

Introduction to Earned Value Management

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EVMS and Federal Contracting

- **FAR Part 34 -Major System Acquisition**
 - **34.000 -- Scope of Part.** This part describes acquisition policies and procedures for use in acquiring major systems consistent with OMB Circular No. A-109; and the use of an Earned Value Management System in acquisitions designated as major acquisitions consistent with OMB Circular A-11, Part 7.
- **Subpart 34.2--Earned Value Management System**
 - An Earned Value Management System (EVMS) is required **for major acquisitions for development**, in accordance with OMB Circular A-11. The Government may also require an EVMS for other acquisitions, in accordance with agency procedures.
 - (b) If the offeror proposes to use a system that has not been determined to be in compliance with the Electronic Industries Alliance Standard 748 (EIA-748), the offeror shall submit a comprehensive plan for compliance with these EVMS standards. Offerors shall not be eliminated from consideration for contract award because they do not have an EVMS that complies with these standards.

EVMS and Federal Contracting

- **DFARS SUBPART 234. 201 EARNED VALUE MANAGEMENT SYSTEM Policy**
- (1) DoD applies the earned value management system requirement as follows:
 - (i) For cost or incentive contracts and subcontracts valued at \$20,000,000 or more, the earned value management system shall comply with the guidelines in the American National Standards Institute/Electronic Industries Alliance Standard 748, Earned Value Management Systems (ANSI/EIA-748).
 - (ii) For cost or incentive contracts and subcontracts valued at \$50,000,000 or more, the contractor shall have an earned value management system that has been determined by the cognizant Federal agency to be in compliance with the guidelines in ANSI/EIA-748.
 - (iii) For cost or incentive contracts and subcontracts valued at less than \$20,000,000—
 - (A) The application of earned value management is optional and is a risk-based decision;
 - (B) A decision to apply earned value management shall be documented in the contract file; and
 - (C) Follow the procedures at [PGI 234.201\(1\)\(iii\)](#) for conducting a cost-benefit analysis.
 - (iv) For firm-fixed-price contracts and subcontracts of any dollar value—
 - (A) The application of earned value management is discouraged; and
 - (B) Follow the procedures at [PGI 234.201\(1\)\(iv\)](#) for obtaining a waiver before applying earned value management.

EVMS and Federal Contracting

- **DFARS SUBPART 234.201(3)**
 - The Defense Contract Management Agency is responsible for determining earned value management system compliance when DoD is the cognizant Federal agency.
- **252.242-7005 Contractor Business Systems.**
 - (e) *Withholding payments.* (1) If the Contracting Officer issues the final determination with a notice to withhold payments for significant deficiencies in a contractor business system required under this contract, the Contracting Officer will withhold five percent of amounts due from progress payments and performance-based payments, and direct the Contractor, in writing, to withhold five percent from its billings on interim cost vouchers on cost-reimbursement, labor-hour, and time-and-materials contracts until the Contracting Officer has determined that the Contractor has corrected all significant deficiencies as directed by the Contracting Officer's final determination...

EVMS and Federal Contracting- History

- 1960s - Earned value-based performance management began in the 60s, based initially on Department of Defense (DOD) Cost/Schedule Control Systems Criteria (C/SCSC).
{1966 US Air Force implementations}
 - Earned Value was used as an objective measure for progress, i.e., physical accomplishment
- 1970s-80s – The DOD continued the use of Earned Value in response to bearing cost and schedule risk in cost-plus contracting.
 - Contractors pushing high tech, newly developed weaponry
 - Military having critical schedule needs (“Arms Race”)
- 1990s – Policy moved Earned Value into all Federal agencies
 - OMB Circular: A-11, NASA Policy Directive 9501.3, DOD 5000.2R, and DOE, Order 413.3 to name a few

Basic Purpose: Why EVMS?

Contractor and Customer Benefits

- An earned value management system is an aid to both the EVM contractor and EVM customer. The benefits of implementing an EVMS can be summarized as follows. An EVMS:
 - Improves the planning process;
 - Fosters a clear definition of the work scope;
 - Establishes clear responsibility for work effort;
 - Integrates technical, schedule, and cost performance;
 - Provides early warning and analysis of potential Earned Value problems;
 - Identifies problem areas for immediate and proactive management attention;
 - Enables more accurate reporting of cost and schedule impacts of known problems;
 - Enhances the ability to assess and integrate technical, schedule, cost, systems analysis, and risk factors;
 - Provides consistent and clear communication of progress at all management levels; and
 - Improves project visibility and accountability.

Considerations: Why Not EVMS?

- Quality of the work accomplished is not measured
- Requires close attention to details and visibility into program risks
- Implementation costs are usually high and requires a high level of coordination between departments
- Users must be disciplined and dedicated to maintaining data integrity
- Data collection and analysis can be time consuming

These are the reasons why the Federal Government limits the required use of Earned Value Management to only major acquisitions, normally only on Cost Reimbursable contracts, and discourage mandated use on Firm Fixed Price, T&M or Labor Hour Contracts.

Definition: What is Earned Value Management?

