



PROJECT MANAGEMENT
CENTER FOR EXCELLENCE

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



EARNED VALUE MANAGEMENT WHAT IS IT ...AND WHY SHOULD I CARE?

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Program Control & Earned Value Management

2018 Project Management Symposium



What is EVM...

KEY CONCEPTS



Is it EV, EVM, or EVMS?

Earned Value

EV = Budgeted Cost of Work Performed (BCWP) or the value of completed work in terms of assigned budget - how much performance, technical accomplishment, or physical scope has the contractor performed

Earned Value Management

EVM = Using the data generated by the Earned Value Management System to make informed program management decisions

Earned Value Management System

EVMS = The implementation of Contractor's combined written processes and tools that supports proper use of the EVM data, reports, management value, and provides insight for making program management decisions

Budget versus Funding

Budget

- Baseline Plan
- Integrated Program Management Report (DI-MGMT-81861)

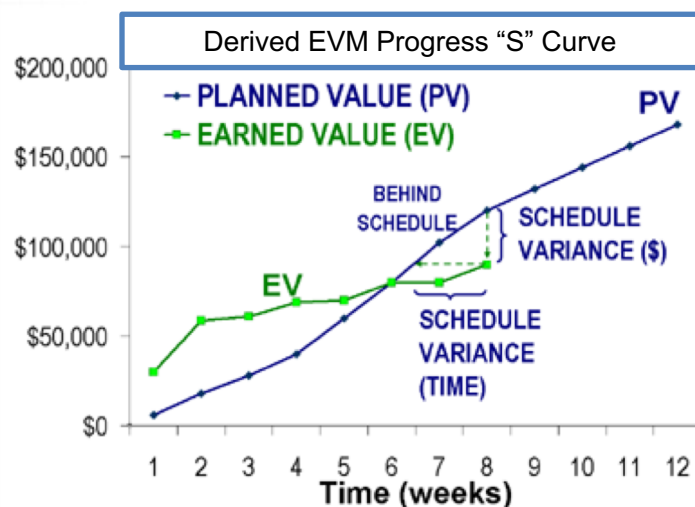
Primary value is its utility in reflecting current contract status and projecting future contract performance.

Funding

- Pays the Invoices
- Contract Funds Status Report (DI-MGMT-81468)

Supplies funding data about defense contracts to Program Managers for:

- updating and forecasting contract funds requirements,
- planning and decision making on funding changes to contracts,
- developing funds requirements and budget estimates in support of approved programs,
- determining funds in excess of contract needs and available for de-obligation, and
- obtaining rough estimates of termination costs.



Earned Value Management Definition:

Translation of **technical scope (SOW/PWS)** into an integrated project plan in which:

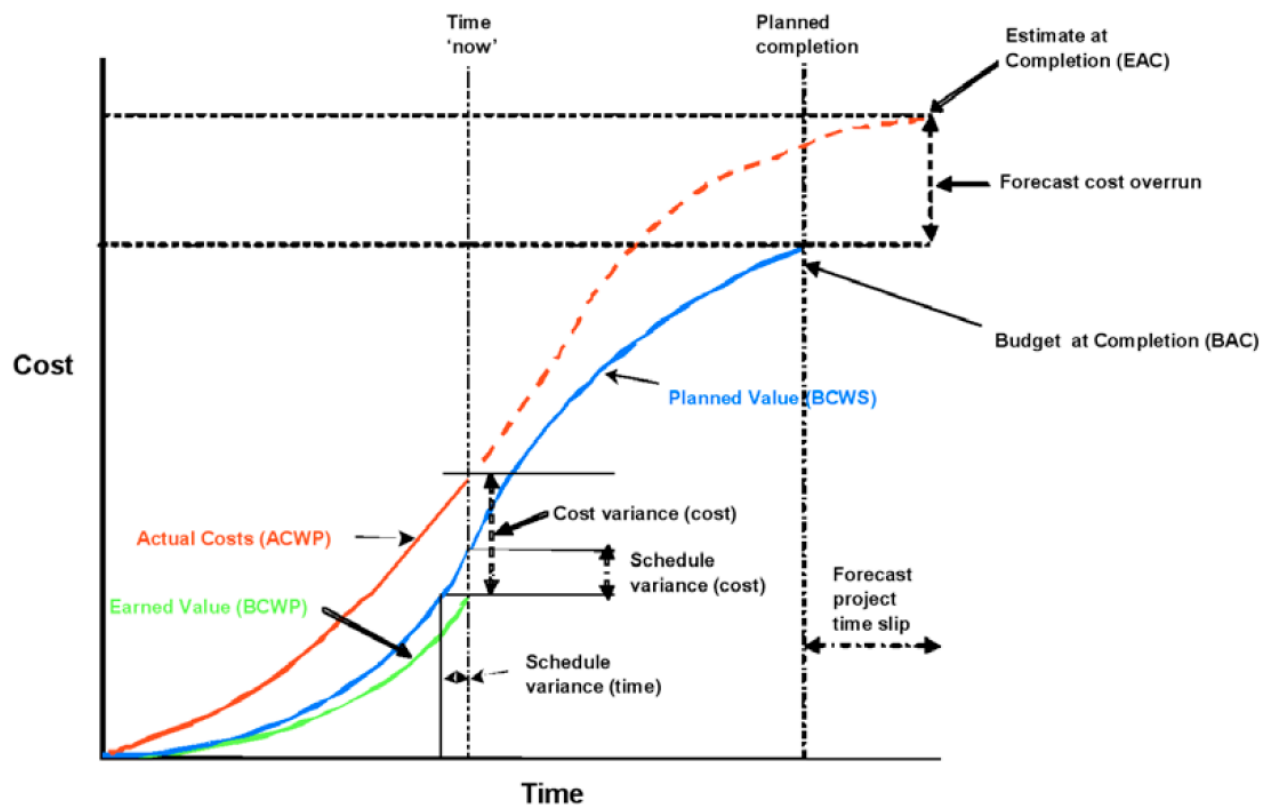
- Work is broken down into **deliverable units (WBS)**
... which are ...
- **Scheduled** as a series of integrated, logically dependent tasks with defined durations (**IMS**)
... and ...
- Planned with estimated resources as a time-phased **budget (BCWS/PV)**
... to establish ...
- A **baseline (PMB)** in which **performance (BCWP/EV)** can be tracked and **risks (MR)** can be identified and mitigated before they become major issues and excessive **costs (ACWP/AC)** accumulate ...
... to be able to answer

What am I getting? (**SOW**)

When am I getting it? (**POP, ECD**)

How much will it cost me? (**TAB or Contract Price, EAC**)

Earned Value Management Graphic:



VARIANCES Positive is Favorable, Negative is Unfavorable

Cost Variance $CV = BCWP - ACWP$
 $CV \% = (CV / BCWP) * 100$

Schedule Variance $SV = BCWP - BCWS$
 $SV \% = (SV / BCWS) * 100$

Variance at Completion $VAC = BAC - EAC$
 $VAC \% = (VAC / BAC) * 100$

OVERALL STATUS

$\% \text{ Schedule} = (BCWS_{CUM} / BAC) * 100$
 $\% \text{ Complete} = (BCWP_{CUM} / BAC) * 100$
 $\% \text{ Spent} = (ACWP_{CUM} / BAC) * 100$

EFFICIENCIES

Cost Efficiency $CPI = BCWP / ACWP$ Favorable is > 1.0 , Unfavorable is < 1.0
 Schedule Efficiency $SPI = BCWP / BCWS$ Favorable is > 1.0 , Unfavorable is < 1.0

BASELINE EXECUTION INDEX (BEI) & Hit Task %

$BEI = \text{Total Tasks Completed} / (\text{Total Tasks with Baseline Finish On or Prior to Current Report Period} + \text{Tasks without baseline finish dates})$

$\text{Hit Task \%} = 100 * (\text{Tasks in Denominator that Completed ON or Before Baseline Finish} / \text{Tasks Baselined to Finish within Current Report Period})$

ESTIMATE @ COMPLETION = ACTUALS TO DATE + [(REMAINING WORK) / (PERFORMANCE FACTOR)]

$EAC_{CPI} = ACWP_{CUM} + [(BAC - BCWP_{CUM}) / CPI_{CUM}]$
 $EAC_{Composite} = ACWP_{CUM} + [(BAC - BCWP_{CUM}) / (CPI_{CUM} * SPI_{CUM})]$

TO COMPLETE PERFORMANCE INDEX (TCPI) §

$TCPI_{Target} = \text{Work Remaining} / \text{Cost Remaining} = (BAC - BCWP_{CUM}) / (\text{Target} - ACWP_{CUM})$

§ To Determine the TCPI for BAC, LRE, or EAC Substitute TARGET with BAC, LRE, or EAC
 # To Determine the Contract Level TCPI for EAC, You May Replace BAC with TAB



What is EVM...

