Earned Value Analysis
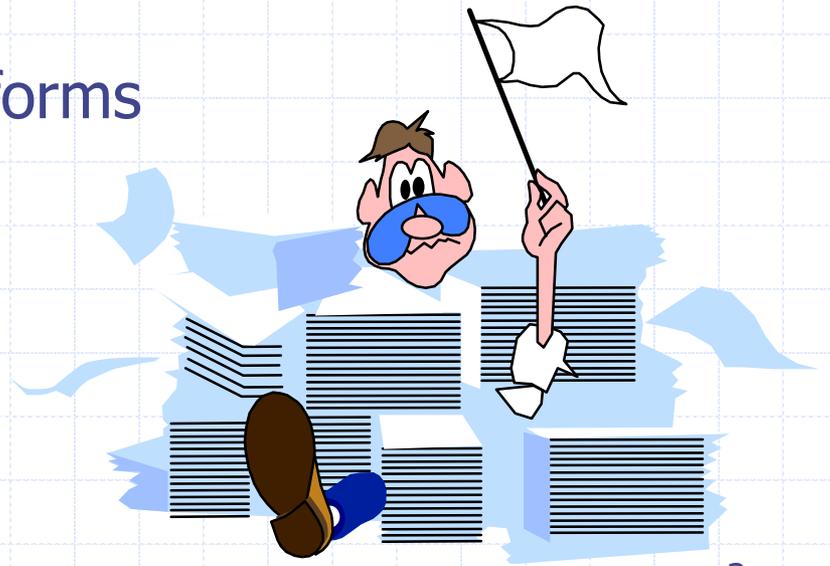
What Is It ?

Why Do I Need It ?

How Do I Do It?

Today's Situation

- Need for <u>accurate</u> and <u>consistent</u> status information
- Numerous complex (and interrelated) projects
  - Projects with many WBS activities
  - Virtual offices
  - Diverse technology platforms

Today's Situation

- "When people report percent complete, you might get 'I'm 50% complete,' based on that person's intuitive knowledge.

- Earned value analysis takes that guesswork out of it," says Robert Leto, director of the IT effectiveness practice at PricewaterhouseCoopers Advisory Services LLP in New York.
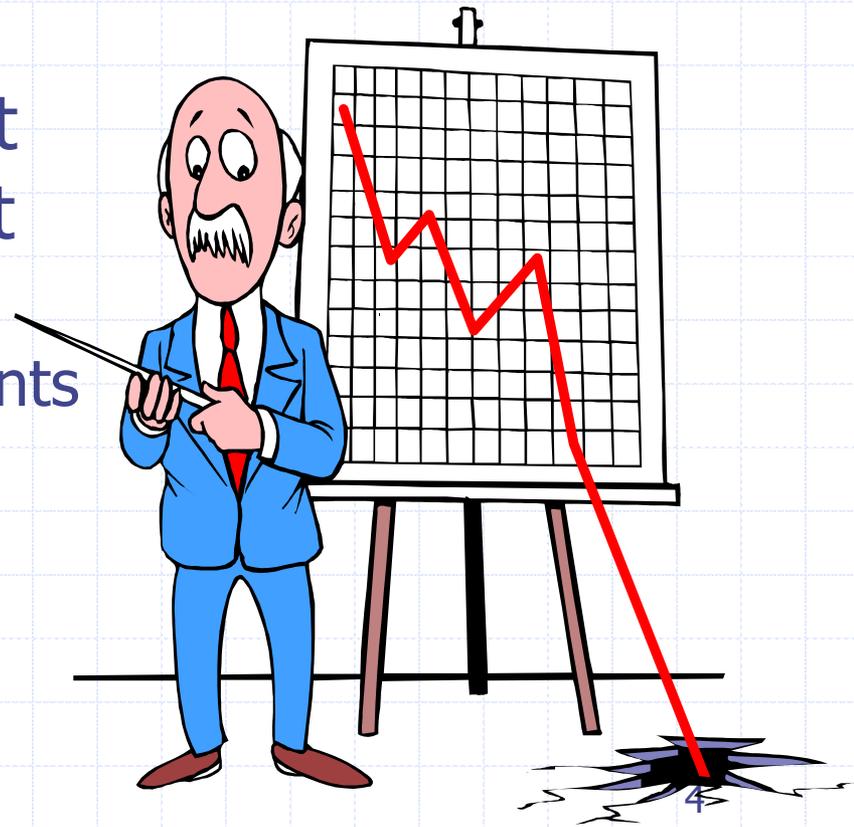
There's Room For Improvement