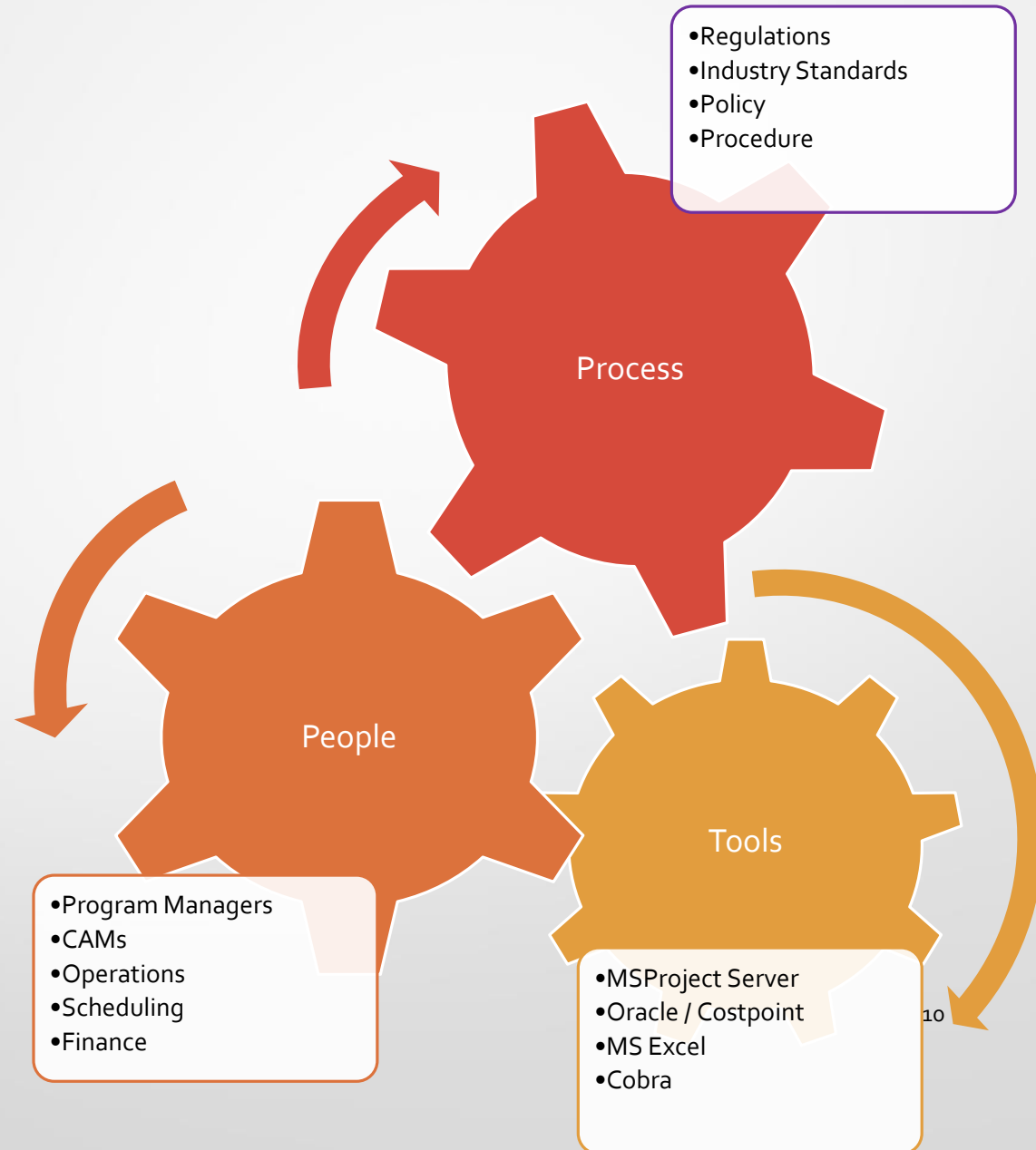
- Earned Value Management (EVM) is a systematic approach to the integration and measurement of cost, schedule, and technical (scope) accomplishments on a project or task. It provides both the government and contractors the ability to examine detailed schedule information, critical program and technical milestones, and cost data.
- Earned Value Management is intended to provide data from a contractor's management system to the government in standard data elements that...
 - Relate time-phased budgets to contract tasks
 - Integrate cost, schedule, and technical performance
 - Indicate work progress objectively
 - Are valid, timely and auditable
 - Are from the internal system the contractor uses to manage
 - Are at a practical level of summarization

Required Elements of EVMS

- The 32 EVMS guidelines are defined in the American National Standards Institute/ Electronic Industries Alliance (ANSI/ EIA) Standard 748-1998 (ANSI/ EIA-748), Earned Value Management System Guidelines. The 32 EVMS guidelines identified by ANSI/ EIA-748 address nine management processes:
 - Organizing
 - Accounting
 - Change Incorporation
 - Scheduling
 - Indirect Management
 - Material Management
 - Work/Budget Authorization
 - Managerial Analysis
 - Subcontract Management

EVMS Defined

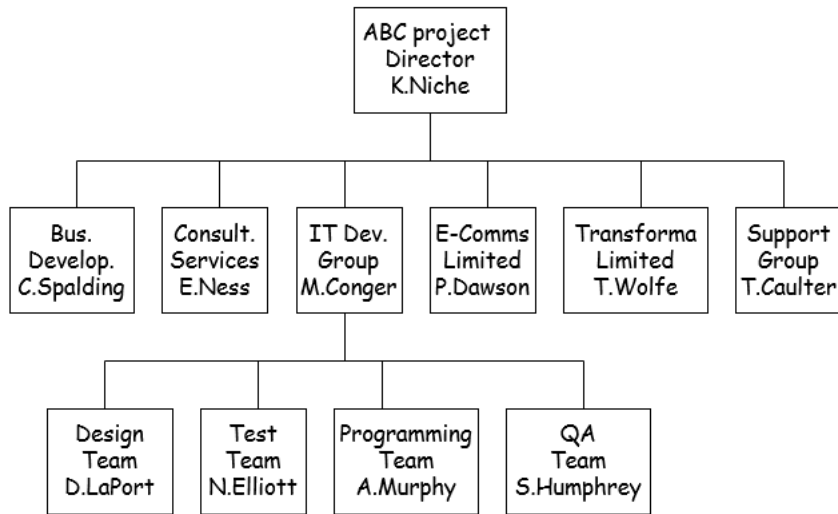
An earned value management system (EVMS) is an integration of well documented business practices, processes, reliable business systems and tools, and well trained responsible employees



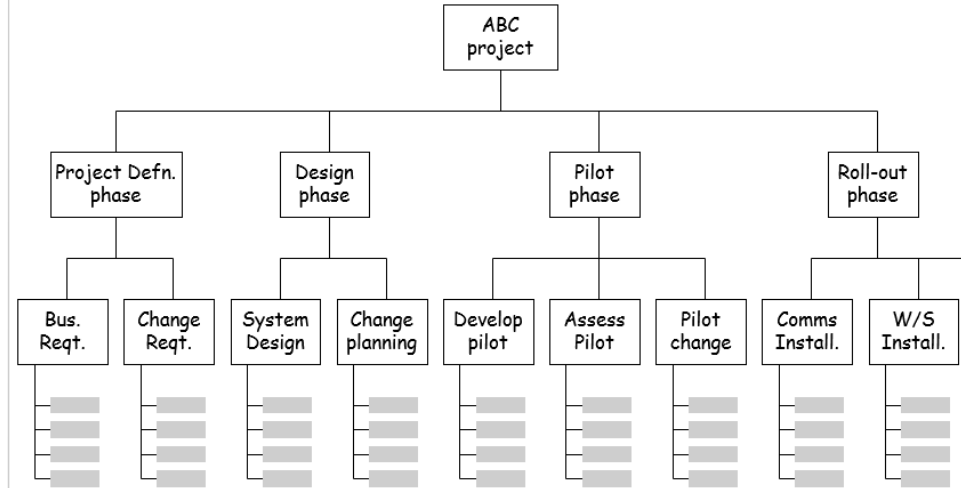
What is needed to use EVM?

