Earned Value Management (EVM)

TOC/CAIV Workshop
Naval Surface Warfare Center
Port Hueneme, CA

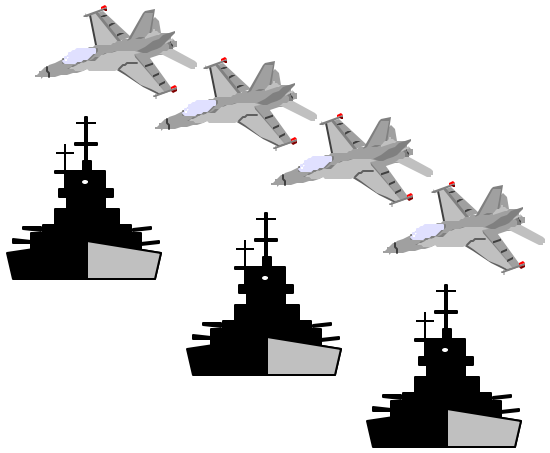
Mike Skratulia

TOC Team Leader EVM Support

'ARO TOC Team - Creating a Common Framework for TOC'

EVM Overview

- Historical prospective
- Basic overview
- Policy guidance
- Principles
- ASN(RD&A) issues
- Implementation methodology
- Training, POC's and web addresses
- Recap



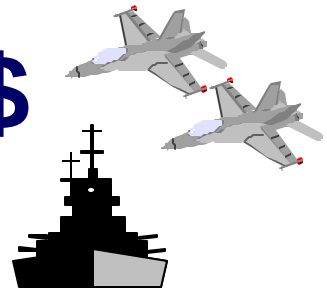
1986 Pentagon Spending:
- **28% of Federal Budget**
- **6.2% of GDP**

$$$

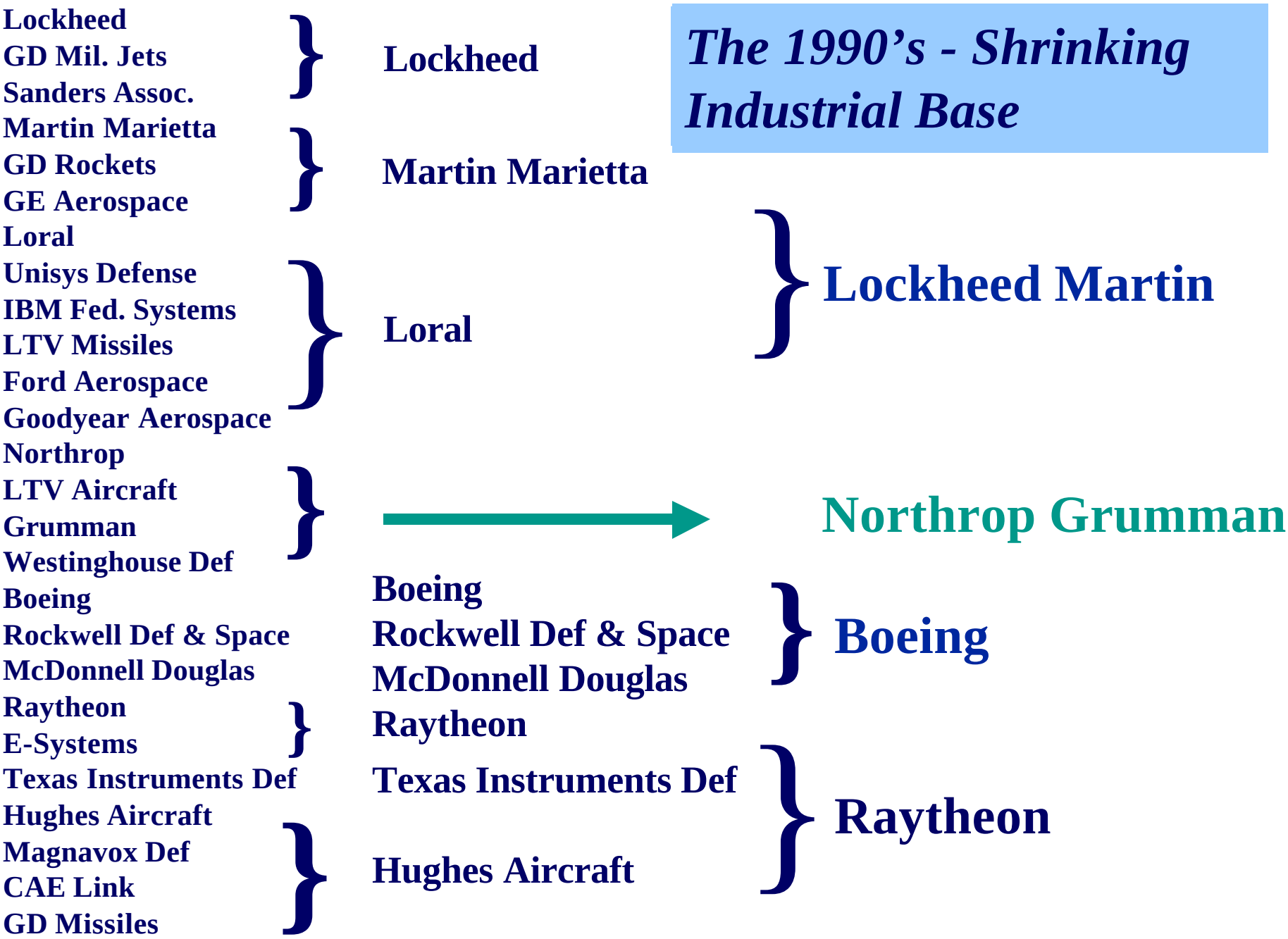
1999 Pentagon Spending:
- **16% of Federal Budget**
- **3.2% of GDP**

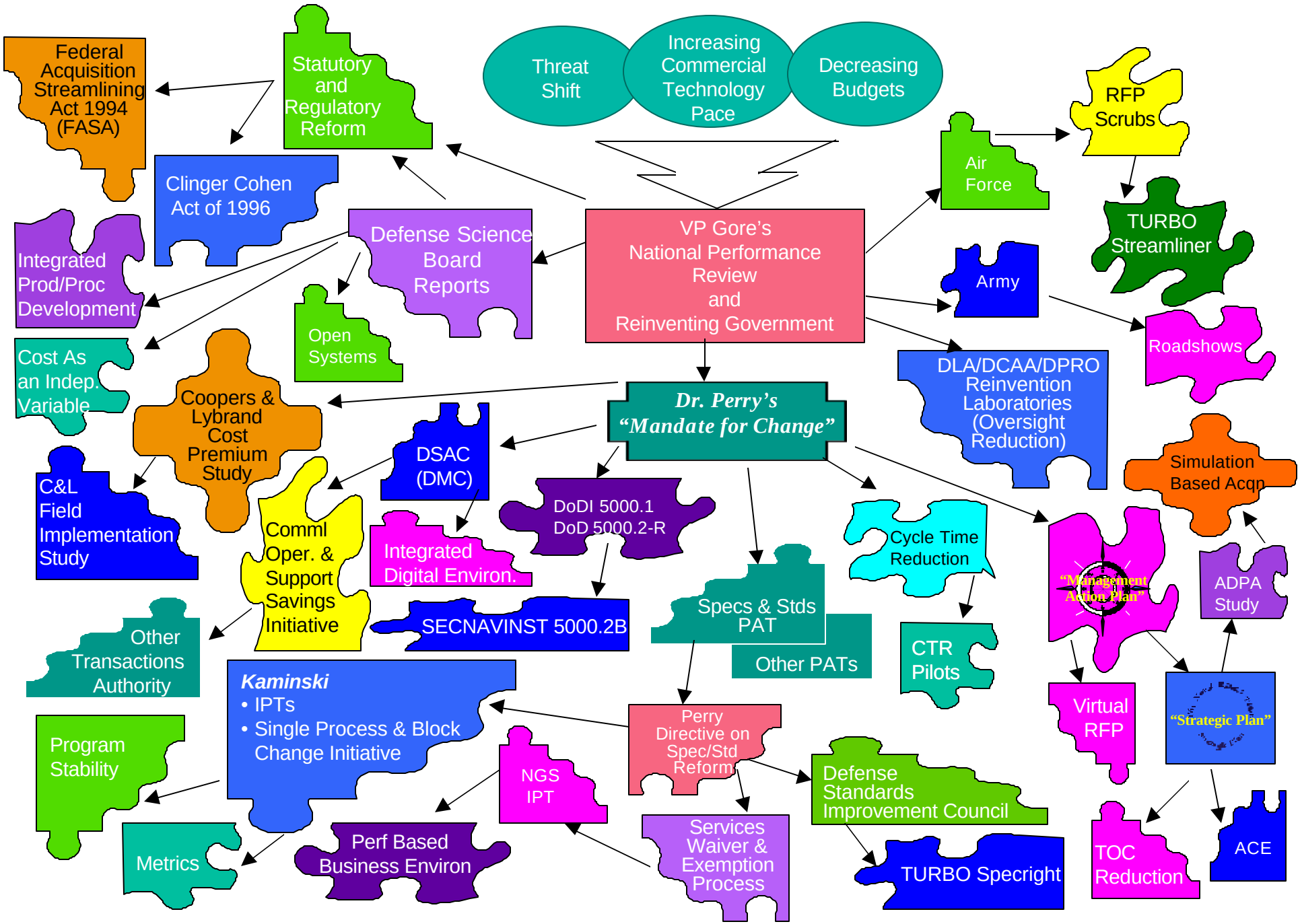
Military Procurement Budget:
- **Down 64% since 1985 peak**
- **$60 Billion goal**

$



The 1990's - Shrinking Industrial Base





Acquisition Reform – A Change Management Feat

Unnecessary Cost ??

