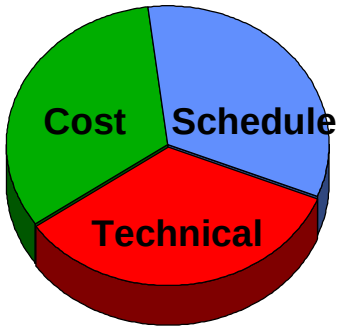
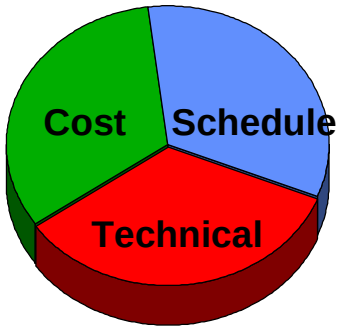
SWEE `98



Earned Value Management (EVM) and Software Development

Susie Meyer - MITRE
Dr. Norm Brown - Software Program Managers Network (SPMN)

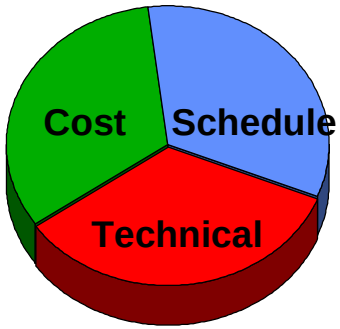
Outline



- EVM introduction
- Practical example
- Effective use in software development

Earned Value Management (EVM)

EVM = *Integrated Management*



- EVM is a management technique that *integrates* cost, schedule, and technical performance measurement and goals
- Instead of simply comparing cost incurred to a spend plan EVM incorporates actual work accomplished
- EVM should be integrated with risk management and other program metrics for effective project management

Basic Concepts of EVM

❶ ***Plan*** **all work scope for the project to completion.**

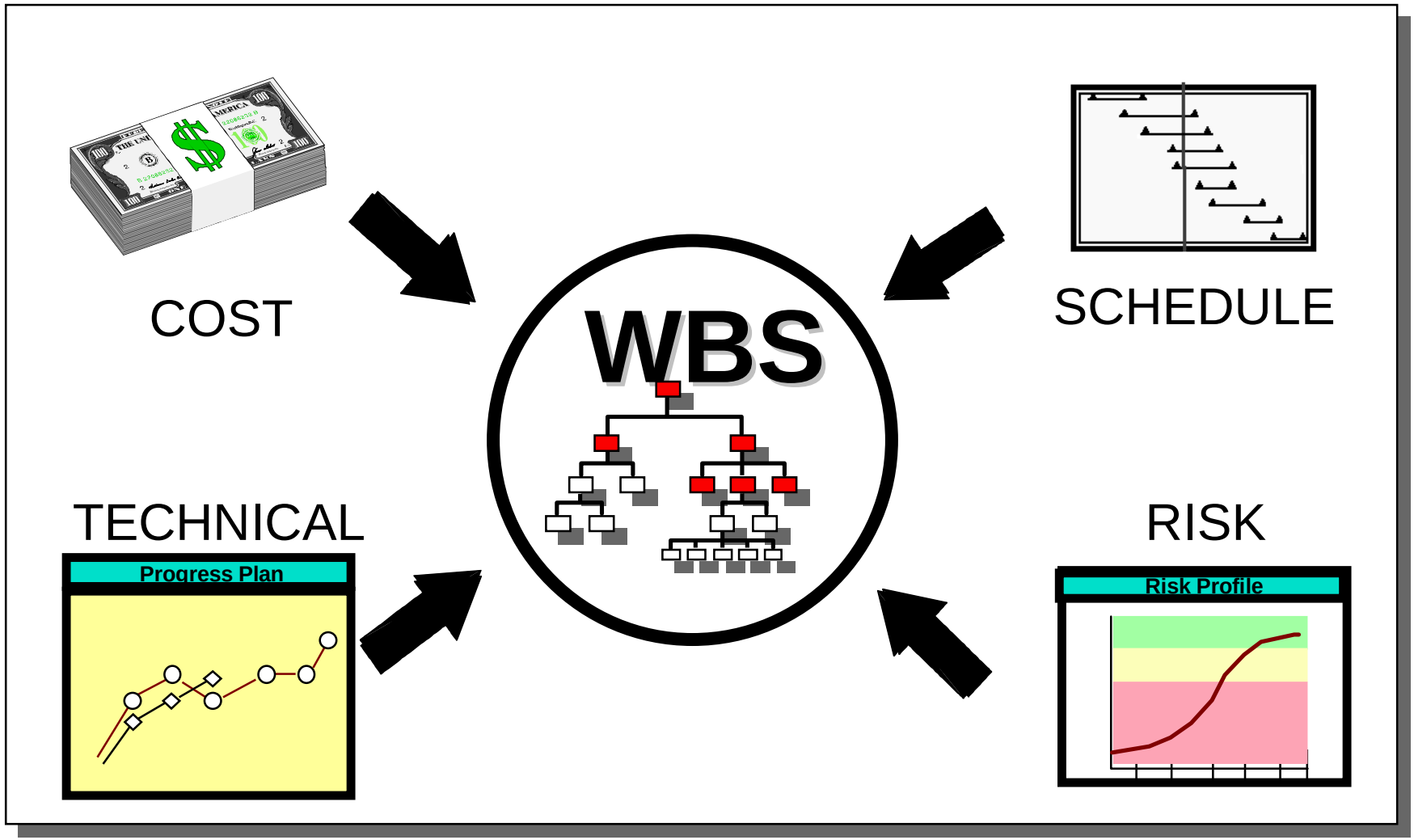
❷ ***Integrate*** **project work** ***scope, schedule, and cost*** **objectives into a baseline plan against which accomplishments may be measured.**