70% of projects are:
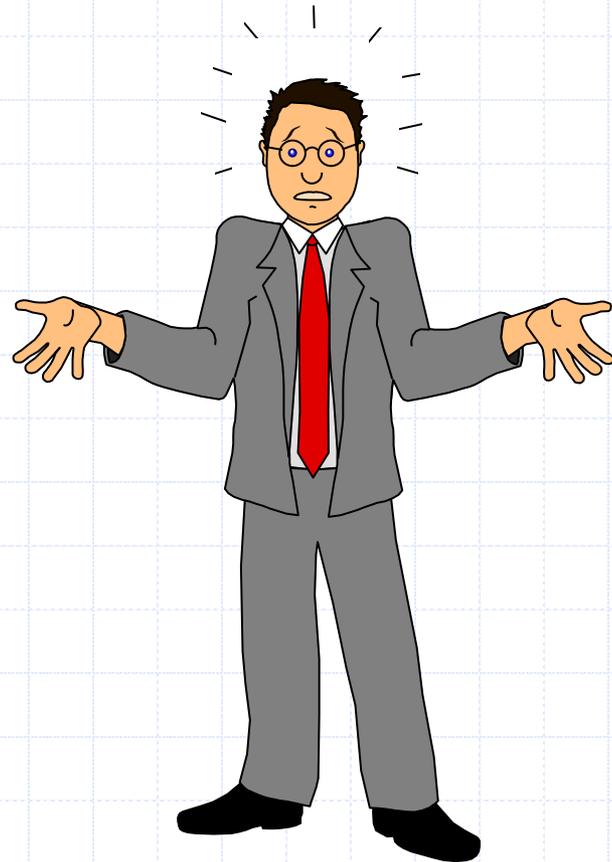- Over budget
- Behind schedule

52% of all projects finish at 189% of their initial budget

And some, after huge investments of time and money, are simply never comple

How to answer the question:
"Have we done what we said we'd do?"

- % complete estimating
  - % of Budget spent
  - % of work done
  - % of time elapsed

  - subjective, incomplete
  - draws false conclusions

Enter Earned Value Analysis

- "Earned Value Analysis" is:
  - an industry standard way to:
    - measure a project's progress,
    - forecast its completion date and final cost, and
    - provide schedule and budget variances along the way.

- By integrating three measurements, it provides consistent, numerical indicators with which you can evaluate and compare projects.

What's more Important?

◆ Knowing where you are on schedule?

◆ Knowing where you are on budget?

◆ Knowing where you are on work accomplished?

EVA Integrates All Three

◆ It compares the PLANNED amount of work with what has actually been COMPLETED, to determine if *COST* , *SCHEDULE, and WORK ACCOMPLISHED* are progressing as planned.

◆ Work is "Earned" or credited as it is completed.

Earned Value needed because...

- Different measures of progress for different types of tasks

- Need to "roll up" progress of many tasks into an overall project status

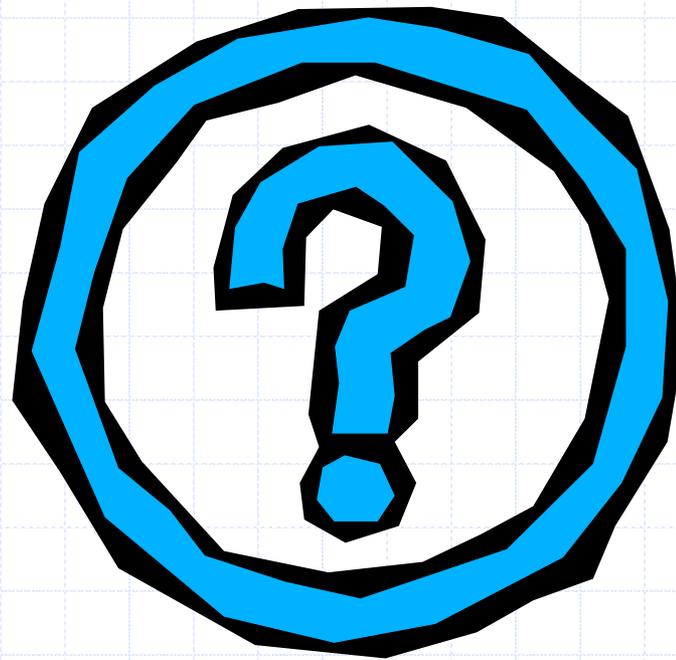- Need for a uniform unit of measure (dollars or work-hours).

Earned Value needed because...

◆ Provides an "Early Warning" signal for prompt corrective action.

- Bad news does not age well.