"The DoD Regulatory Cost Premium: A Quantitative Assessment"

December, 1994, Coopers & Lybrand/TASC Study:

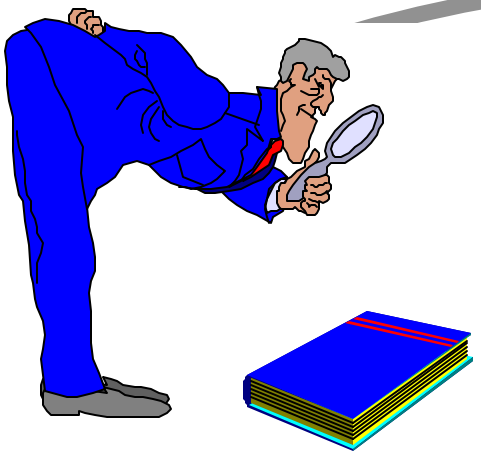
C&L/TASC Cost Drivers: Cost without a requirement

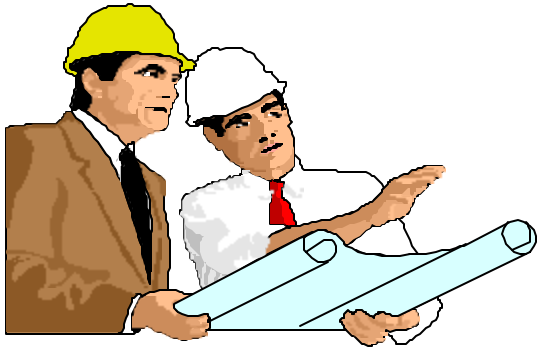
Total DoD Cost Premium is 18%

C/SCS Cost Premium is 0.9%

- Nearly 3/4 is in Engineering/Program Mgmt
  - Written control account variances
- Most of Remainder is in administrative and external reporting activities

EVM
Transition Process





Oversight/ inspection

Management

Earned Value Management: Implementation Problems

"Financial Management"

Audit-like reviews

Reporting focus

Too many "surprises"

A-12 (Navy)

Challenge: Keep good principles, Stop bad practices

Lesson of the A-12

The "Beach" Report, A-12 Administrative Inquiry, 28 Nov 1990

Too often, earned value insights remain the sole province of the supporting program control staff of both contractors and the government.

Earned value must be an integral part of the performing design and manufacturing organizations.

Only when program technical staffs are held accountable for earned value analysis, will they begin to understand its implications.

Growing Consensus: Government/Industry Best Practice

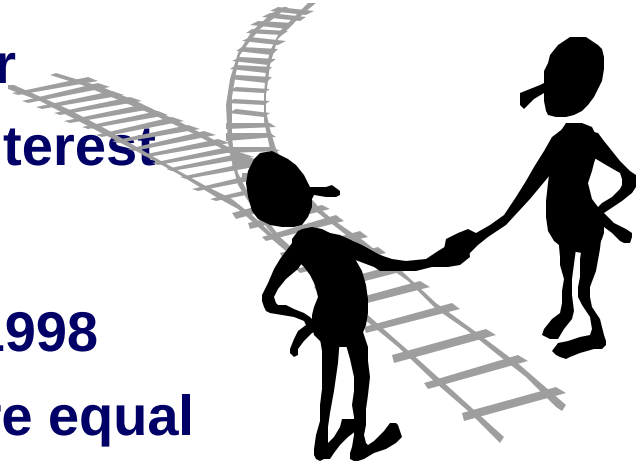
Dec. '96 DoD accepted industry EVMS guidelines as C/SCSC replacement

Reserved right for government reviews

- **As determined by project manager**
- **"Self-certification" not in public interest**

Encouraged "true" standard

- **ANSI/EIA 748-98 EVMS issued in 1998**
- **DoD and industry EVMS criteria are equal**
- **International discussions - Australia, Canada, UK, US**



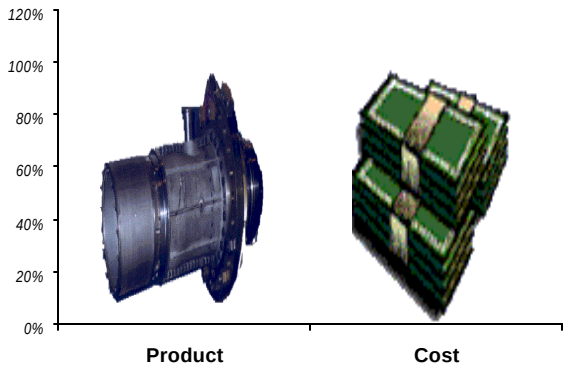
Earned Value Management

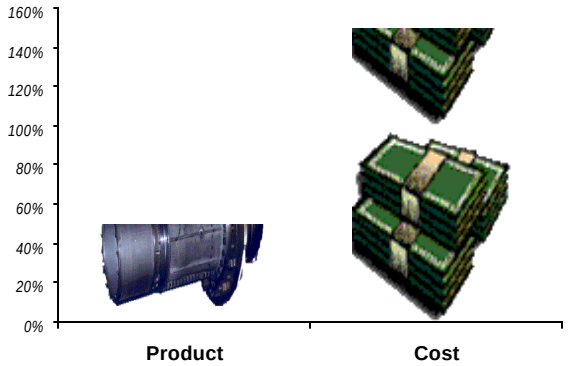
Guidance

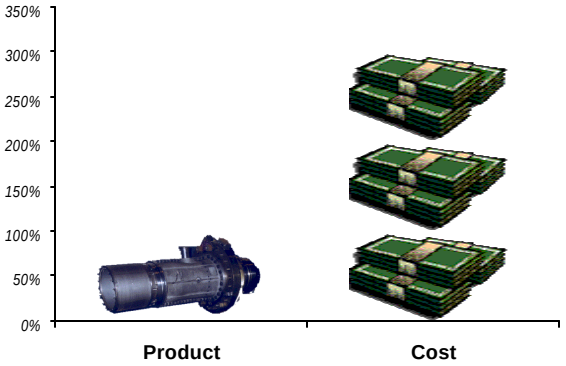
- USD(A&T) accepted industry standard for Defense Acquisition
  - ANSI/EIA-748-98
  - Acceptance memo signed 17 Aug 99
  - Acknowledged as world's best practice for managing complex projects
  - Incorporated changes into DoD 5000.2
  - *Defense Contract Management Agency* acts as executive agent for EVM

EVM Web Site: - www.acq.osd.mil/pm

Earned Value Management







Budget

Tool that allows both government and contractor visibility into technical, cost, and schedule progress on their contracts.

Time Now

Industry Best Practice ANSI/EIA-748-98 adopted as Defense standard for EVM replacing Cost/Schedule Control System.

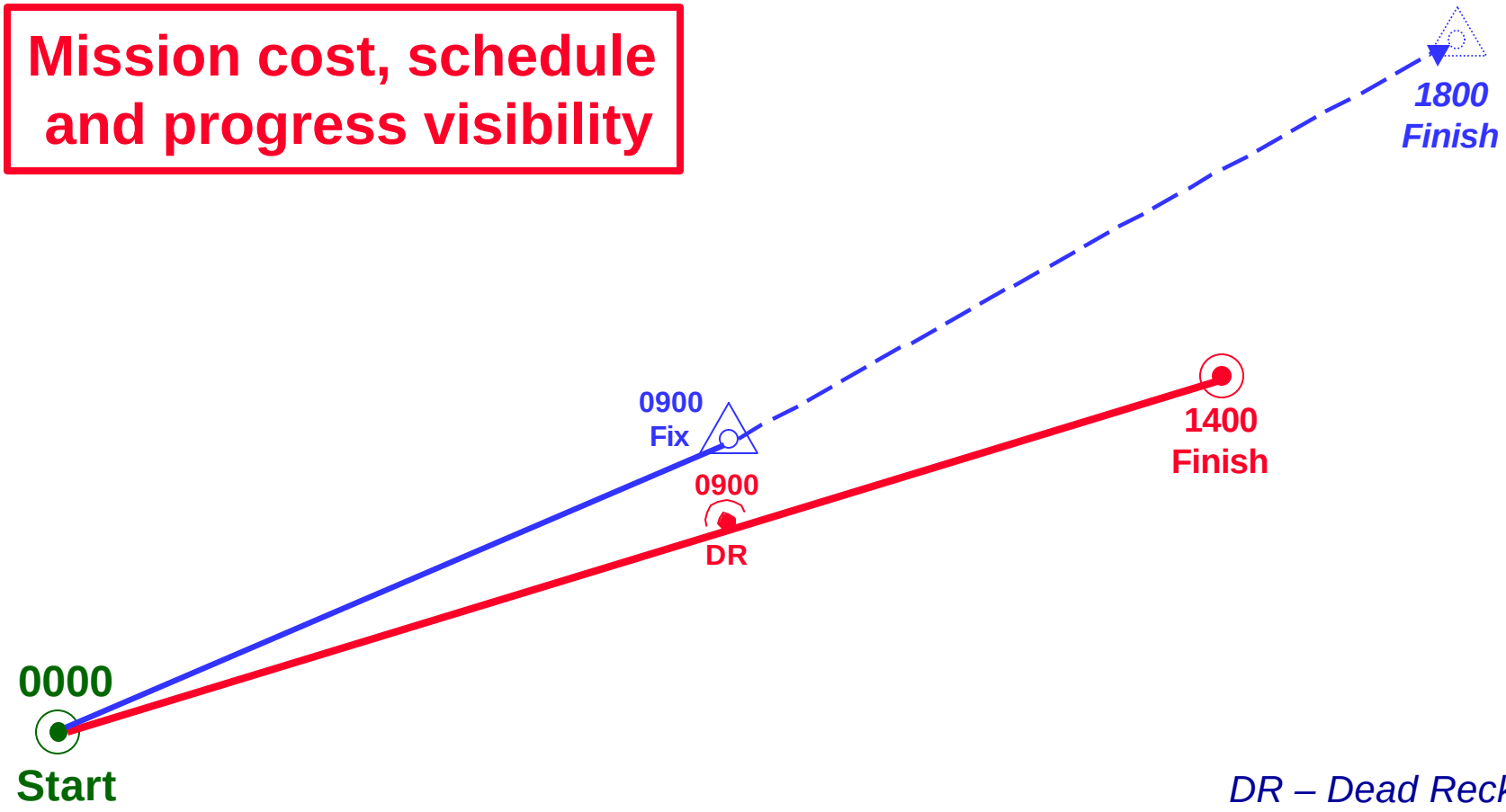
Completion

Required for non-FFP contracts
>$73M RDT&E
>$315M procurement
Below threshold may be appropriate.