1. Establish Work Breakdown Structure (WBS)
2. Establish Organisation Breakdown Structure (OBS)
3. Integrate planning, scheduling, budgeting, work authorisation and cost accumulation with WBS & OBS
4. ID company organisation responsible for controlling overheads
5. Cost & schedule performance measurement by WBS/OBS

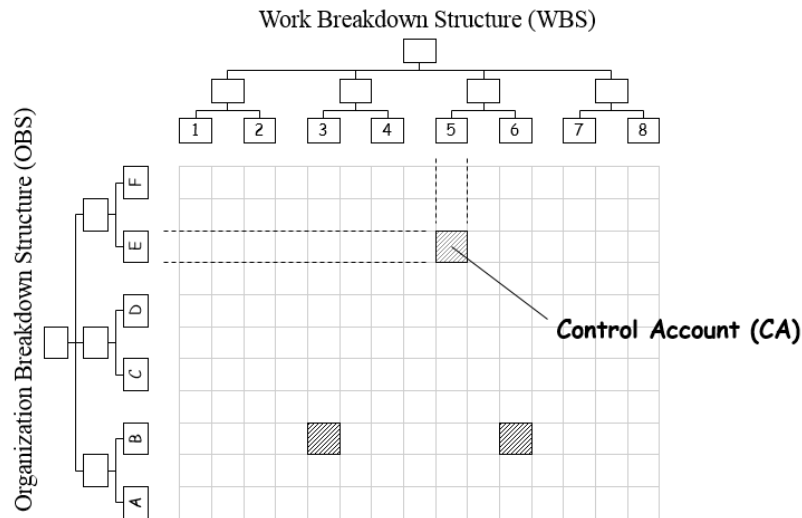
Organisational Breakdown Structure (OBS)