- Still time to recover

- Timely request for additional funds
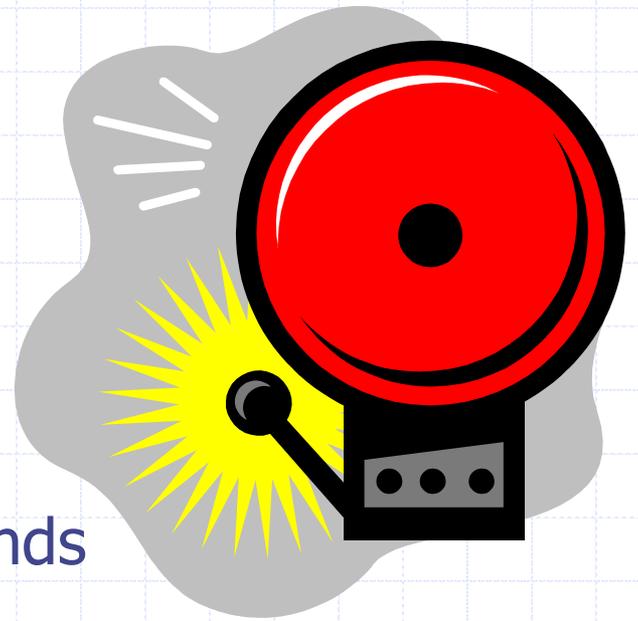
OK, So What Is This Stuff?

So, Is This Stuff New ?
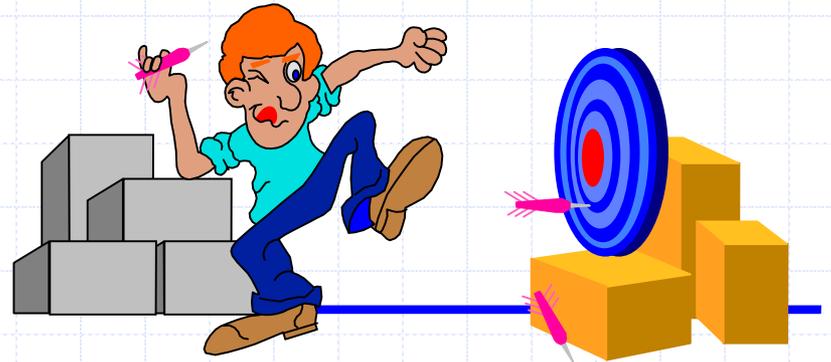
It's been around since the sixties.

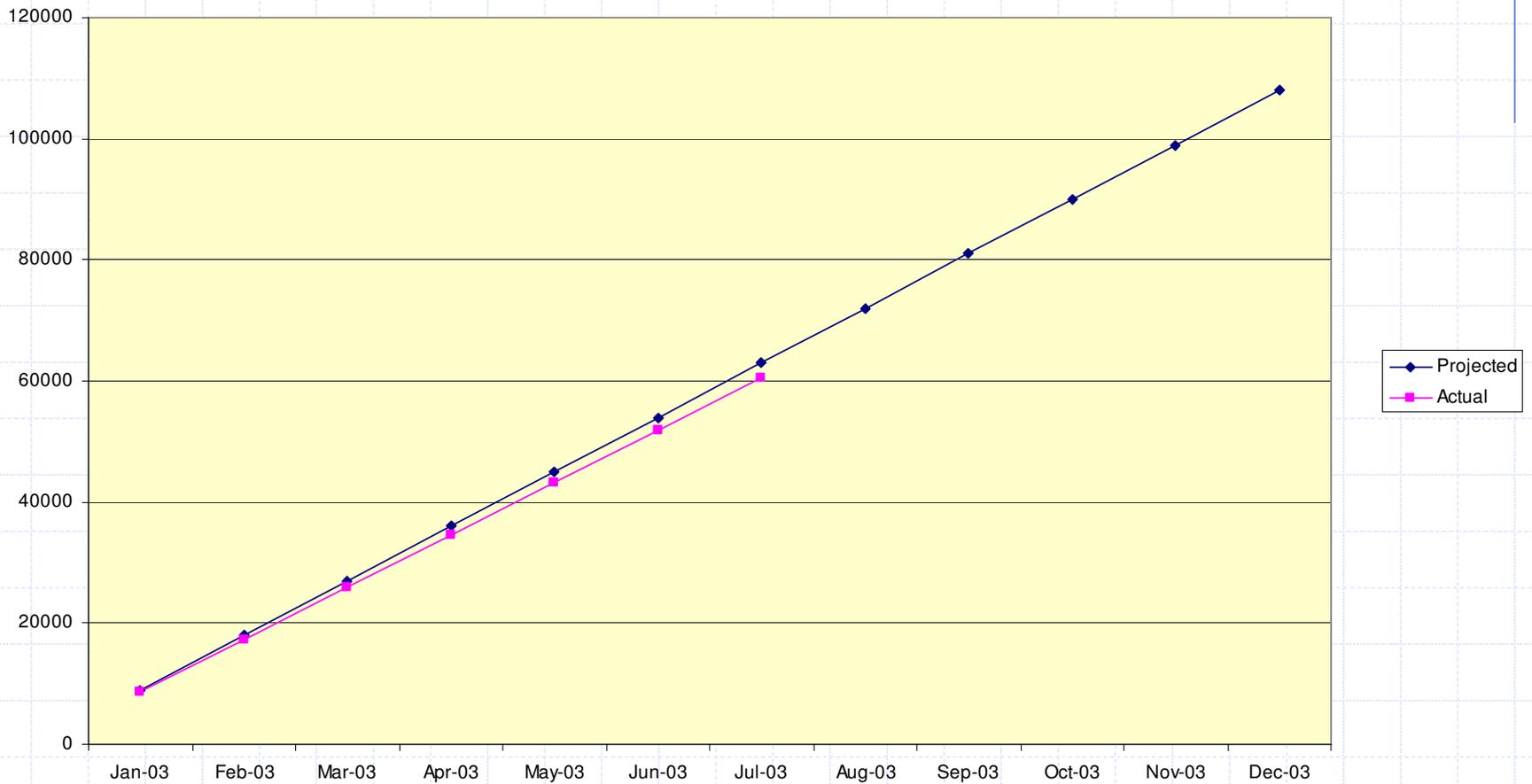"Cost/Schedule Control Systems Criteria" (C/SCSC)