Navigating

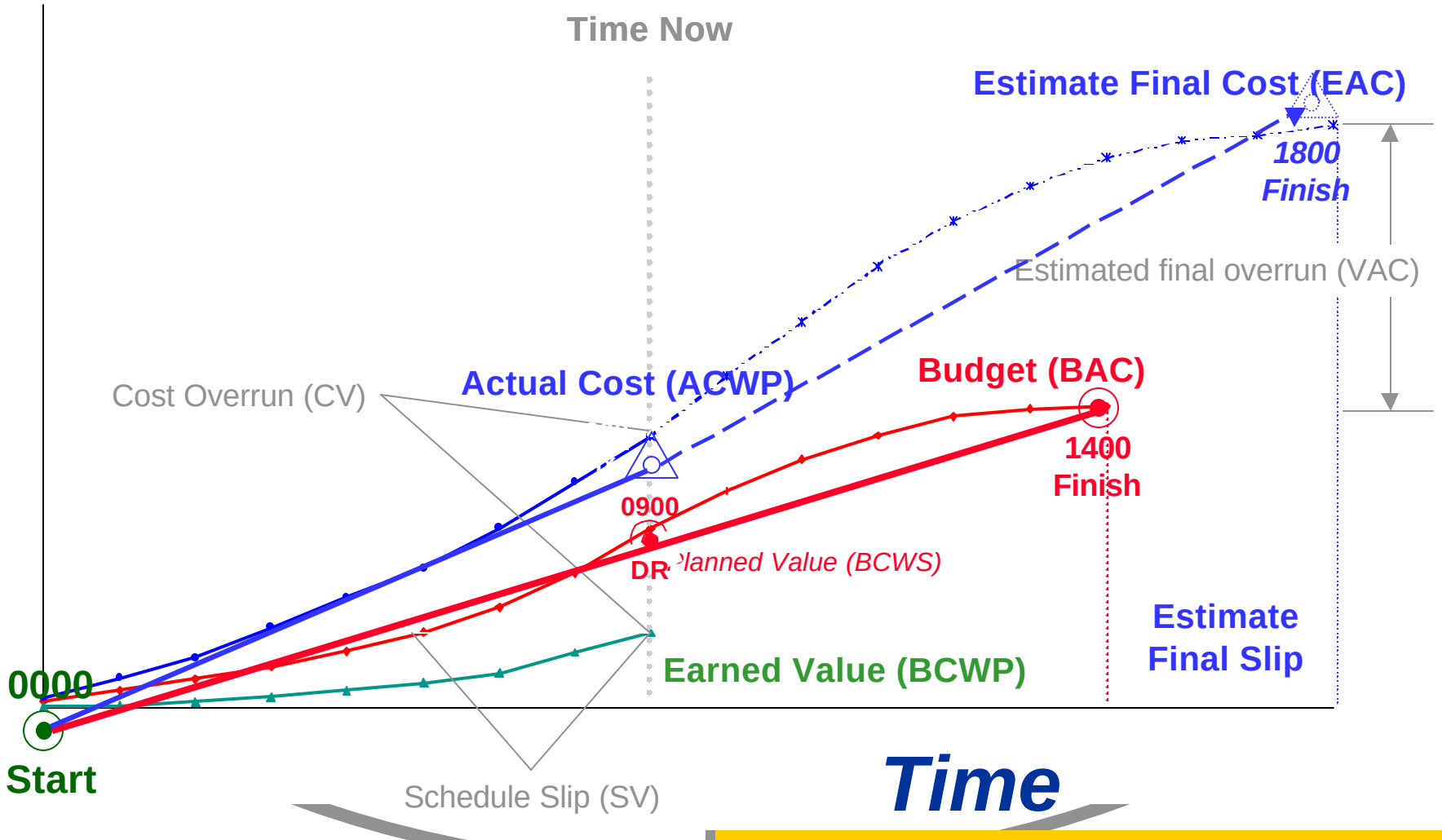
(Earned Value Management)