❸ ***Objectively assess accomplishments*** **at the work performance level.**

❹ ***Analyze significant variances*** **from the plan and** ***forecast impacts*****.**

❺ ***Summarize data*** **to higher levels for management decision making and for implementing corrective action when necessary*****.***

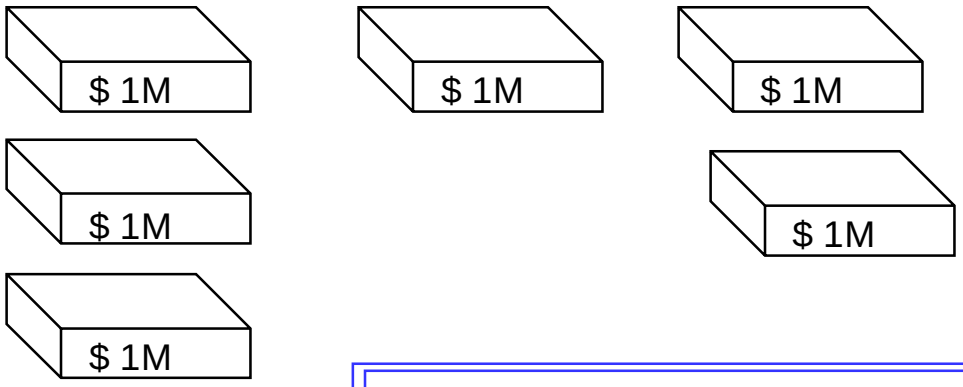
Work Breakdown Structure - The Key to Integrated Management



Purpose of Earned Value: *Effective Management*

Contract: 4 miles of railroad track in 4 months for $4 million.
Status: After 3 months, only $2 million has been spent.
Question: How are you doing (and how do you know)? *