Examples of informal Earned Value Analysis

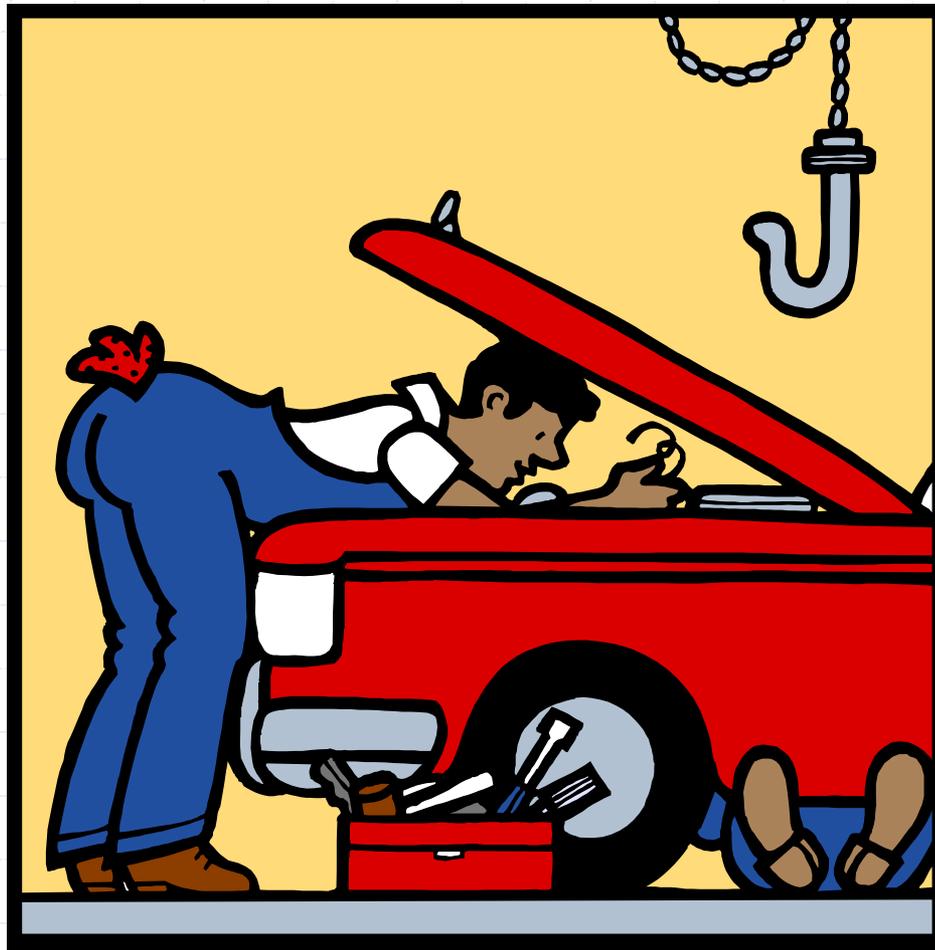It's done informally without realizing it.
- 30% time used,
- 30% **$$** spent
- So, if 30% of the work is done, I must be OK ??