Mission cost, schedule and progress visibility



DR – Dead Reckoning

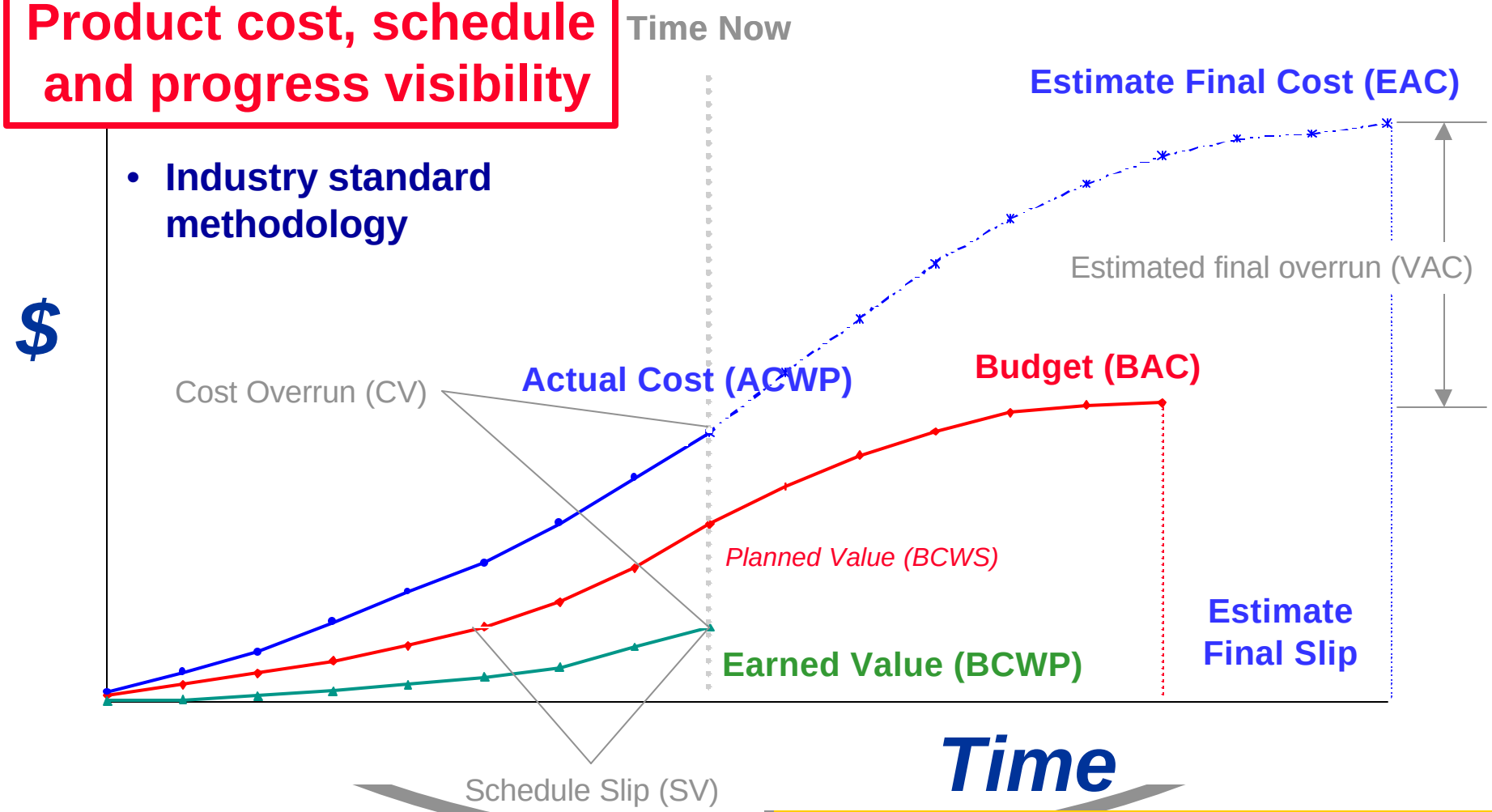
Earned Value Management



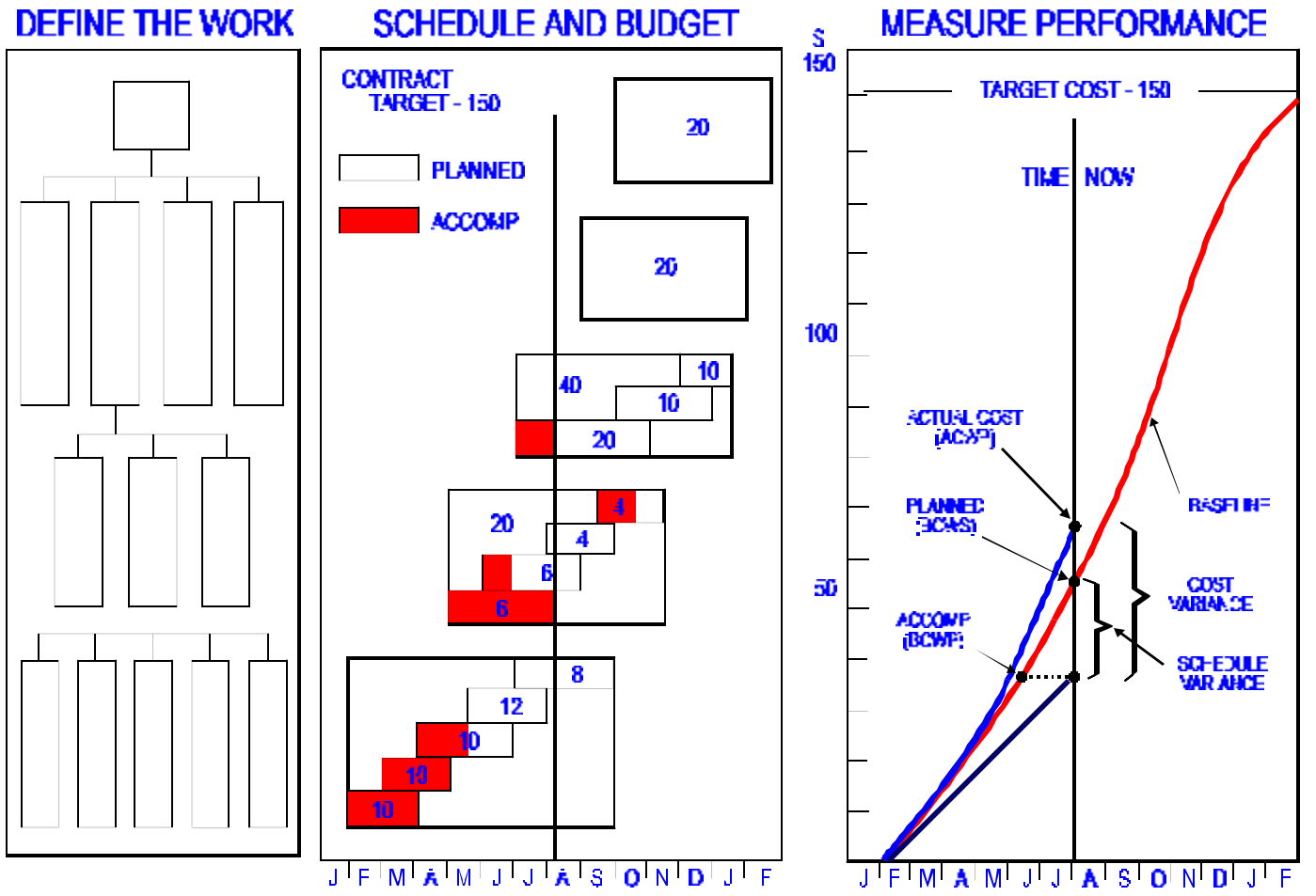
Earned Value Management

Product cost, schedule and progress visibility

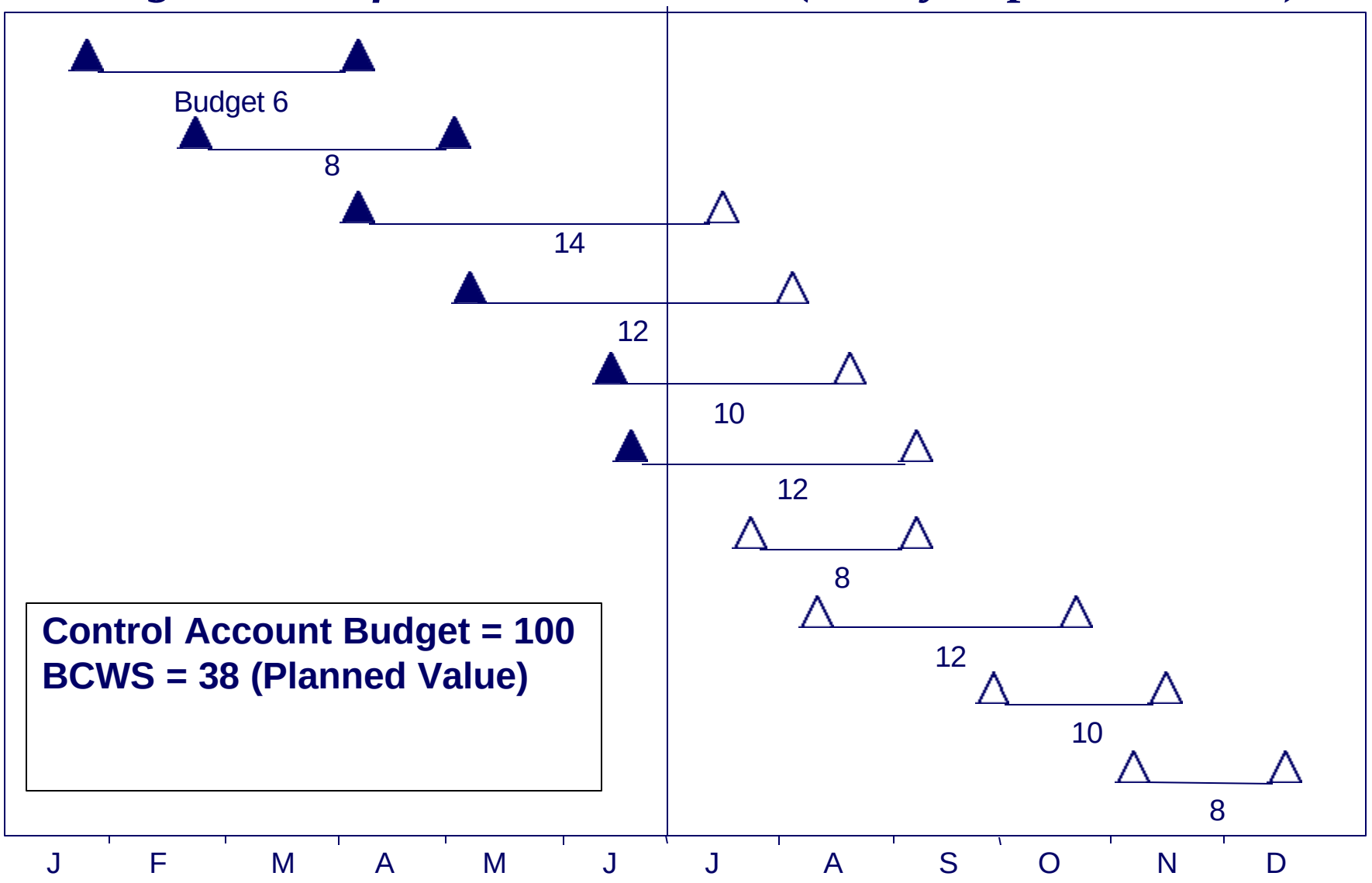
- **Industry standard methodology**



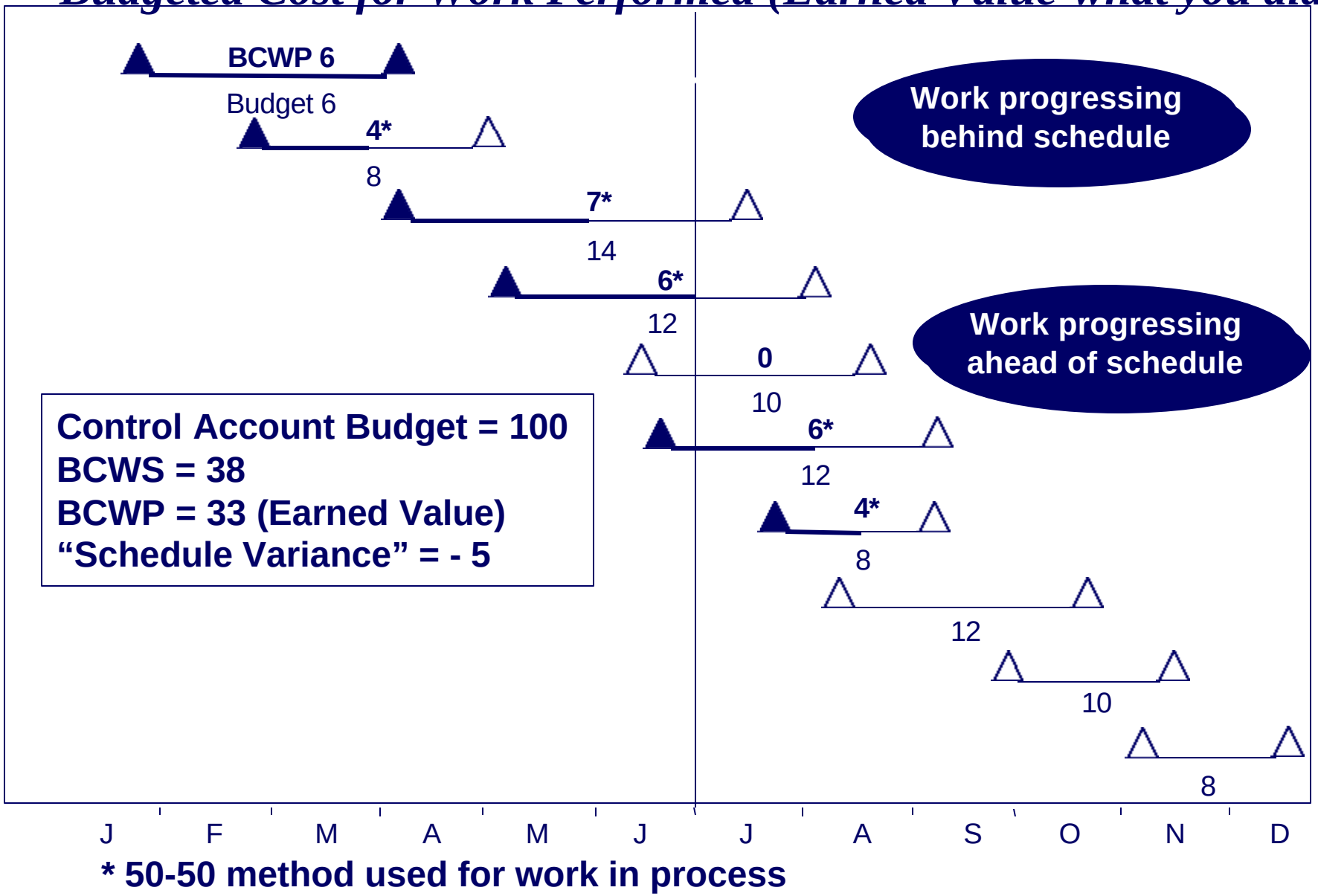
Earned Value Management = Basic Management Principles