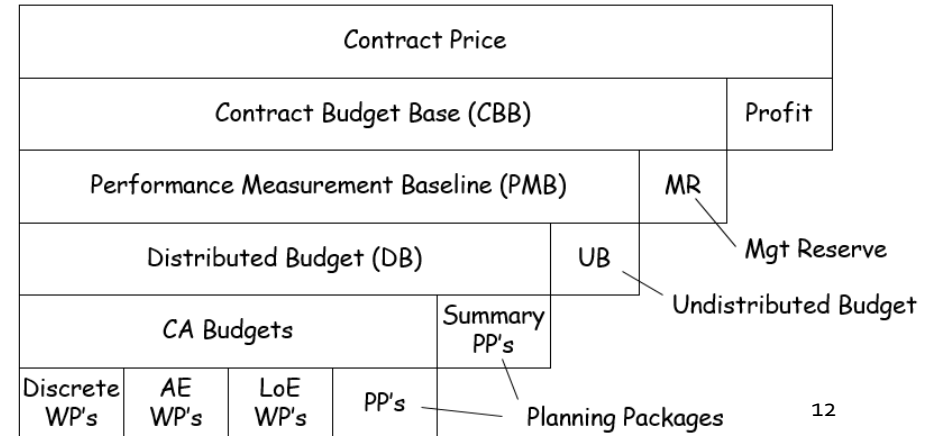
WBS - execution orientated example

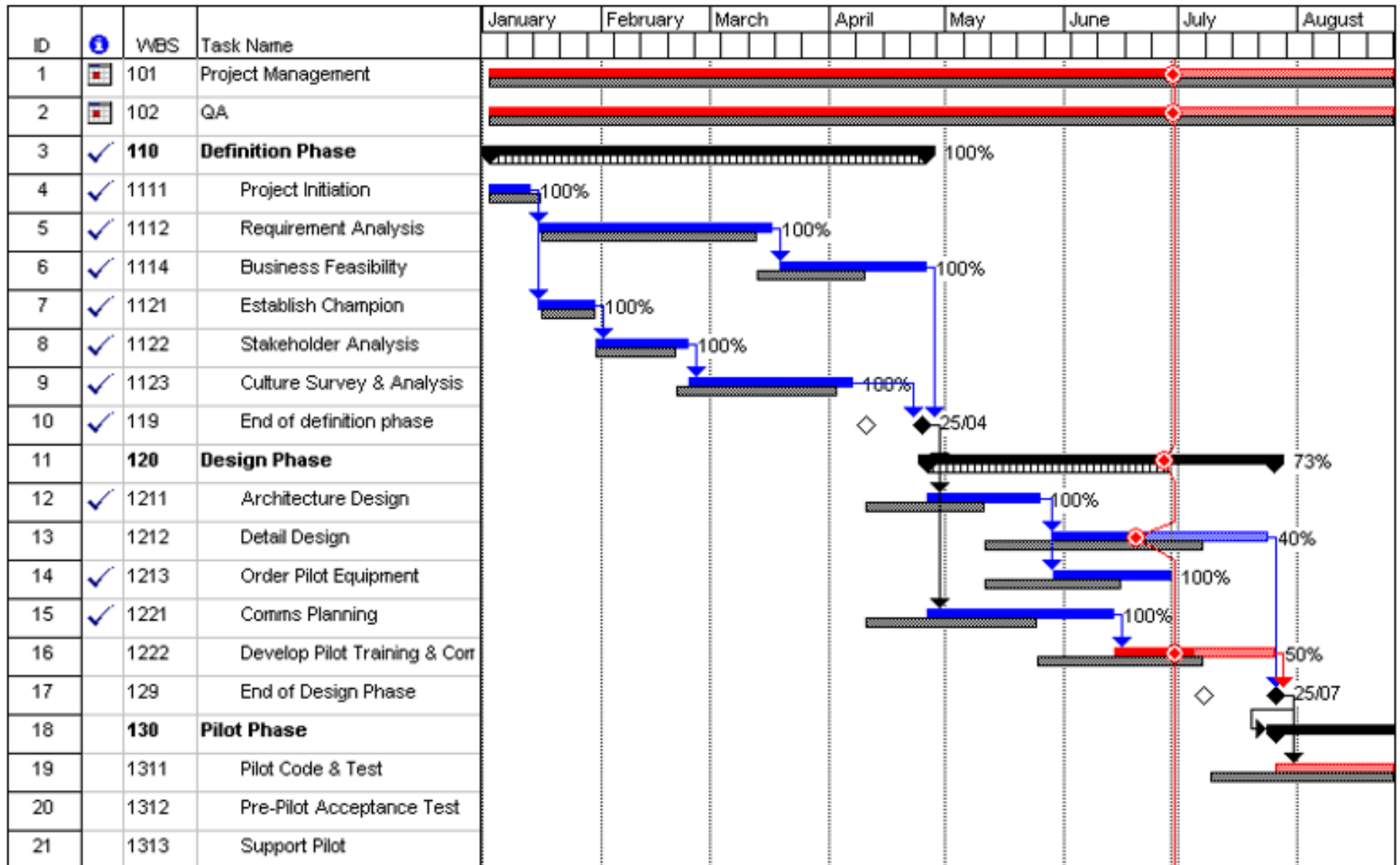


Responsibility Allocation Matrix (RAM)



Budget Breakdown

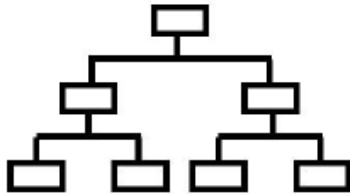




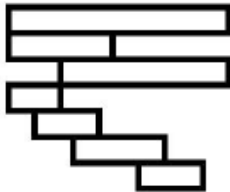
Performance Measurement Baseline (PMB)

- Integration of Scope (aka Technical Scope), Schedule, and Cost

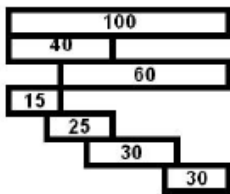
1. Define the Work



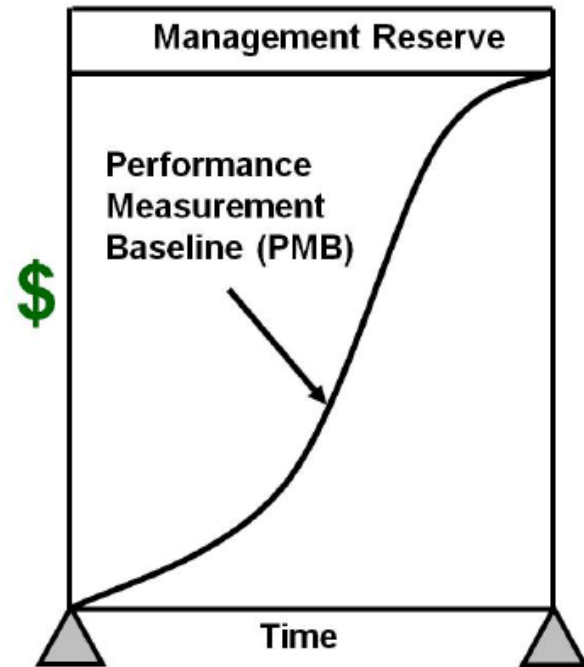
2. Schedule the work



3. Allocate budgets



Contract Budget Base



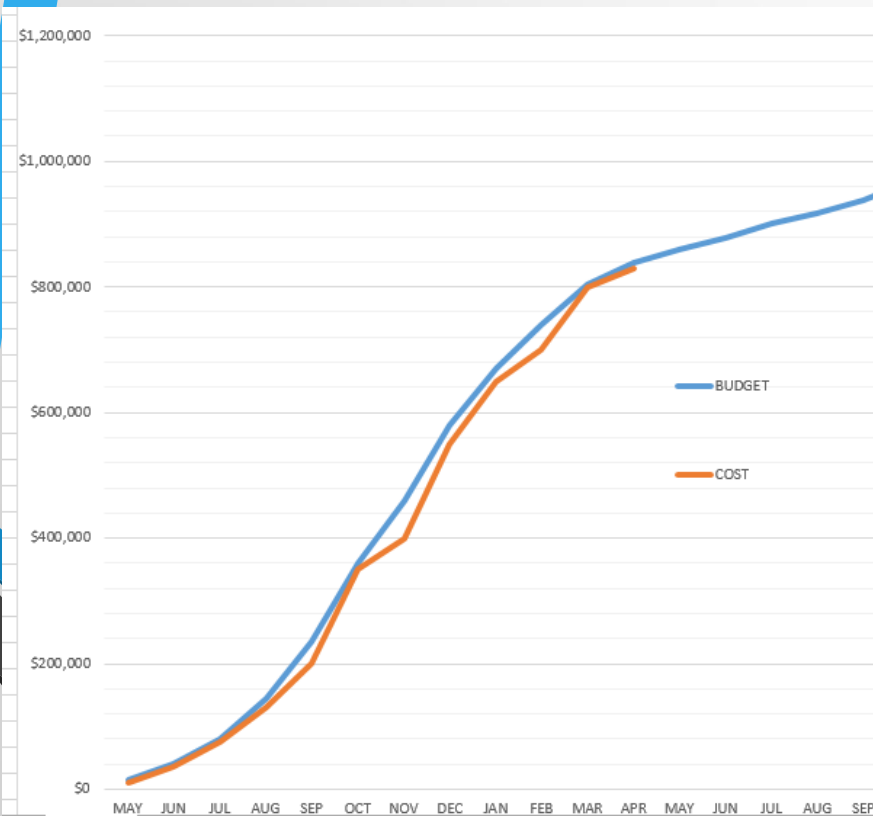
Establishing the baseline – an iterative, three step process

Very Basics: 5 Key Elements:

QUESTION	ANSWER	ACRONYM
How much work <u>should</u> be done?	Budgeted Cost for Work Scheduled	<u>BCWS</u>
How much work <u>is</u> done?	Budgeted Cost for Work Performed	<u>BCWP</u>
How much did the <u>is done</u> work cost?	Actual Cost of Work Performed	<u>ACWP</u>
What was the total job <u>supposed</u> to cost?	Budget at Completion	<u>BAC</u>
What do we <u>now expect</u> the total job to cost?	Estimate at Completion	<u>EAC</u>