- Shop floor estimates

- Cost comparisons
  Budget vs. Actual

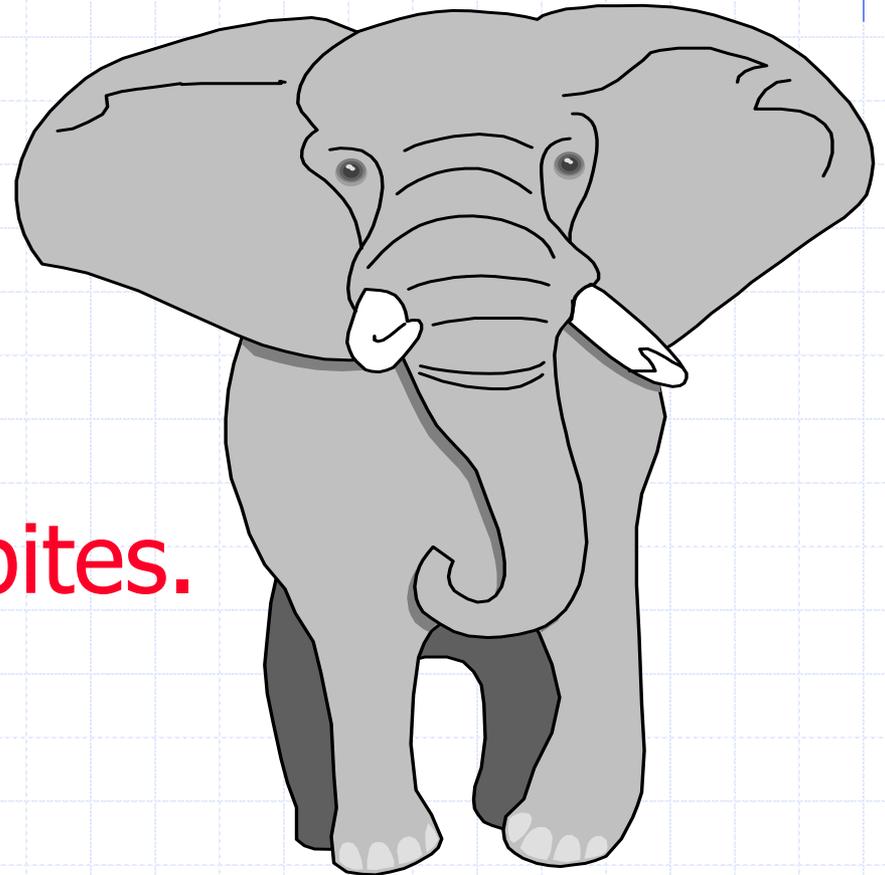# How's this project doing?

Let's Take A Look Under The Hood

But First! - We gotta get organized

- EVA works best when work is 'compartmentalized'.

- Compartmentalization is best achieved with a well-planned Work Breakdown Structure.

- So, how do I create a WBS for a really complex project?

How am I gonna eat this elephant?

Obviously in small bites.

Proper WBS Design

- One WBS per program
  - Deliverable-oriented
  - Work not in the WBS is out-of-scope
  - Each descending level represents more detail
- Full (and accurate) definition is key
  - Defined deliverable(s)
  - Timeframe for delivery of product
  - Total cost (direct and indirect) to deliver product

Let's Look at an example:

A sample Work Breakdown Structure

Serve Pizzas to Customers

Provide the Place | Cook the Food | Serve Customers | *(Others)*

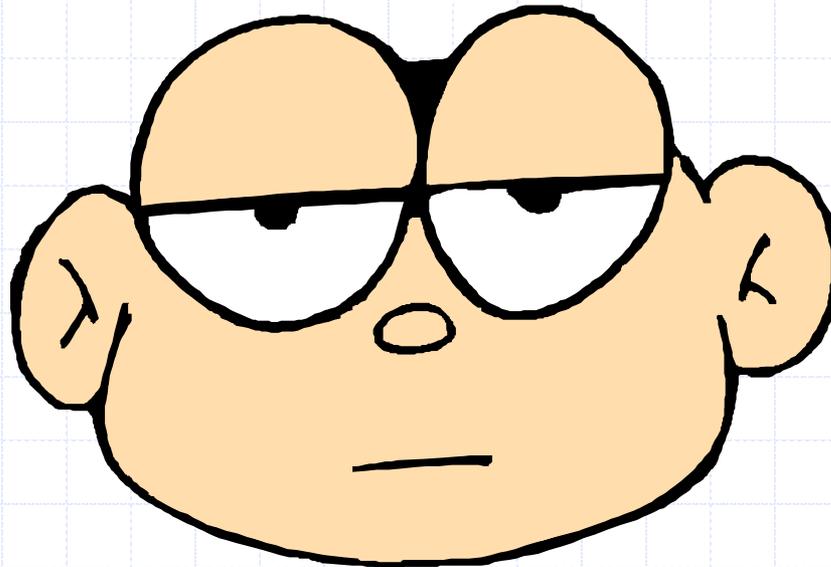Make the Dough | Cook the Sauce | Build the Pizza