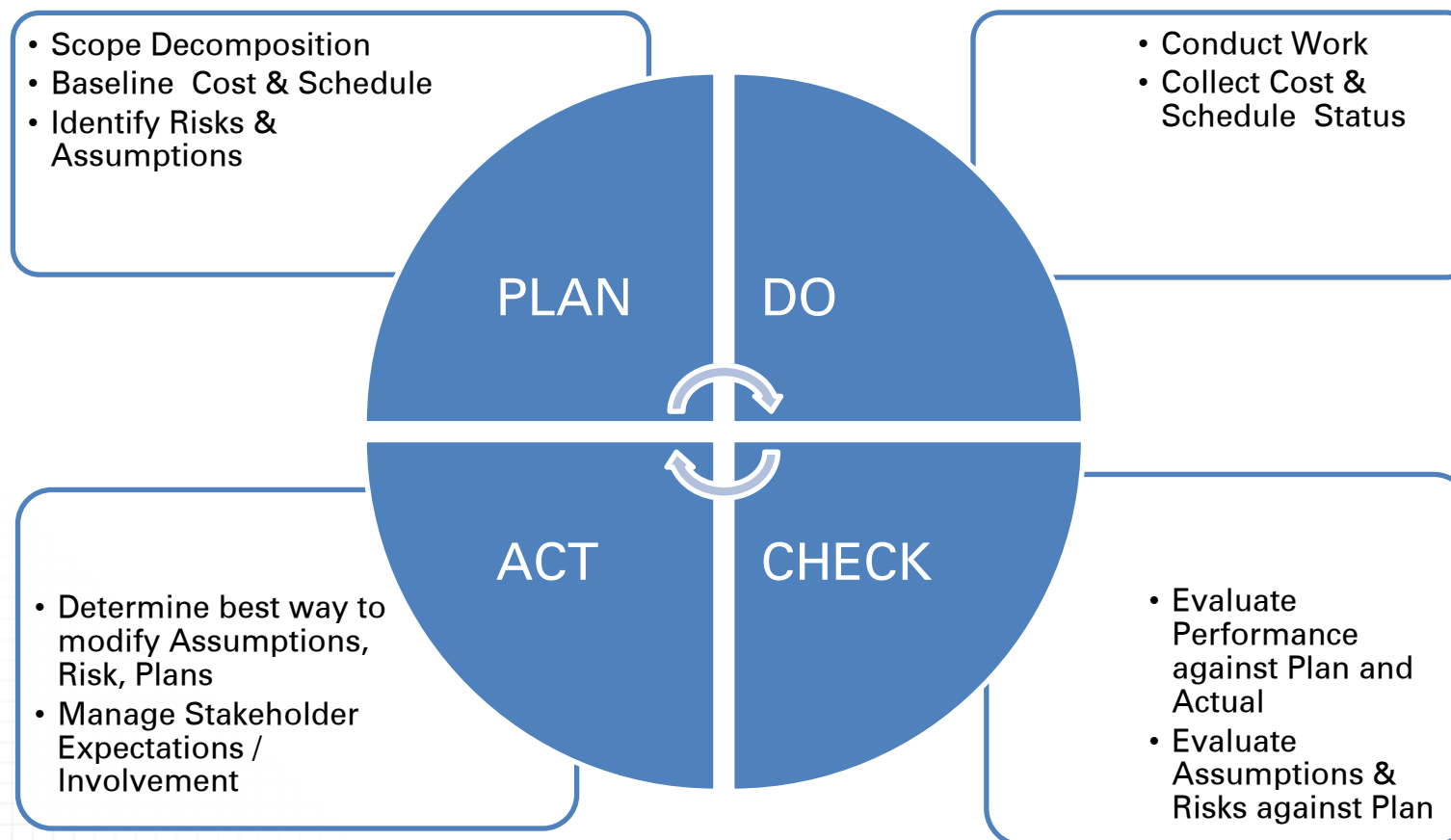
WHY DO I CARE?