Budgeted Cost for Work Scheduled (<u>what you planned to do</u>)



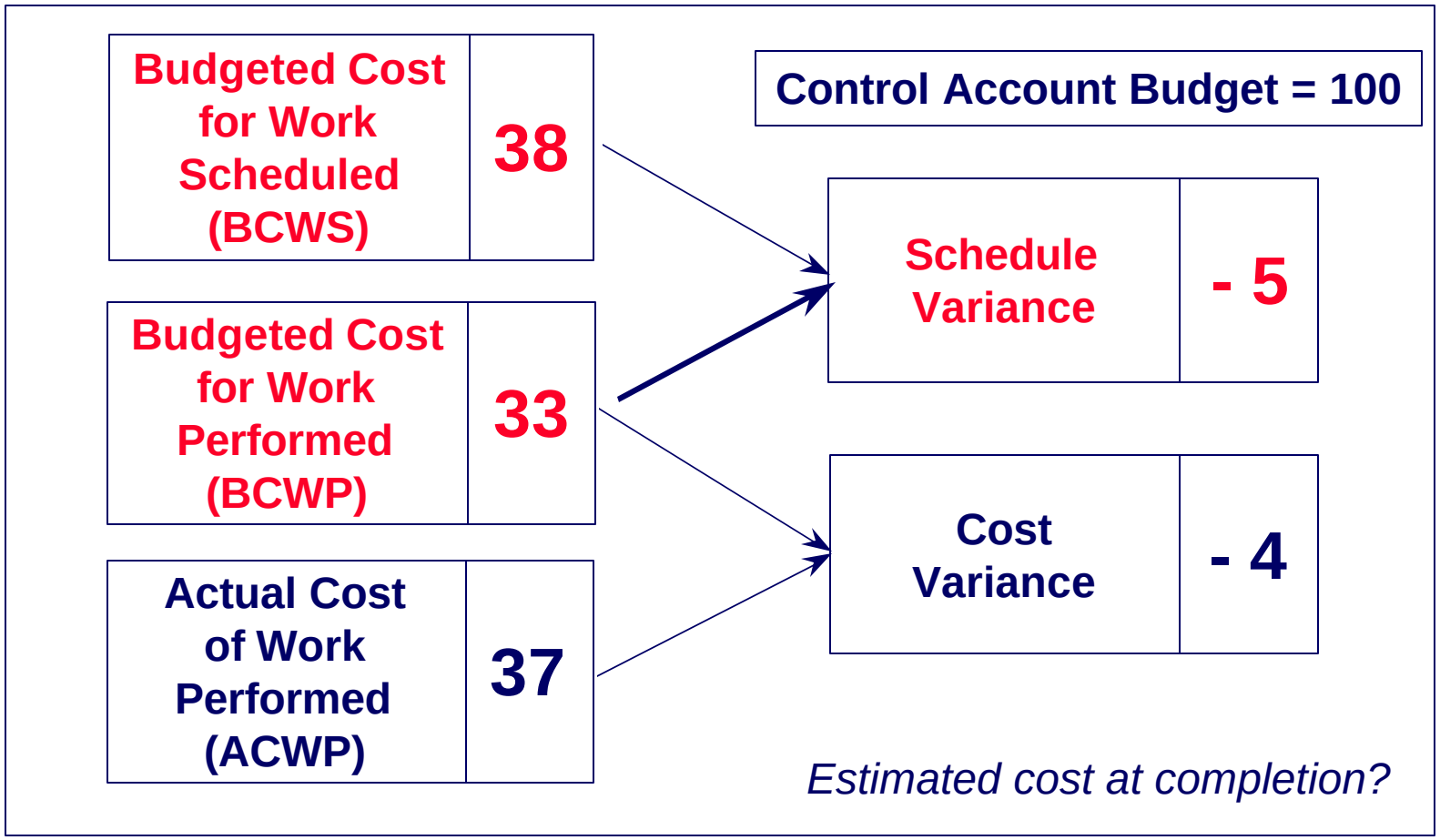
Budgeted Cost for Work Performed (Earned Value-what you did)



*** 50-50 method used for work in process**

Earned Value Concept

Actual Cost of Work Performed (what it cost to do what you did)



How much is it going to cost?

(One way to do it)