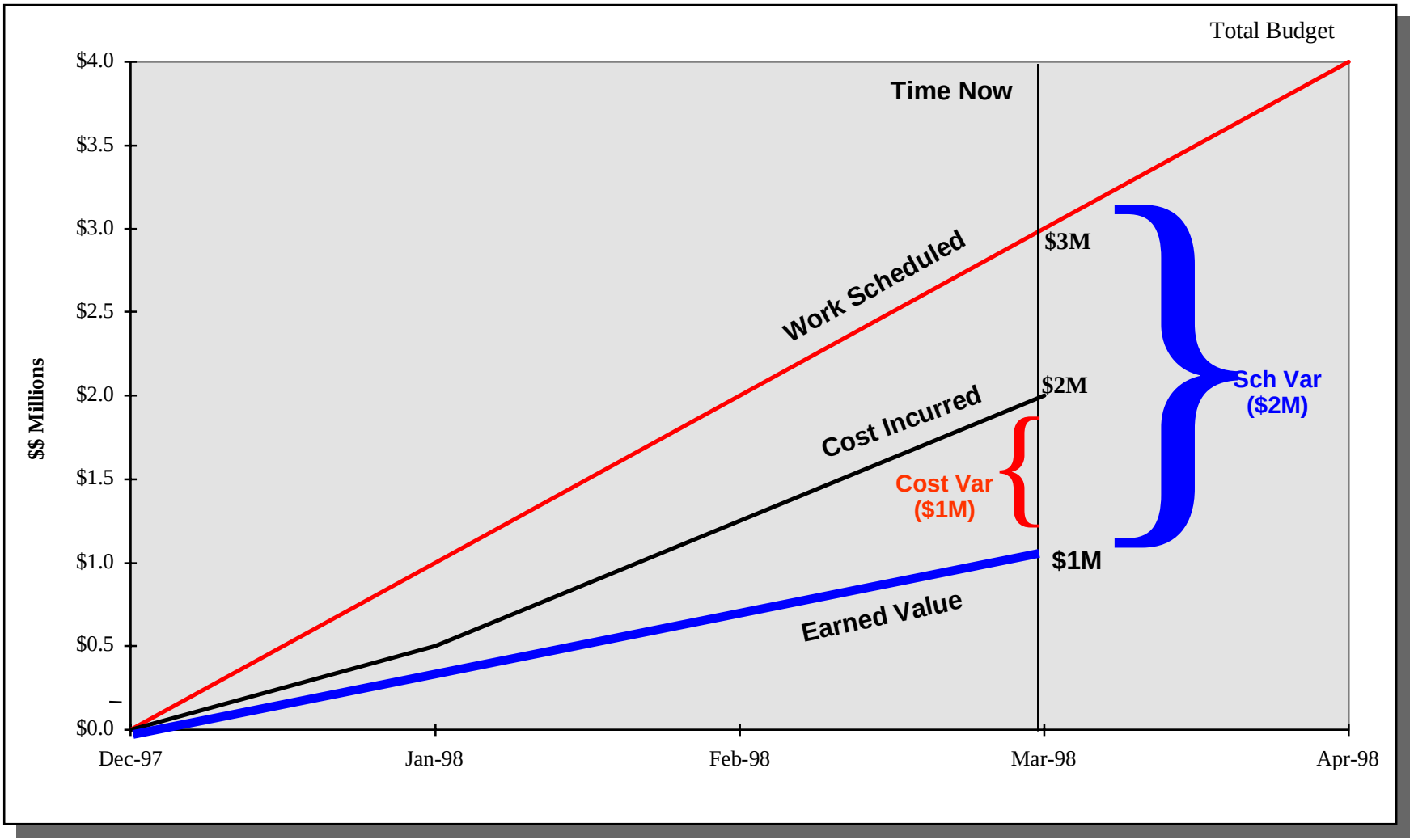
PLANNED WORK	EARNED VALUE	COST OF WORK	SCHEDULE VARIANCE	COST VARIANCE
$ 3M	$ 1M	$ 2M	$1M - $3M = ($2M) (66% behind)	$1M - $2M = ($1M) (100% overrun)