Principles of EVM = Basics of Good Project Management

- Identify & Breakdown Scope into FINITE elements
- Assign & Plan Scope for Technical, Schedule, & Cost Control
- Integrate Scope, Schedule, & Cost into a BASELINE Plan & Manage Changes to the Baseline
- Use Actual Cost Incurred Aligned to Baseline
- Objectively Assess Accomplishments of Work Performed
- Analyze Significant Variances & Update Forecasts
- Use EVM Information in the Project Management Process

Deming PDCA Cycle in the Context of Earned Value Project Management Methods



What can a Project Manager learn from the data?

- Is the team meeting performance targets on cost and schedule?
 - Are critical tasks being executed according to plan?
 - Can the causes of variances be isolated and remedied?
- Were the assumptions estimates made in the original plan accurate?
 - Which were inaccurate and should be re-assessed?
- Have there been significant scope changes that impact the approach to meet the project target?
- Are risks being appropriately mitigated?
- What lessons have we learned to date that we can implement going forward?
- How much work is the remaining?
 - How much more will it likely cost to complete the remaining work?
 - How much longer will it likely take to complete?



Reasons Projects Fail

(<http://mosaicprojects.wordpress.com/2012/03/25/project-or-management-failures/>)

<i>Reason for Failure</i>	<i>Cause</i>	<i>EVM / SH*</i>
<i>Inadequate business case</i>	Initiation	EVM (Indirect)
<i>Undefined objectives and goals</i>	Initiation	EVM
<i>Inadequate or vague requirements</i>	Initiation	EVM
<i>Unrealistic timeframes and budgets; unachievable objectives</i>	Initiation	EVM
<i>Lack of prioritization and project portfolio management</i>	Initiation	Stakeholder
<i>Estimates for cost and schedule are erroneous</i>	Initiation/Project	EVM
<i>Failure to set and manage expectations</i>	Initiation/Project	Stakeholder
<i>Business politics</i>	Initiation/Benefits	Stakeholder
<i>Cultural and ethical misalignment</i>	Initiation/Benefits	Stakeholder
<i>Lack of a solid project plan</i>	Project	EVM
<i>Poor estimating</i>	Project	EVM
<i>Poor processes/documentation</i>	Project	EVM (Indirect)
<i>Poor risk management</i>	Project	EVM
<i>Overruns of realistic schedule and cost estimates</i>	Project	EVM
<i>Failure to track progress</i>	Project	EVM

<i>Reason for Failure</i>	<i>Cause</i>	<i>EVM / SH*</i>
<i>Poor Testing</i>	Project	EVM
<i>Poorly defined roles and responsibilities</i>	Project/Support	Stakeholder
<i>No change control process / Scope creep</i>	Project/Support	EVM
<i>Team weaknesses – Inadequate / incorrectly skilled resources</i>	Support/Project	EVM (Indirect)
<i>Lack of user input</i>	Support/Project	Stakeholder
<i>Lack of management commitment / Lack of organizational support</i>	Support	Stakeholder
<i>Ineffective or no sponsorship</i>	Support	Stakeholder
<i>Poorly managed – project manager not trained/skilled</i>	Support	EVM (Indirect)
<i>Inflexible processes and procedures, templates and documentation</i>	Support	EVM (Indirect)
<i>Insufficient or Inadequate resources / lack of committed resources</i>	Support/Initiation	EVM (Indirect)
<i>Poor communication / Stakeholder engagement</i>	Benefits/Project	Stakeholder
<i>Poor or ineffective organizational change management.</i>	Benefits	EVM
<i>Stakeholder conflict</i>	Benefits	Stakeholder
<i>Inability or unwillingness to stop a project after approval</i>	Benefits	EVM

EVM Misconceptions

- EVM is a panacea for cost & schedule overruns
- Data Analysis is only backward looking & not necessarily a good predictor of final cost, delivery, or quality
- There is a minimal level when cost & schedule management are not relevant
- EVM does not lend itself to all contract types or program phases
- EVM requires the project be fully defined at initiation
- The rigidity of the EIA-748 EVM Standard does not allow for “other” techniques or emerging best practices
- There is a lack of correlation to project risk, quality, & technical performance to the cost & schedule metrics reported



Discussion

“Through more than forty years, earned value management has proved itself as the best way known to measure and manage integrated technical, cost and schedule performance — first on defense contracts and more recently on all government programs. Its promise is achieved when it is viewed primarily as a management tool. When that ideal is lost or marginalized, EVM tends to devolve to an excessive reporting and oversight requirement that further diminishes its value for management — a vicious cycle that harms management in the long run.”

- Wayne Abba



Questions?

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