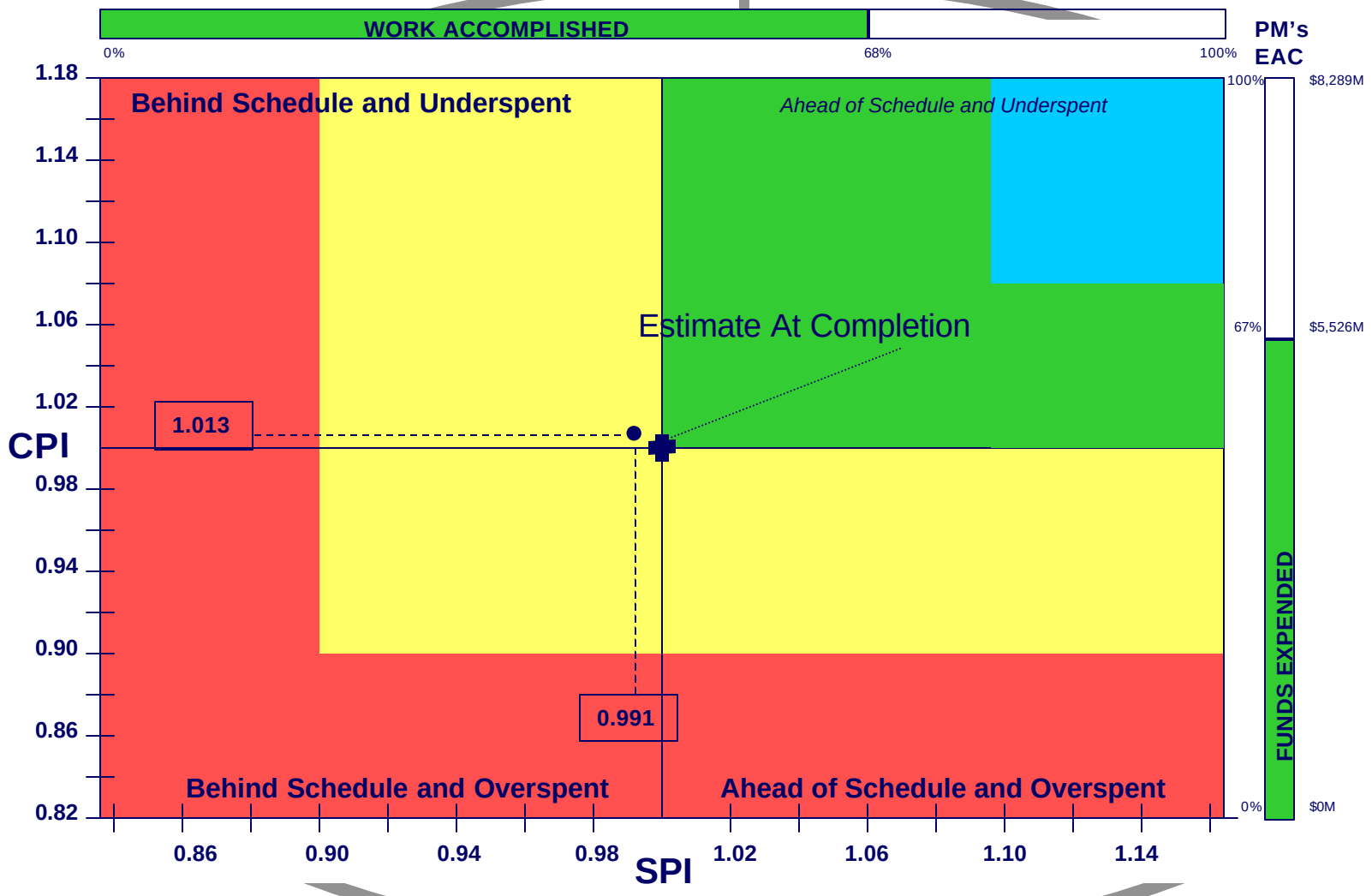
Cost Performance Index

$$\frac{BCWP}{ACWP} = \frac{33}{37} = 0.89$$

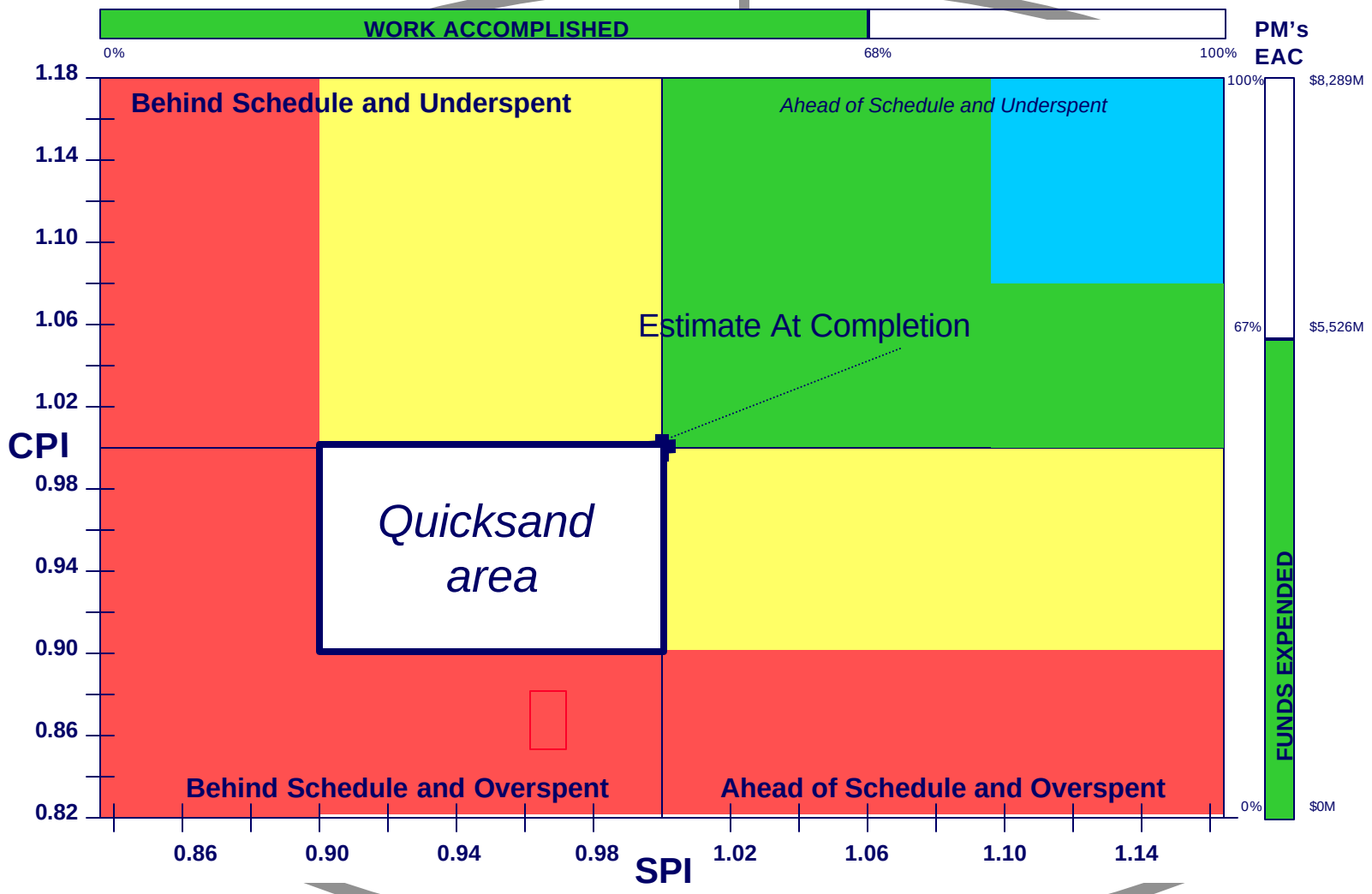
Estimate at Completion

$$EAC = \frac{Target\ Cost}{CPI\ Index} = \frac{100}{0.89} = 112$$

ASN(RD&A) Bullseye Chart



ASN(RD&A) Bullseye Chart



ASN (RD&A) EVM Observations

- PM's need to understand EVM data
- Award fee and EVM performance are often inconsistent
- Contractor starting the project based on a unrealistically low estimate is a bad way to start
- A firm fixed price contract doesn't insulate a program from poor EVM performance and its ramifications

Suggestions For Improvements

- Improve your understanding of EVM technical terms
- Review award fee criteria in your contracts
- Keep communications open with your contractors
- Avoid being lulled by re-baselining actions and instead focus on management initiatives to resolve EVM deficiencies

THE F-14 SITUATION,1995

Cold War Over: Fleet Air Defense / Fighter: Single Mission Only Aircraft

High infrastructure and maintenance costs

Burden on modernization budget and limited fleet operational value

F-14 in a survival mode, budget disappearing

We needed to change the way we did business

F-14 STRIKE FIGHTER

POWER PROJECTION ASSET TO 2008

1997 F-14'S

BOL CHAFF*
NIGHT VISION*
GBU WPNS
LANTIRN*
ALR-67*

TARPS DI*
IRST (D)
JTIDS (D)
PTID (A/B)
ASPJ (D)
UPGRADE (B)*

YEAR 2000 F-14'S

BOL CHAFF
NIGHT VISION
BOL IR
GBU WPNS
EGI/GPS (B,D)
SCP (A,B)
LANTIRN
ALR-67
DFCS
FTI

TARPS DI
IRST (D)
JTIDS [SURVEILLANCE (D)]
TCS (CCD)
PTID
ASPJ (D)
UPGRADE (B)

* FLEET INTRODUCTION SYSTEMS IN LIMITED SUPPLY

NEW BUSINESS APPROACH

Objective: Maximize Fleet Modernization and Resource Allocation. Identify Risk Before it Becomes a Problem

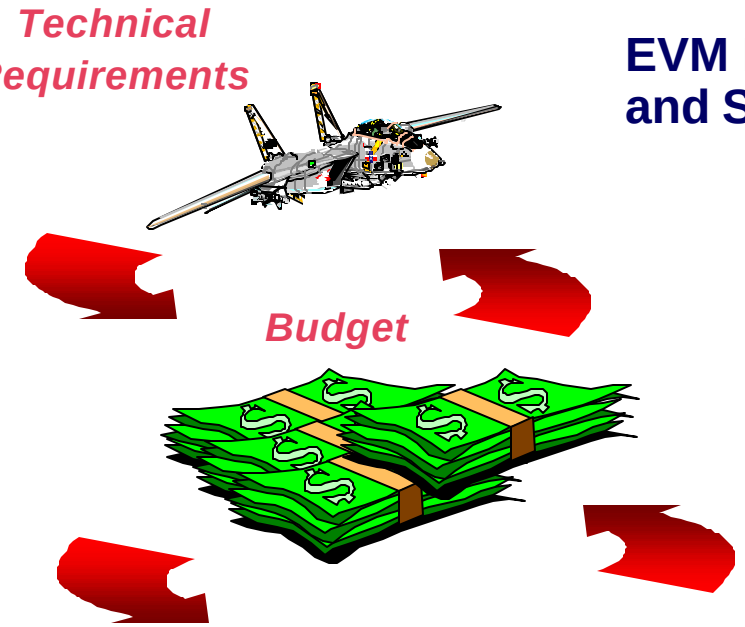
Total Ownership

- Manpower
- Material
- Infrastructure
- Budget

Performance Measures

- **Cost/Schedule Variance**
- **Plan vs Actual**
- **Estimate to Complete**

INTEGRATED APPROACH



EVM Links Requirements, Budget, and Schedule.

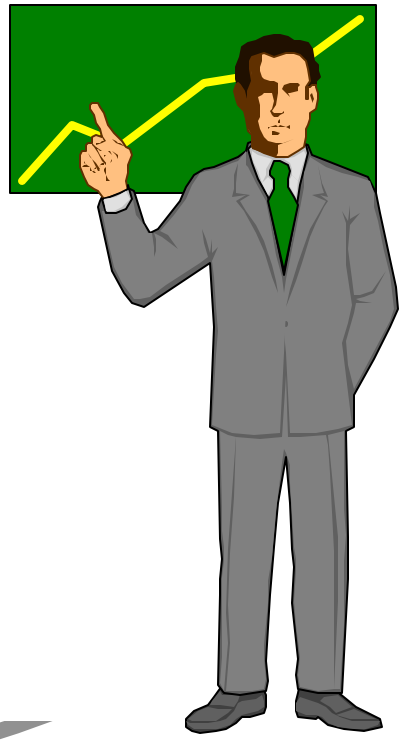
Schedule slips impact the budget and may increase technical risk.

Major impacts to Requirements, Budget or Schedule will cause a Replan of the project.

INSTITUTED EARNED VALUE MANAGEMENT

Earned Value Management Techniques Provide...