WBS Units are "Work Packages"

◈ Lowest level WBS elements

◈ Have an accompanying narrative

◈ Have three measurable components
- Scope of work to be accomplished
- Total (direct and indirect) cost
- Timeframe for completion

Control Account Plans

◆ A CAP is essentially a Work Package with some added features:

- ➤ Assignment of responsibility
  - Organization
  - Individual
- ➤ Division (if necessary) into lower-level Work Packages.
- ➤ Metrics for measuring EV performance
  - Milestones
  - % complete
  - Other

The sum of the CAPs constitutes the Performance Measurement Baseline

Enough With the WBS Stuff Already !

We came here to talk about Earned Value.

Some New Terms

◆ BCWS - Budgeted Cost of Work Scheduled

◆ ACWP - Actual Cost of Work Performed

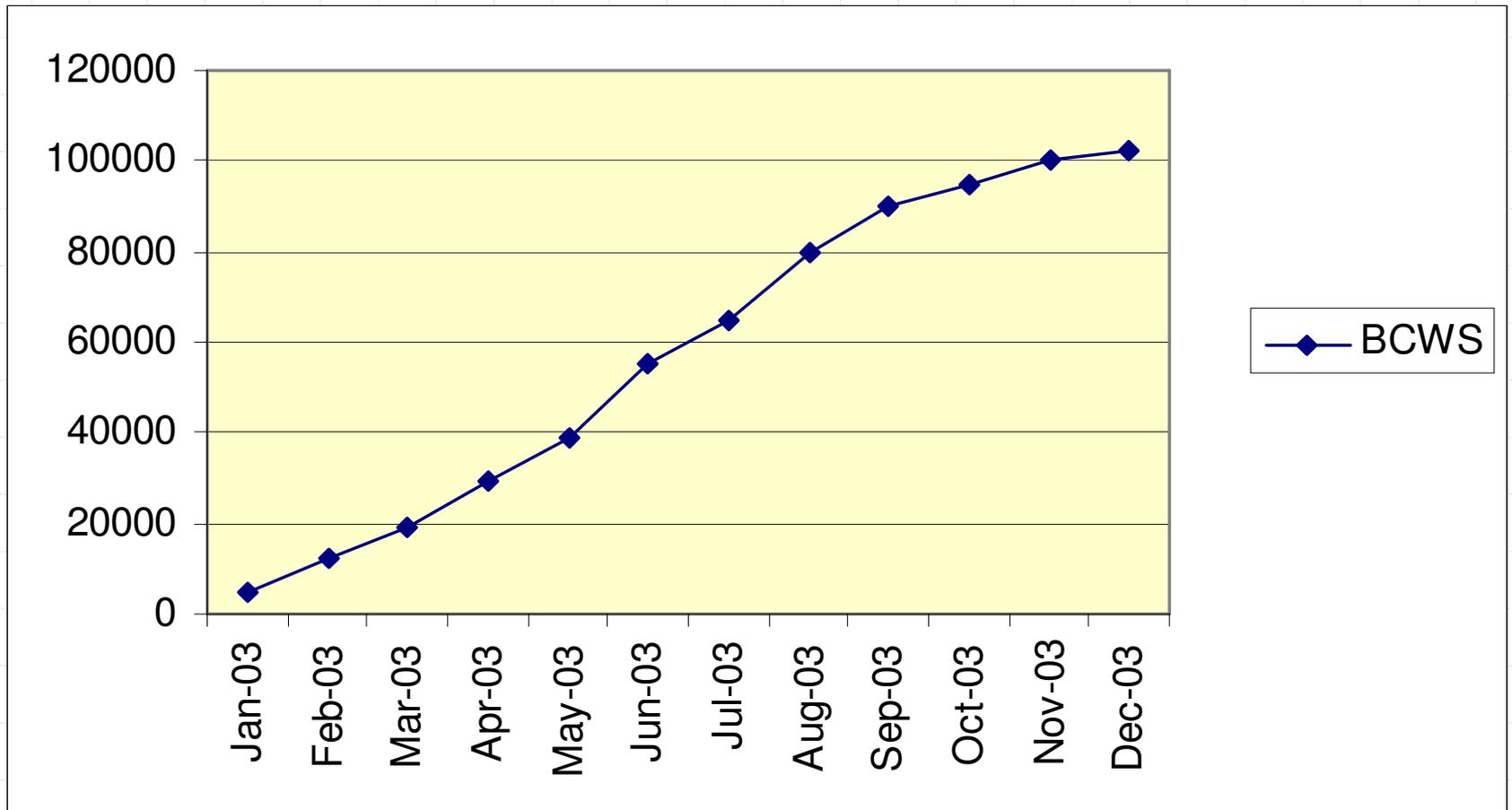◆ BCWP - Budgeted Cost of Work Performed

Earned Value Definitions

◆ BCWS: "Budgeted Cost of Work Scheduled"

Planned cost of the total amount of work <u>scheduled</u> to be performed by the milestone date.

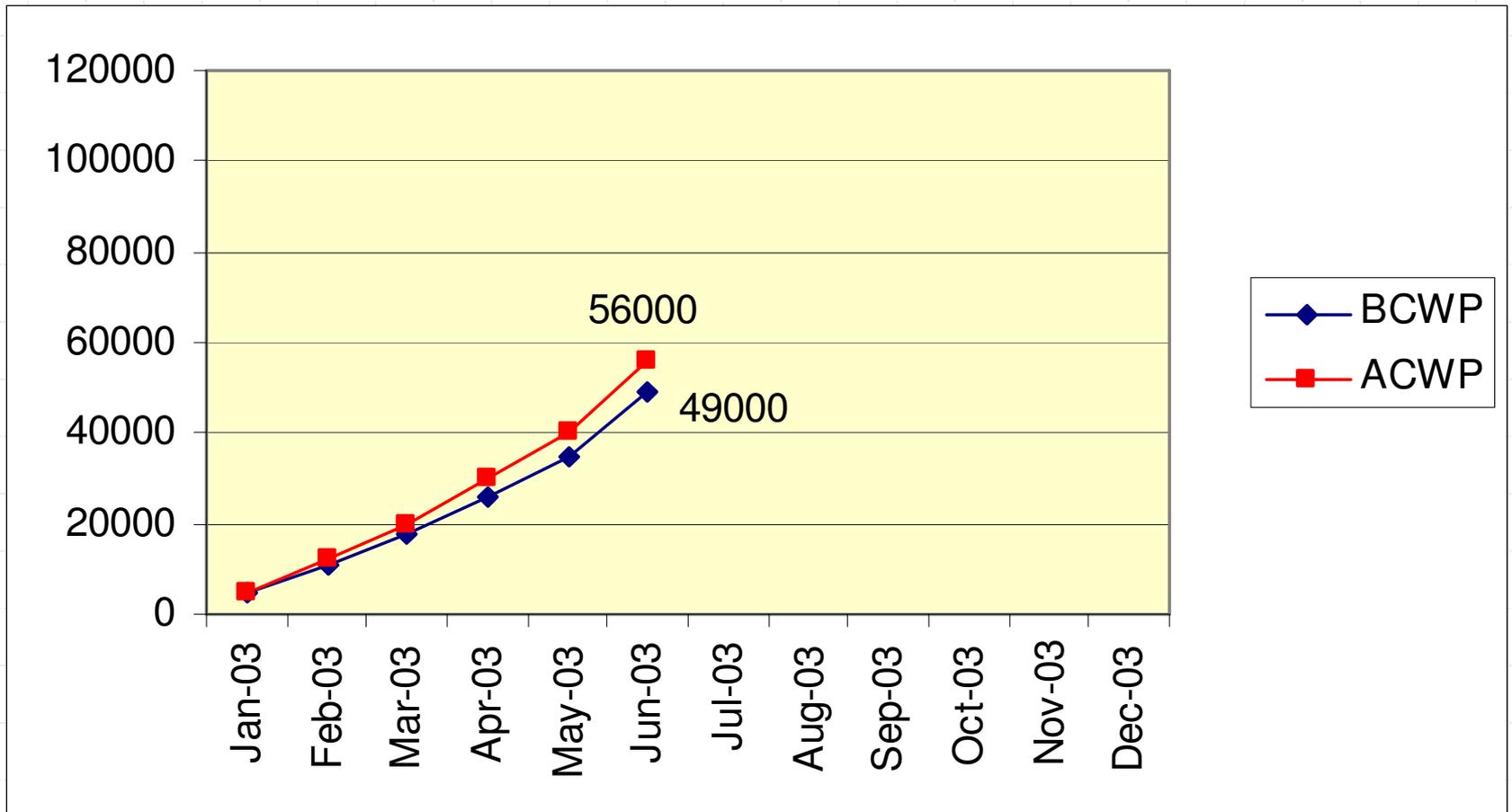# BCWS - Budgeted Cost of Work Scheduled

Earned Value Definitions (cont.)