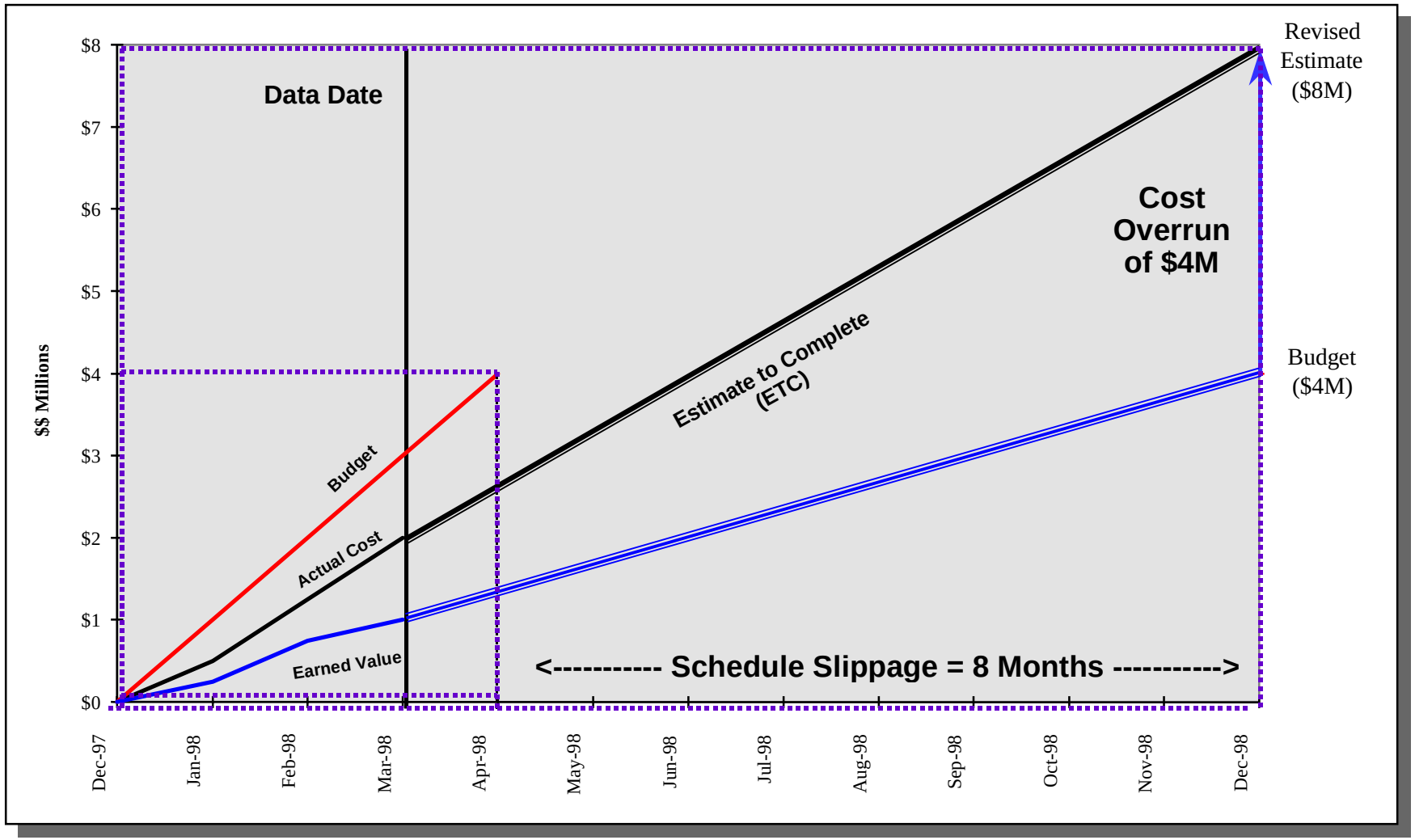
Estimate at Completion: $8M and 8 months late

** Source: GAO Report May 97*

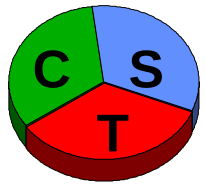
An EVM Example: A graphic view



An EVM Example: A graphic view (concluded)