- Common Framework for the Communication of Cost, Schedule, and Technical Issues
- Accurate Estimates of Cost To Complete
- Efficient Management of Cost and Schedule Performance
- Product Focused Life Cycle and Cost Management
- Increased Visibility into Resource Management
- Insight into future allowing time to manage or work around obstacles



STANDARD IPT BRIEFINGS SLIDES

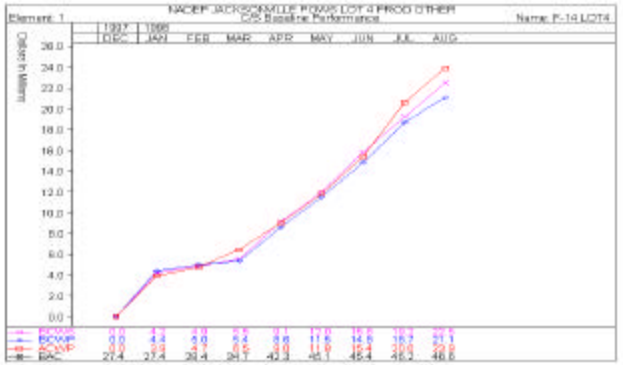
JAX F-14 Lot 4
Cost/Schedule Summary
Month Ending Date: August-98

	WBS	Description	Lvl	% Compl	SV	CV	VAC	OAM	SV	CV	CPI	BAC	LRE	CPI Fcst	O/S Fcst
1	1	F-14 LOT4	1	45.22	↓	↓	↓	STERRETT	-1,398.9	-2,917.2	0.892	51,253.2	52,440.8	52,937.9	52,974.8
2	110	PRD MGM	2	50.01	↔	T	↔	SEAVER	0.0	64.6	1.119	656.0	656.0	381.7	406.6
3	120-0315	PROD A/C 0315	2	76.60	↓	↓	↓	SEAVER	-268.8	-281.1	0.801	2,492.8	2,892.1	2,844.2	2,859.4
4	120-0316	PROD A/C 0316	2	66.55	↓	↓	↓	SEAVER	-233.0	-410.0	0.786	2,265.9	2,670.1	2,652.0	2,652.8
5	120-0317	PROD A/C 0317	2	67.69	↓	↓	↓	SEAVER	20.8	-158.2	0.978	1,936.8	2,107.4	2,212.0	2,181.8
6	120-0318	PROD A/C 0318	2	52.53	↓	↓	↓	SEAVER	18.1	-215.7	0.731	1,893.8	1,994.6	2,466.1	2,359.6
7	120-0190	PROD A/C 4190	2	89.92	↓	↓	↓	SEAVER	-204.8	-397.3	0.871	2,197.4	2,286.1	2,486.3	2,496.1
8	120-420D	PROD A/C 420D	2	74.15	↓	↓	↓	SEAVER	-139.9	-280.4	0.923	2,259.2	2,746.5	2,345.4	2,729.0
9	120-421D	PROD A/C 421D	2	68.56	↓	↔	↓	SEAVER	-181.8	-402.3	0.786	2,157.9	2,573.3	2,744.5	2,722.2
10	120-422D	PROD A/C 422D	2	59.38	↓	↓	↔	SEAVER	-138.7	-257.3	0.810	2,068.6	2,282.8	2,530.6	2,507.3
11	120-423D	PROD A/C 423D	2	57.40	↓	↓	↔	SEAVER	36.8	93.7	1.034	2,044.1	2,345.6	1,976.7	1,977.0
12	120-424D	PROD A/C 424D	2	48.21	↔	↓	↔	SEAVER	287.6	81.1	1.102	1,817.4	2,018.8	1,649.2	1,666.8
13	120-425D	PROD A/C 425D	2	36.94	↑	↓	↓	SEAVER	220.8	93.7	1.057	1,689.3	2,299.4	1,596.1	1,512.5
14	120-426D	PROD A/C 426D	2	18.87			↓	SEAVER	0.3	78.7	1.368	1,886.4	2,282.8	1,388.4	1,429.6
15	120-427D	PROD A/C 427D	2	5.59			↔	SEAVER	0.0	60.0	0.423	1,767.7	1,959.3	516.5	597.0
16	120-5K06	DM A/C 5K06	2	78.80	↔	↔	↓	SEAVER	-197.7	-264.8	0.736	932.7	1,265.3	1,268.7	1,264.8
17	120-5K07	DM A/C 5K07	2	76.26	↓	↓	↓	SEAVER	-26.6	-109.7	0.829	684.2	966.1	826.7	829.6
18	120-5K08	DM A/C 5K08	2	73.86	↔	↓	↓	SEAVER	-131.0	-73.8	0.899	886.2	766.1	684.7	688.8
19	160	AVIONICS CHANGE	3	39.97	↔	↔	↔		-0.9	0.0	1.167	19.4	16.7	16.6	17.0
20	180	QUAL ASSUR	2	62.09	↓	↔	↔	MR. QUALITY	-6.3	13.4	5.323	26.6	17.9	6.0	6.4
21	190	PROCESS ENGR	2	41.64	↔	↔	↔	DunLAP	0.0	40.3	2.292	175.2	107.5	78.5	84.2

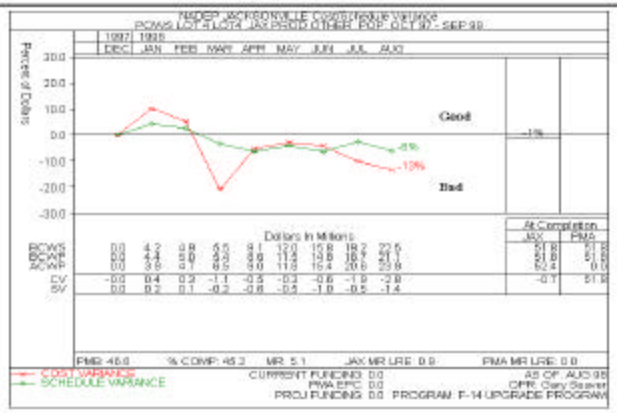
Schedule Variance for Analysis

Cost Variance for Analysis

JAX F-14 Lot4
Cost/Schedule Baseline Performance



JAX F-14 Lot4
Cumulative Cost/Schedule Variances



ACFT 5K06
Schedule Variance Drill Down
Month Ending Date: August-98

	WBS	Description	Lvl	% Compl	SV	CV	VAC	OAM	SV	CV	CPI	BAC	LRE	CPI Fcst	O/S Fcst
1	120-5K06	DM A/C 5K06	2	78.80	↔	↔	↓	SEAVER	-197.7	-264.8	0.736	932.7	1,265.3	1,830.2	1,827.2
2	5K06-135	ASSEMBLY	3	54.01	↔	↓	↓	WOODS	-170.3	-139.1	0.597	379.9	562.3	634.5	640.2
3	5K06-136	CRIM/FLT CHECK	3	0.00	↔		↑	KENNEY	-21.7	0.0		21.7	16.9	21.7	21.7
4	5K06-137	UPGRADE MATL	3	80.00	↑	↔	↔	BURKARD	-1.9	-92.5	0.072	9.0	103.0	134.6	108.0
5	5K06-151	INDUCT	3	100.00	↔	↔	↓	KENNEY	0.0	1.7	1.880	5.1	3.8	3.4	3.4

Schedule Variance Explanation:

WBS Element 135 Assembly Phase -$174.2K: Schedule Variance at the phase level.

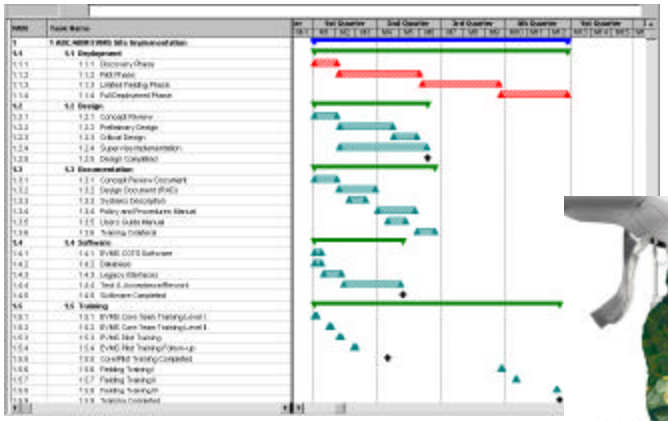
Cause: On this aircraft we had several AFC's that were identified for incorporation after we had established our baseline. These AFC's include ALR 67 (VAL/VER), SCP pt 3 (Sensor Correlation Program) and AFC 859 for a total of 3,674 manhours. This aircraft also had 4 bad inlet walls that had to be removed and replaced. With all this added work content, the Assembly Phase was burdened with many work arounds to accomplish the change in schedule and some delay was unavoidable.

Impact: The significance of the negative schedule impact is currently under evaluation.

Corrective Action: Overtime hours are being worked to help improve this negative schedule variance.

EVM INSIGHT MANAGEMENT ACTIONS

F-14 Team utilizes EVM information Insight to proactively manage...



Cost and Schedule

Technical Performance

Risks

…and Develop Workarounds

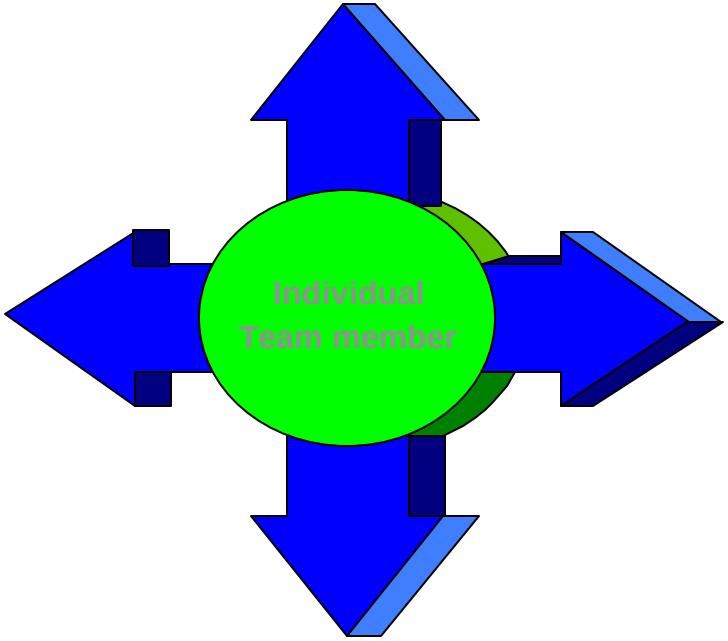
"Do not use EVM information as a hammer"