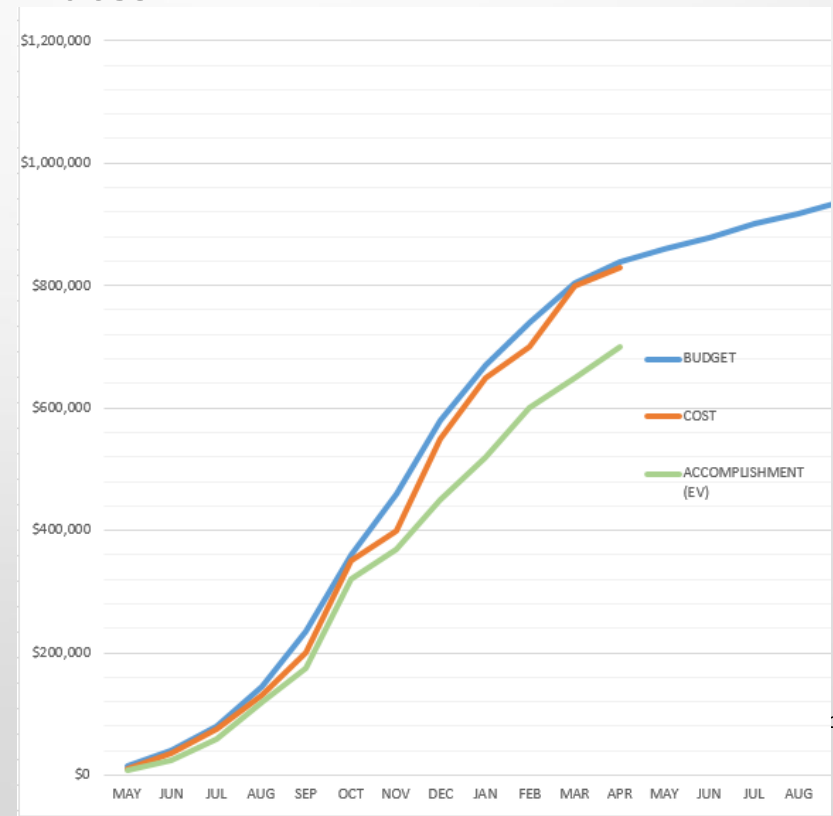
Spend Plan

- Only tracks costs to budget
- Cannot predict final costs
- Does not indicate efficiencies



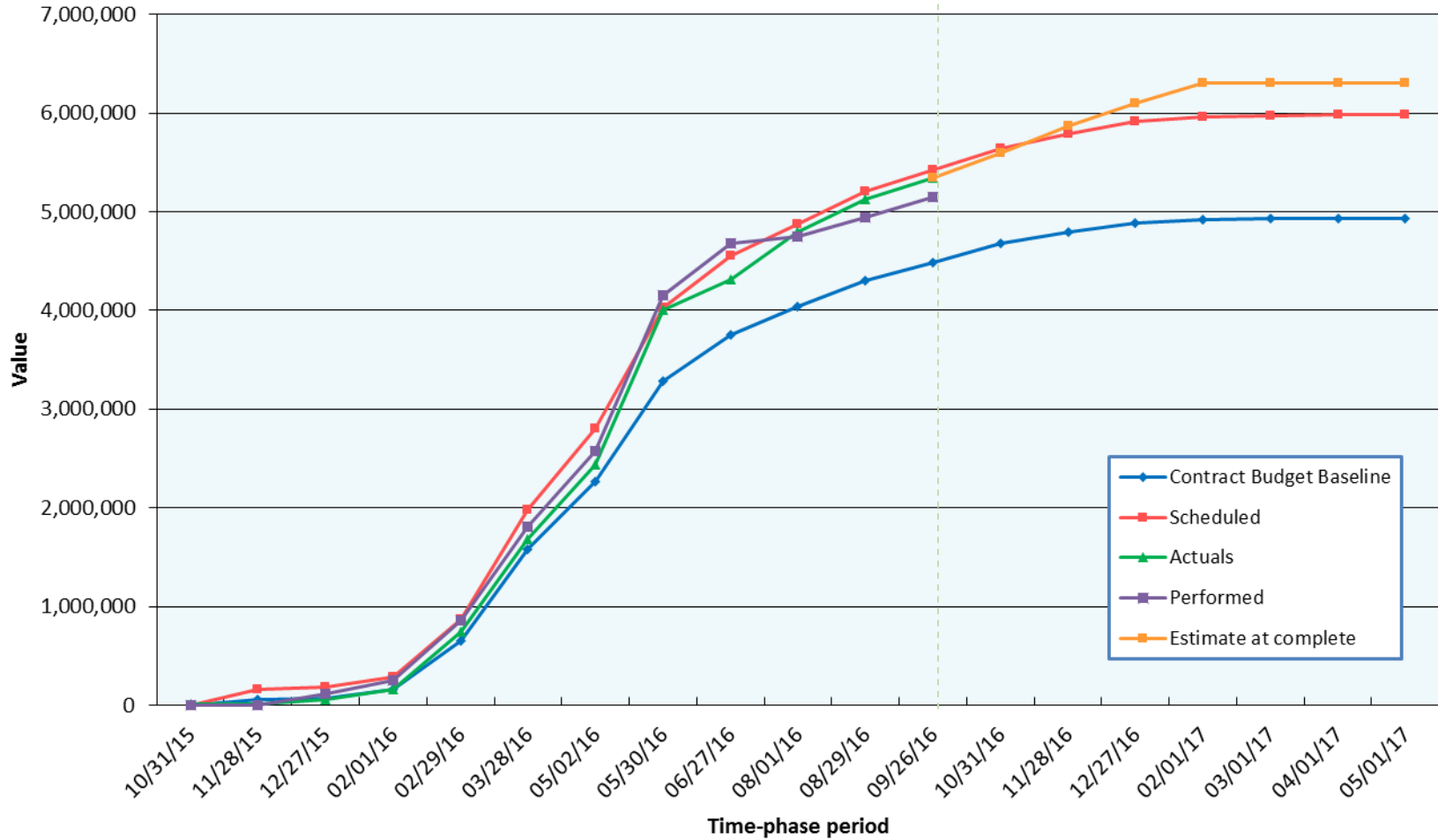
Earned Value Management

- Quantifies the value of the work accomplished
- Tracks schedule and cost performance
- Predicts final costs
- Calculates past and future efficiency rates