EVM & Integrated Planning

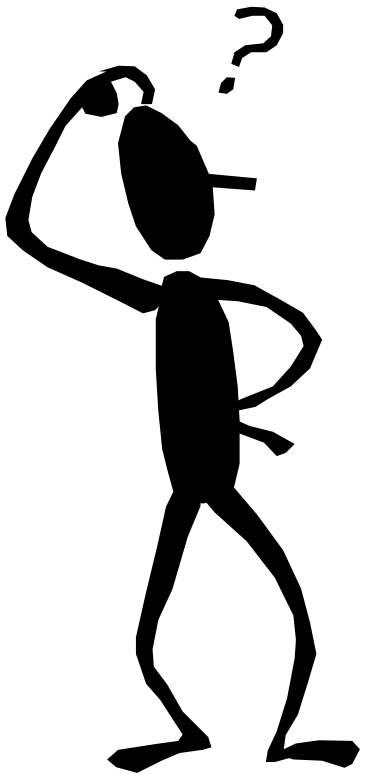


- EVM must be used to MANAGE, not just report
- Schedules should be well thought out with detailed dependency networks
  - Incorporate all integrated product teams (IPTs) in the development of the schedule
- Develop schedule activities in term of quantifiable targets or metrics
  - Make those same metrics the basic building blocks of the EVMS
  - Metrics then become the planning and resource allocation integration link
- This link makes EV status objective and quantifiable
  - Can be independently evaluated and statused

Reference

- Software Program Managers Network home page
  - http://www.spmn.com
- Earned Value home page
  - http://www.acq.osd.mil/pm/
  - Includes several links such as
    - Policy
    - DIDs (CPR and CSSR)
    - Papers and presentations

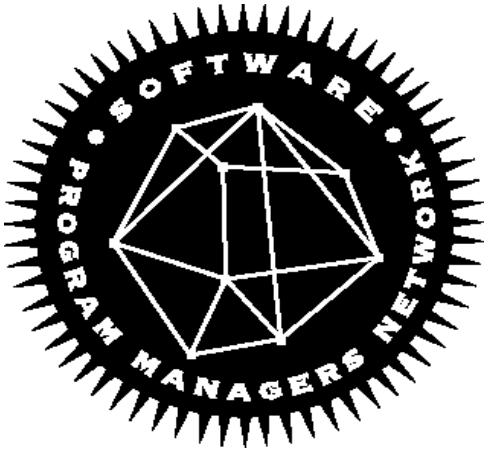
A thought!



“The <u>really</u> nice thing about not planning is that failure comes as a complete surprise and is not preceded by long periods of worry and depression!”

Micro Planning International

Earned Value



Earned Value, Rework, and Best Practices: Tracking The Essential Indicators

Earned Value

- DoD programs spend an estimated $42 billion annually for software
- Typically some 70% of the $42 billion goes to operation and sustainment
- COTS integration is only one area for which programs find big surprises in cost and schedule

Earned Value

BEST PRACTICES

- Commercial Best Practices have produced dramatic savings in software development and maintenance
- Too often, DoD contractor development activities do not implement these best practices when they could

Earned Value

- This failure to use best practices tends to produce programs that cannot
  - effectively manage, nor
  - track progress
    - because they <u>have no detailed</u> plan

Earned Value

TRACKING THE ESSENTIAL INDICATORS

- Progress towards implementing these Best Practices is generally not measured at all, except with the grossest of measures

- Earned Value has been consistently shown to be the **key** program progress metric, and its value in successful commercial sectors is primary

