Steps For Program Management & S/W Development



No difference in approach for Software or Hardware Systems!

Integration of Systems and Software EVM Workshop Participants

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Integration of Systems and Software EVM Items Raised for Discussion

- EVM application to software, WBS
- Statusing of accounts
- Impact of COTS on EVM
- Case studies on software intensive systems
- The need for the software practitioner to know details of EVM
- Integration of EVM with other measurements
- Cost data on FFP and performance contracts

Integration of Systems and Software EVM Discussion

- EVM application to software, WBS
  - MIl-STD-881 is the general framework that includes software & systems
  - How much visibility is needed, the Program Manager and supplier need to work this out. May need more emphasis on software, to drive it down lower than the 3rd level of the WBS.
  - Industry has a problem with reporting to lower levels on the WBS. Would like to see at the CSCI, release, or increment level.

Integration of Systems and Software EVM Discussion

- EVM application to software, WBS (Cont)
  - Do we need to address the WBS differently for a COTS environment?
  - Should be able to apply and measure software EV the same way as hardware
  - Need to plan properly for the scope of effort, IBR has to be done, maybe for software, more detail is needed
  - Provide same care/attention to software as to hardware, recognized as major driver of a system

Integration of Systems and Software EVM Discussion

- **Statusing of accounts**
  - Inspection against planned tasks, need clear exit criteria
  - Need status of updating requirements document, if lots of cycle time, could be a problem
  - For Spiral Development, count the number of cycles or passes a software work product goes through until considered acceptable. Cycles need to be understood in the plan. Is there an optimum numbers of cycles?
  - Capability of supplier and acquirer could have an impact on the optimum cycle time
  - Be more precise in defining when project passes a formal review.

Integration of Systems and Software EVM Discussion

- Impact of COTS on EVM
  - Cannot discount glue code for COTS, could be a large amount of additional effort required
  - Stressed COTS package in the environment, will the COTS package work based on need
  - Get COTS vendors to understand how their product will interface with the system, need to plan realistic time and effort to get accurate estimates
  - Need to do a good business case when COTS is needed: analysis, facts, data
  - See Betsy Clark workshop results

Integration of Systems and Software EVM Discussion

- Case studies on software intensive systems
  - Are there successful case studies available that can be put in PSM?
  - DOD EVM web site has a note board that may be used to inquire about such case studies
  - Does the Air Force acquisition manual (blue book) contain or reference case studies?

Integration of Systems and Software EVM Discussion

- The need for the software practitioner to know details of EVM
  - Need some knowledge of EVM
    - Possibly not at the junior programmer level
  - Exit criteria are needed for implementing EVM at the Work Package and Cost Account levels
  - How well the effort has been initially planned impacts effectiveness of EVM measurement
  - Is EVM in the suppliers training process?

Integration of Systems and Software EVM Discussion

- Integration of EVM with other measurements
  - There needs to be a method to combine EVM data with other technical performance measures for a comprehensive assessment
  - DoD is piloting Technical Performance Measurmement System (TPMS), NRO assessing
  - There are some methods proposed to tie EVM value earned to technical performance achievement

Integration of Systems and Software EVM Discussion

- Cost data on FFP and performance contracts
  - CCDR Data on FFP contracts provided the contract was not award competitively or competition no longer exists
  - FFP is sometimes incorrectly applied to development or efforts with some risk
  - OSD feels that EV should not be used to fix the flaw in the acquisition strategy process that allows risky FFP contracts
  - FFP contracts should only be used for low risk efforts

Integration of Systems and Software EVM Summary

- ***EVM is a Program Management tool that provides more than financial measurement***
- ***There is a significant opportunity to increase the coverage and application of EVM within the PSM structure***

Integration of Systems and Software EVM Conclusions, Recommendations, and Results

- ***Comments related to PSM to EV.***
  - ***WBS Guidance, (i.e. COTS, WBS Level)***
  - ***De-mystify EVM, understand the "M" in EVM***
  - ***Include Cost Performance Reports, Formats 1 thru 5 and what these reports mean***
  - ***Understanding forecasting using EVM information***

Integration of Systems and Software EVM
Next Steps/Action Items