S-Curve Chart

Sample Project: EVM S-Chart



What we can now measure:

BCWS – Budgeted Cost of Work Scheduled

ACWP – Actual Cost of Work Performed

BCWP – Budgeted Cost of Work Performed

BAC – Budget At Complete

ETC – Estimate To Complete

EAC – Estimate At Completion

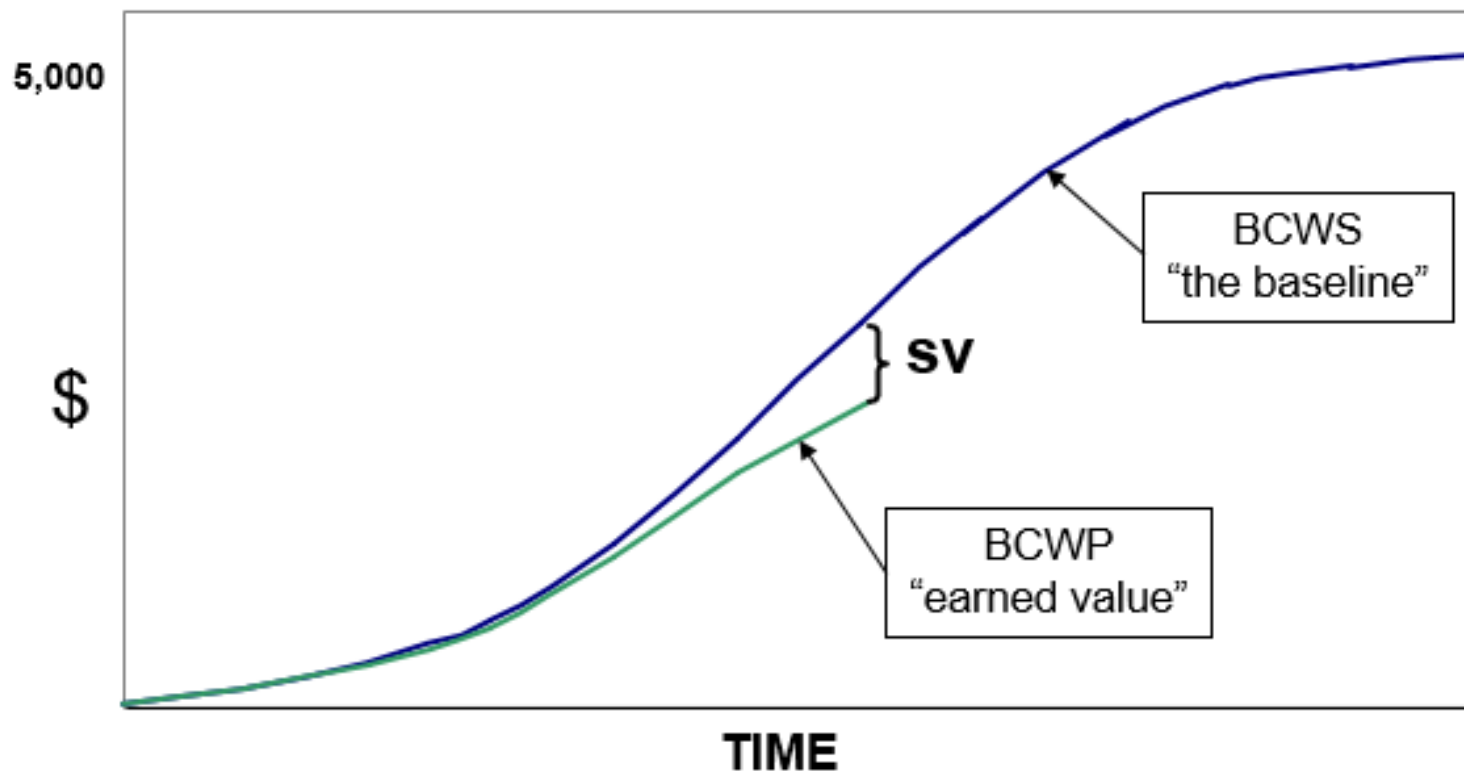
SV – Schedule Variance

CV – Cost Variance

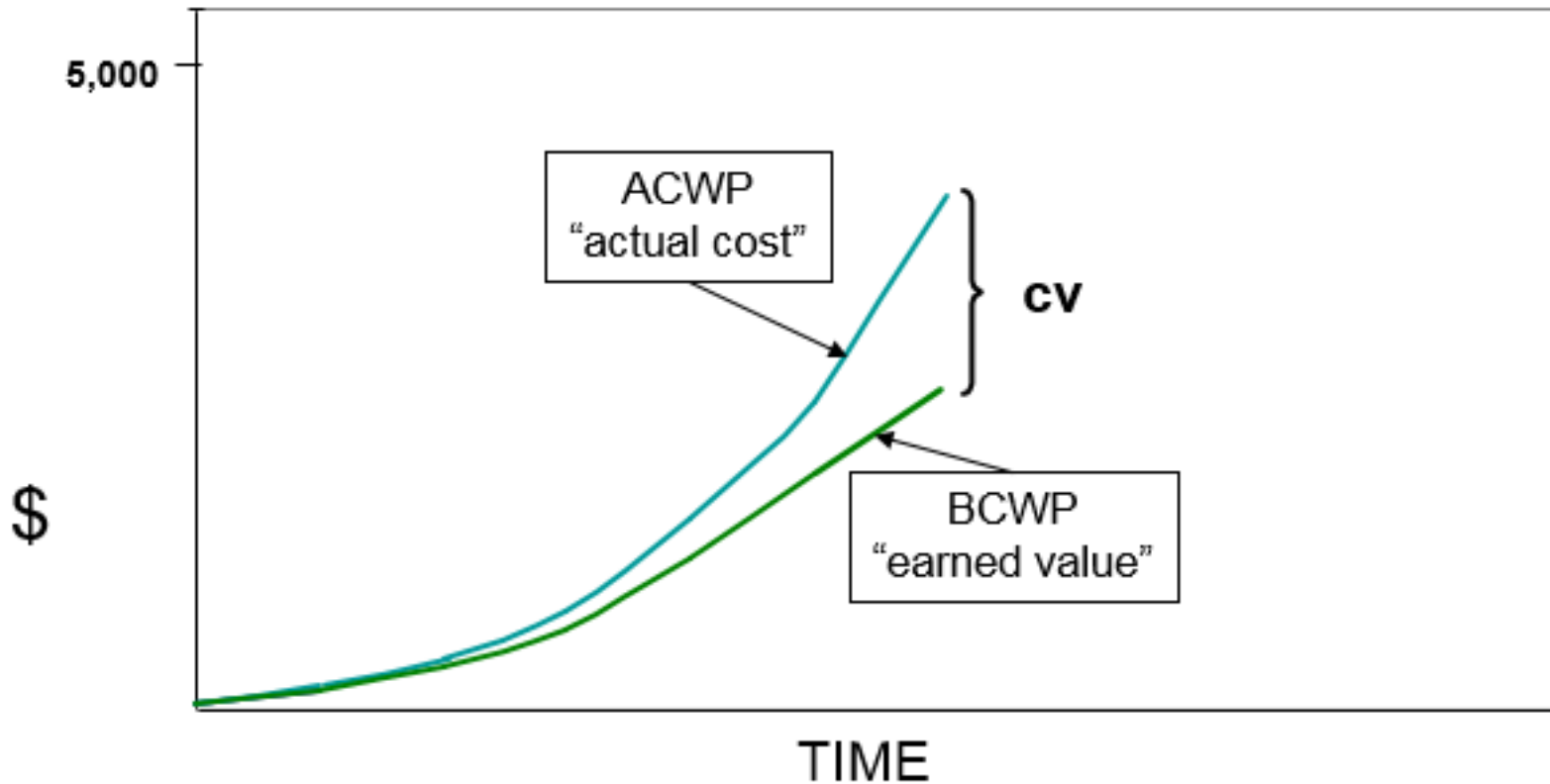
SPI – Schedule Performance Index

CPI – Cost Performance Index

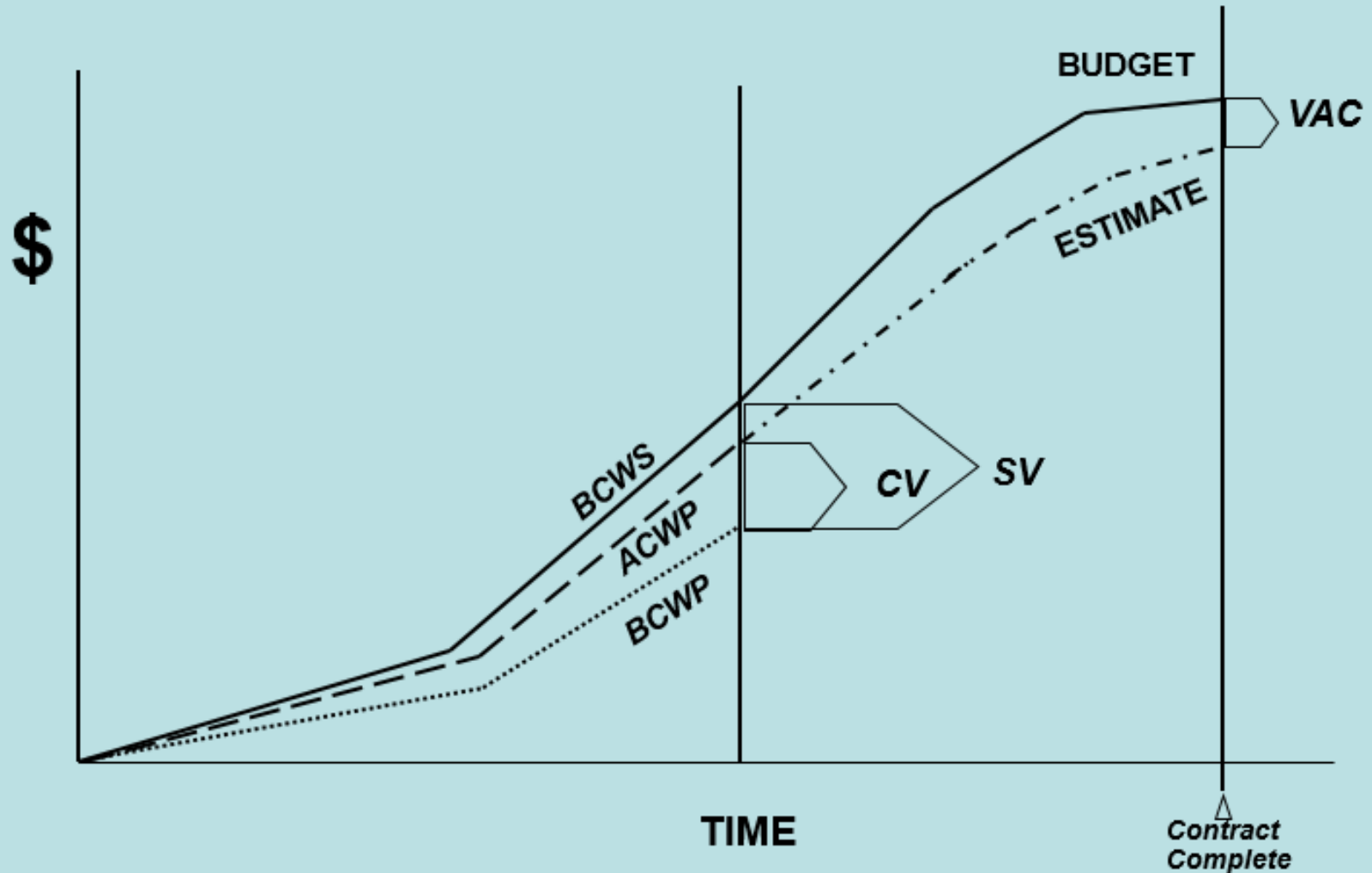
Schedule Variance

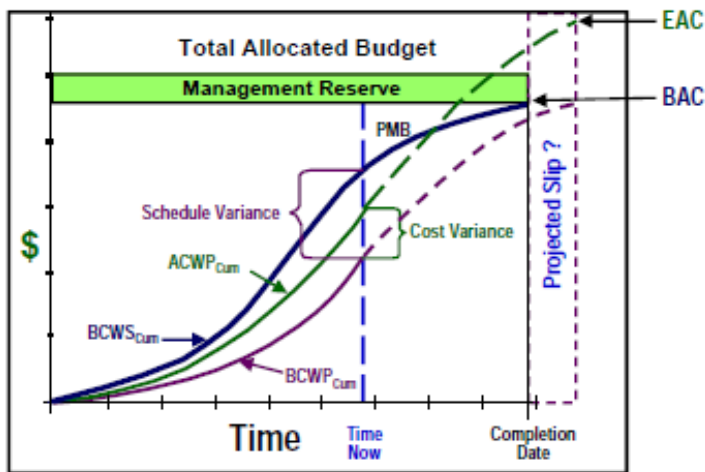


Cost Variance



PERFORMANCE MEASUREMENT DATA ELEMENTS





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

% Schedule	= (BCWS_CUM / BAC) * 100
% Complete	= (BCWP_CUM / BAC) * 100
% 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

BASLINE EXECUTION INDEX (BEI) & Hit Task %

BEI = Total Tasks Completed / (Total Tasks with Baseline Finish On or Prior to Current Report Period)
 Hit Task % = 100 * (Tasks Completed ON or PRIOR to Baseline Finish / Tasks Baselined to Finish within Current Report Period)

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

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

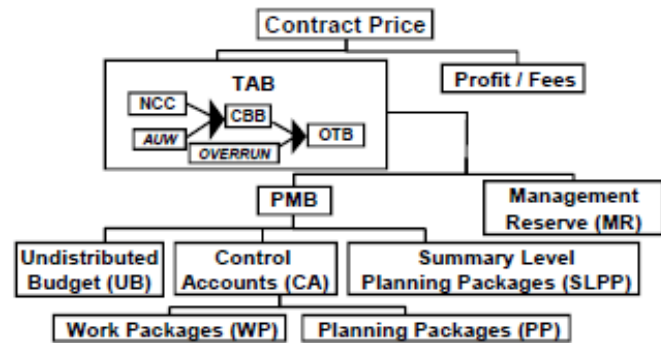
$$EAC_{Composite} = ACWP_{CUM} + [(BAC - BCWP_{CUM}) / (CPI_{CUM} * SPI_{CUM})]$$

TO COMPLETE PERFORMANCE INDEX (TCPI) §

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

§ 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



ACRONYMS

ACWP	Actual Cost of Work Performed	Cost actually incurred in accomplishing work performed	- ACTUAL COST