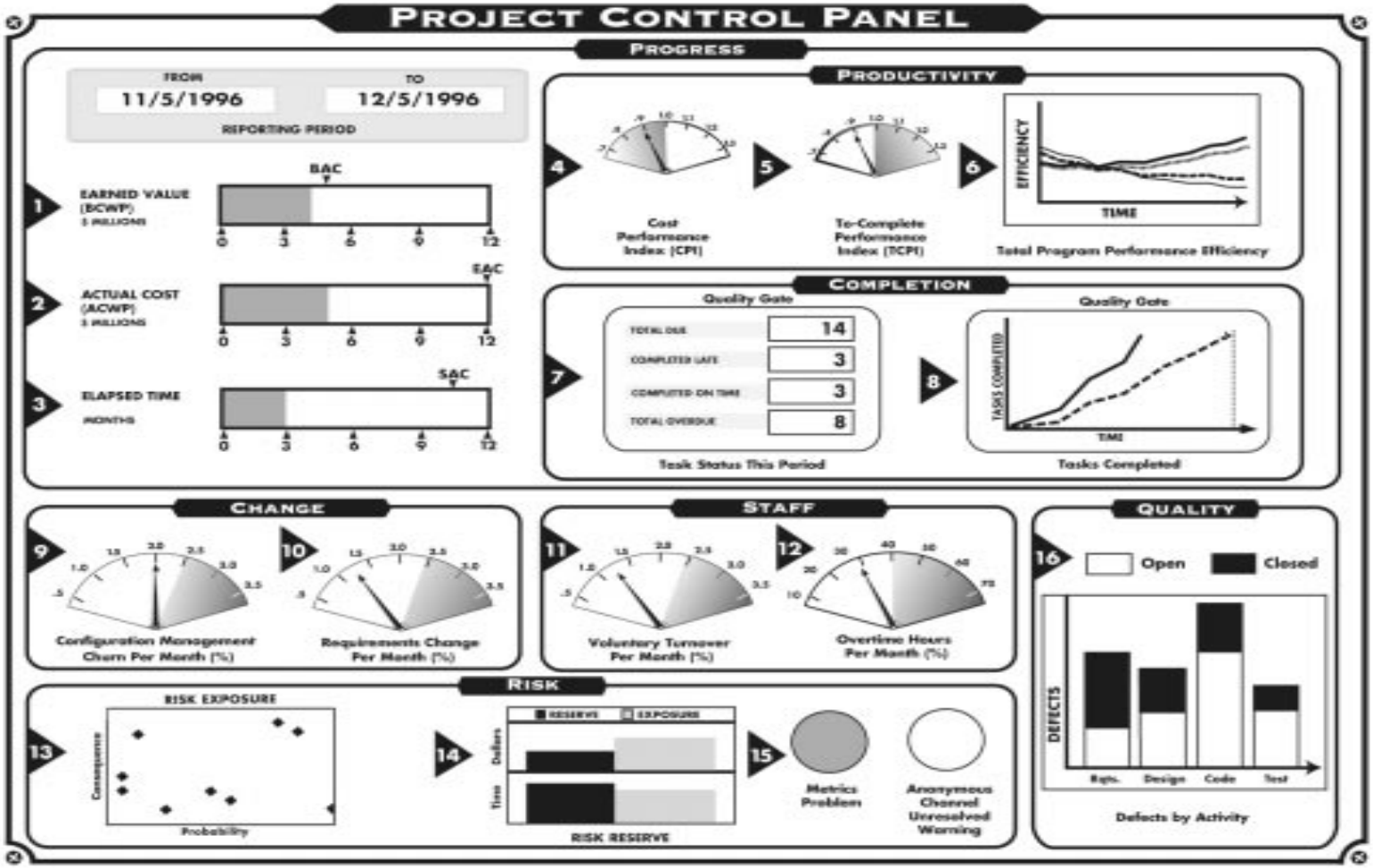
Earned Value

TRACKING THE ESSENTIAL INDICATORS

- The SPMN Software Project Control Panel presents key program indicators for the Program Manager