QUALITATIVE BENEFITS

Not All Benefits of Earned Value are Measurable

Clearer Understanding of the work to be performed, and when it is to be completed

Helps them provide a focused response to problems



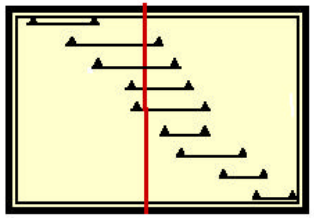
Believe they are using a tool that benefits them

Increased ownership in the Program

Work Breakdown Structure: The Key to Integration

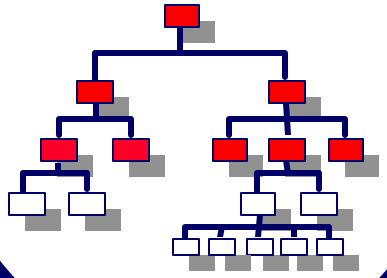
MIL-HDBK-881

COST

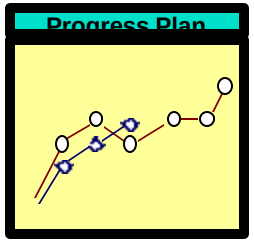


SCHEDULE

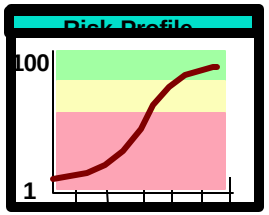
WBS



TECHNICAL PERFORMANCE

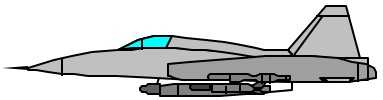


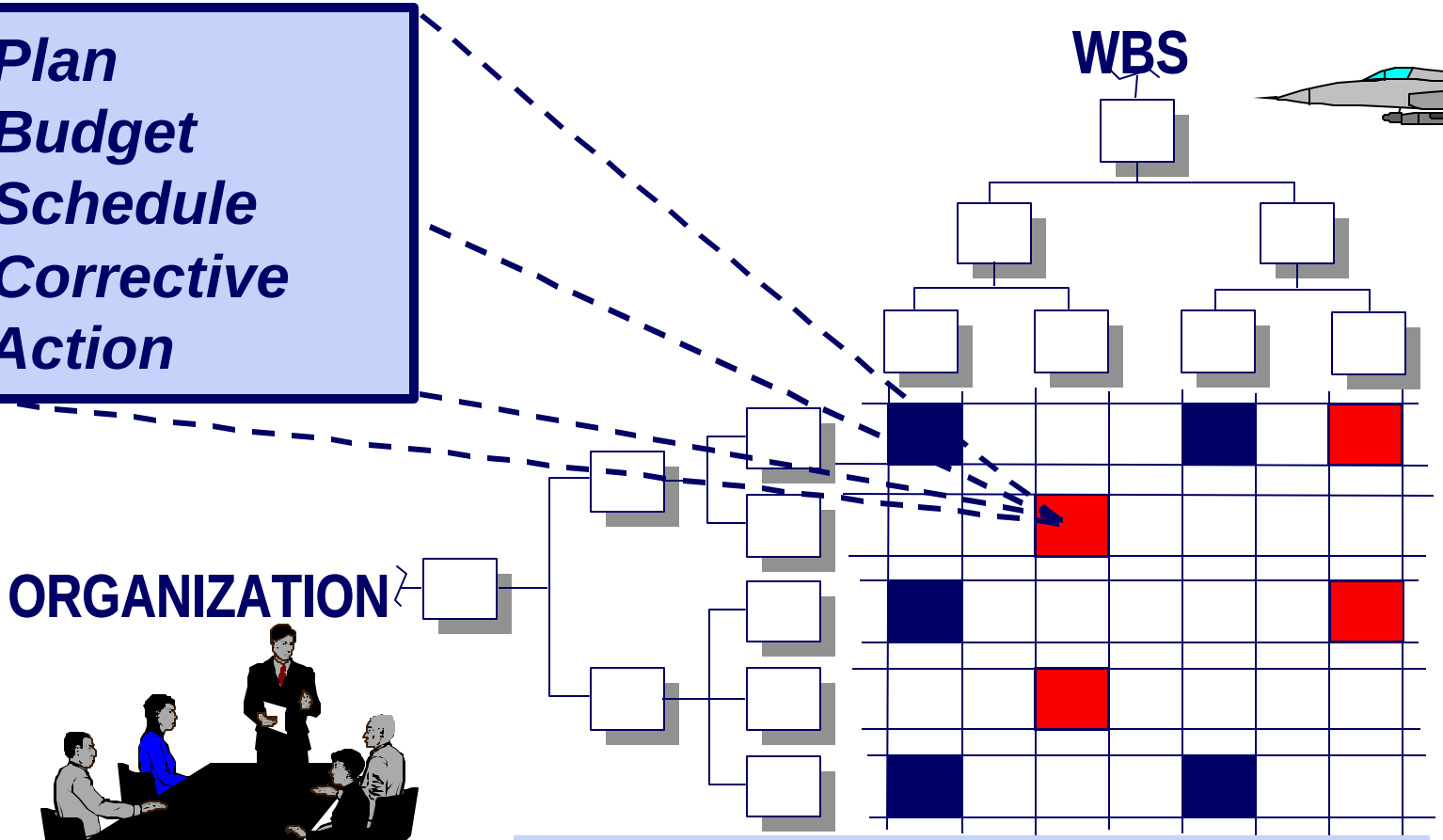
RISK



The Control Account: Where the Action is

- *Plan*
- *Budget*
- *Schedule*
- *Corrective Action*





CAs under IPTs as appropriate

Key Building Blocks

Integrated Program Management Initiative

Model Program Objectives

WBS

IPTs

Integrated Baseline Review (IBR)

“Right Size” Reporting

Integrated Digital Environment

Training

Earned Value Management Courses

LOCATION OF EARNED VALUE MANAGEMENT COURSES

http://www.dsmc.dsm.mil/courses/crslist.htm

Business, Cost Estimating, & Financial Management

The Following Information Is Available for Each EV Course:

Description of the BCF 102 / 203 Course

BCF-102 / 203 Course Eligibility Requirements & Prerequisites.

BCF-102 / 203 Course POC

BCF-102 / 203 Schedule.

BCF-102 DL - Internet-based Course Available 1Q/FY00

Fundamentals Earned Value Course

BCF-102

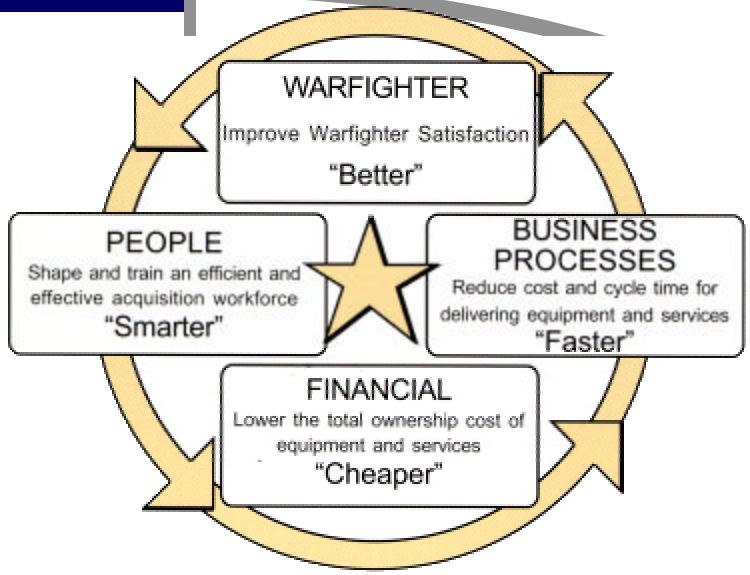
Now On-Line

Intermediate Earned Value Management Course

BCF-203

2 - 3 Day 'Tailored' Courses (Fee For Service & Instructor Availability)

ARO FY00 Goal #3



Challenge:
Weapons system costs are too high.

ARO will work with five organizations to implement Activity Based Cost Management (ABCM) and incorporate Earned Value Management (EVM) into three projects or programs.

Champion: Mr. Willie Jones

ARO TOC Team - Creating a Common Framework for TOC'

Definition of "Decision"

"Irrevocable allocation of resources"

Benefits of EVMS

Single control system that provides reliable data.

Integrates work, schedule, and cost using WBS structure.

Data base of comparable projects useful.

CPI provides early warning signal = not more than 10% change after 20% complete.

SPI provides early warning signal.

CPI predictor of final cost of project.

Uses index based method to forecast final cost of project.

Management by exception principle can reduce management overload.

Recap

EVM is a key initiative of ASN(RD&A)

EVM is a tool for visibility into the program's progress

Leadership commitment is critical for EVM success

EVM is not a "Fire and Forget" system

EVM is used and accepted industry wide

EVM
Points of Contact

DCMA **HQ EVM Executive Agent**

Bill Gibson, EVM Process Owner

DSMC

Lt. COL Dave Melton (EVM Department chair)

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EVM Websites

www.acq.osd.mil/pm

www.dsmc.dsm.mil/courses/crslist.htm

www.acq-ref.navy.mil

EVM Preferred Tool

- wInsight is a computer software tool specifically designed for analyzing performance analysis data.
- Tool supports the Integrated Product Development (IPD) management philosophy
- Flexible and easy to use to locate problem areas, analyze data, and update Estimate at Completion (EAC).
- DCMA recommends Contracting Administration Offices utilize wInsight as their primary Earned Value analysis tool.