AUW	Authorized Unpriced Work	Work contractually approved, but not yet negotiated / definitized	
BAC	Budget At Completion	Total budget for total contract thru any given level	
BCWP	Budgeted Cost for Work Performed	Value of completed work in terms of the work's assigned budget	= EARNED VALUE
BCWS	Budgeted Cost for Work Scheduled	Time-phased Budget Plan for work currently scheduled	= PLANNED VALUE
CA	Control Account	Lowest CWBS element assigned to a single focal point to plan & control scope / schedule / budget	
CBB	Contract Budget Base	Sum of NCC & AUW	
EAC	Estimate At Completion	Estimate of total Cost for total contract thru any given level generated by Ktr, PMO, DCMA, etc. = $EAC_{Ktr / PMO / DCMA}$	
LRE	Latest Revised Estimate	Ktr's EAC or EAC_{Ktr}	
MR	Management Reserve	Budget withheld by Ktr PM for unknowns / risk management	
NCC	Negotiated Contract Cost	Contract Price Minus profit or fee(s)	
OTB	Over Target Baseline	Sum of CBB + additional budget approved for remaining work	
PAC	Price At Completion	EAC Plus Adjusted Profit or Fee(s)	
PMB	Performance Measurement Baseline	Contract time-phased budget plan	
PP	Planning Package	Far-term CA activities not yet defined into WPs	
SLPP	Summary Level Planning Package	Far-term contract activities not yet defined into CAs	
TAB	Total Allocated Budget	Sum of all budgets for work on contract = NCC, CBB, or OTB	
TCPI	To Complete Performance Index	Efficiency needed from 'time now' to achieve a Cost Target = BAC, LRE, or EAC	