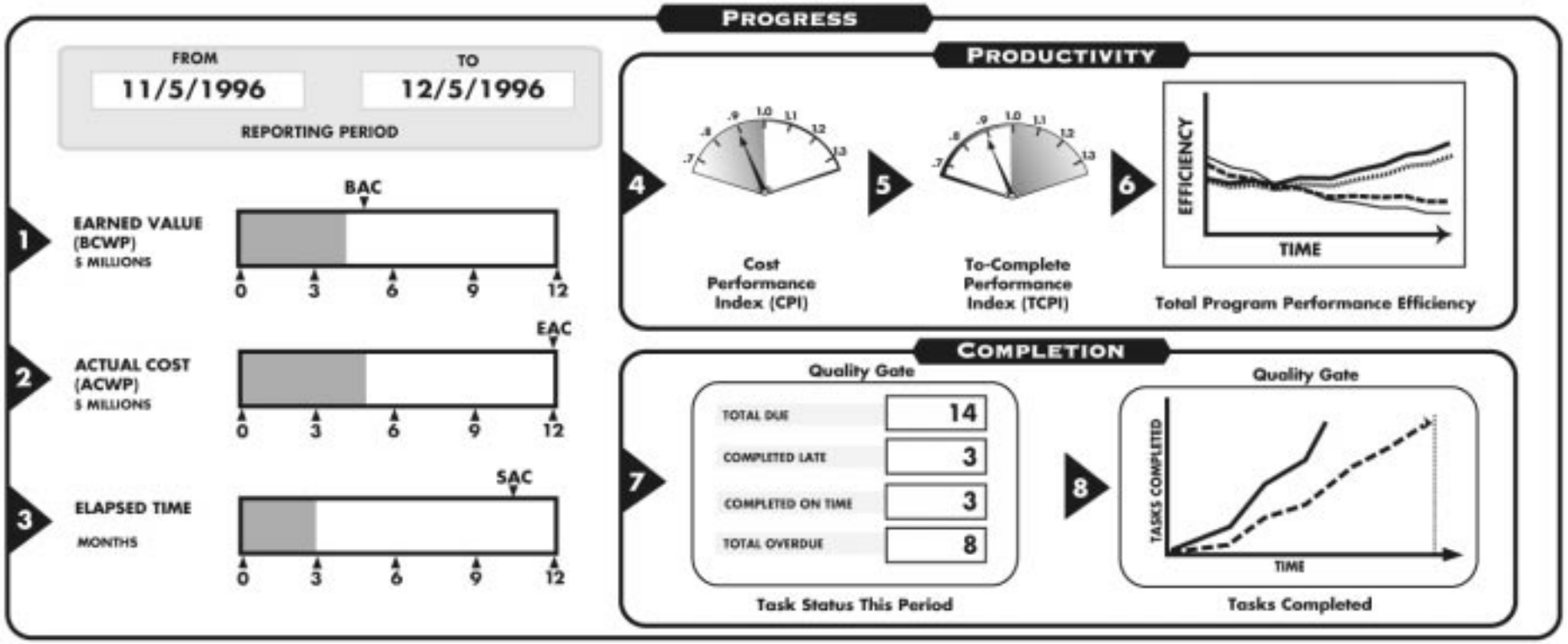
Earned Value

SOFTWARE PROJECT CONTROL PANEL DISPLAY SCREEN



Earned Value

CONTROL PANEL DISPLAY SCREEN -- PROGRESS SECTION



Earned Value

REWORK

- Rework is an output-oriented factor which has dramatic effect upon CPI and TCPI
  - basic measures of project productivity

- Measuring rework provides enormous insight as a composite indicator of project maturity, and points the way to change

Earned Value

FUNDAMENTALS OF EV SUCCESS

❶ Task Activity Network

❷ Task Accounting

❸ Add risk mitigation tasks to Task Activity Network

❹ Risk Mitigation Activities not on Critical Path (cont'd)

Earned Value

FUNDAMENTALS OF EV SUCCESS (cont'd)

❶ TASK ACTIVITY NETWORK

- Short duration tasks
- Crisp completion criteria
- Good estimation of resources each task needs

Earned Value

FUNDAMENTALS OF EV SUCCESS (cont'd)

❷ Task Accounting
- An accounting system that will track to tasks

❸ Add risk mitigation tasks to Task Activity Network

❹ Risks Not On Critical Path
- Remove high risk activities from Critical Path

Earned Value

HOW TO MISUSE EARNED VALUE

1. "Only Fools Fool Themselves"
2. Rubber Band Baselining
3. Use Large Tasks
4. Fuzzy task description
5. Lack of Product-Oriented Tasks

(cont'd)

Earned Value

HOW TO MISUSE EARNED VALUE (cont'd)

1. "Only Fools Fool Themselves"
   - NOT USE what EV is transmitting
   - Ignoring CPI, TCPI, EAC, & Schedule Slip
   - Still rely on wishful thinking
2. Rubber Band Baselining

Earned Value

HOW TO MISUSE EARNED VALUE (cont'd)

❸ Use Large Tasks
- ➡ Essentially guts fidelity EV project tracking and monitoring
- ➡ Effectively not tasks

❹ Fuzzy task description

❺ Lack of product-oriented tasks
- ➡ Use of level of effort tasks

Earned Value

CONCLUSION

- Use earned value management
- Avoid rework
- Use best practices
- Track the essential program indicators