UB	Undistributed Budget	Broadly defined activities not yet distributed to CAs or SLPPs	
WP	Work Package	Near-term, detail-planned activities within a CA	

EVM POLICY: DoDI 5000.02, Enclosure 1, Table 8.

EVMS in accordance with ANSI/EIA-748 is required for cost or incentive contracts, subcontracts, intra-government work agreements, & other agreements valued > \$20M (TY \$). Contracts > \$50M (TY \$) require that the EVMS be formally validated by the cognizant contracting officer.

EVMS is discouraged on Firm-Fixed Price, Time & Material Contracts, & LOE activities regardless of cost. Refer to the IPMR Implementation Guide for IPMR Tailoring Guidance.

DoD's EVM CONTRACTING REQUIREMENTS:

DFARS CLAUSES	252.234-7001 "NOTICE OF EVMS" FOR SOLICITATIONS
	252.234-7002 "EVMS" FOR SOLICITATIONS & CONTRACTS
	252.242-7005 "CONTRACTOR BUSINESS SYSTEMS" FOR SOLICITATIONS & CONTRACTS
CONTRACT PERFORMANCE REPORT	DI-MGMT-81466A 5 FORMATS = WBS, ORGANIZATION, ENDLINES, STAFFING, EXPLANATIONS & PRIOR ANALYSIS
INTEGRATED MASTER SCHEDULE	DI-MGMT-81650 MANDATORY FOR DoD EVMS CONTRACTS
Integrated Program Mngt Report	DI-MGMT-81861 * 7 FORMATS = WBS, OBS / IPT, BASELINE, STAFFING, EXPLANATIONS & PRIOR ANALYSIS, IMS, HISTORY / FORECAST COST

INTEGRATED BASELINE REVIEW MANDATORY FOR ALL EVMS CONTRACTS

WBS For Defense Materiel Items MIL-STD-881-C

* Combines & Supersedes DI-MGMT-81466A & 81650; Effective July 1, 2012

EVM CoP: <https://acc.dau.mil/evm>
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Questions?

- Thank you for your attention!