◆ ACWP: "Actual Cost of Work Performed"

Cost incurred to accomplish the work <u>that has been done</u> to date.
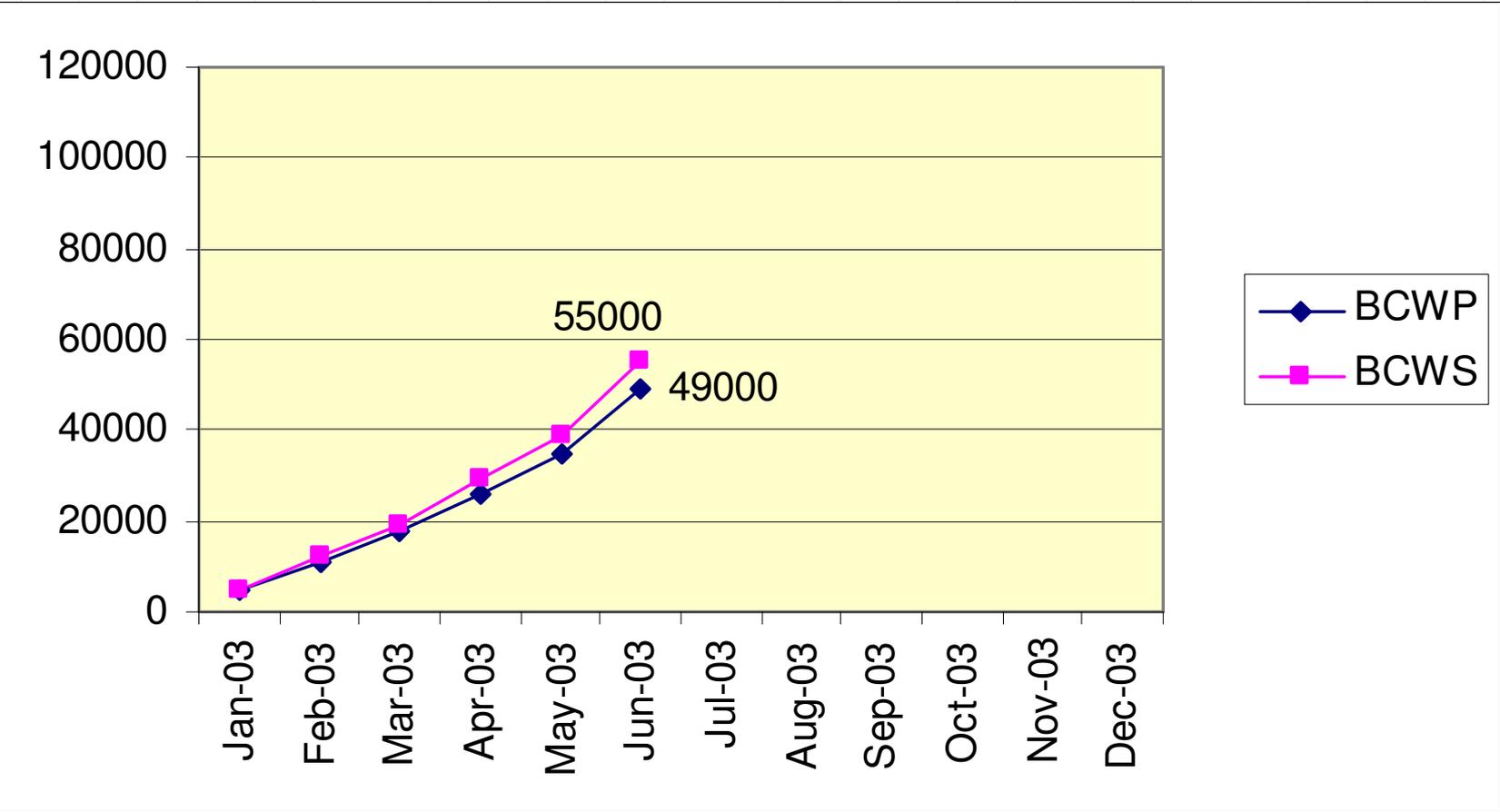
ACWP - Actual Cost of Work Performed

Earned Value Definitions (cont.)
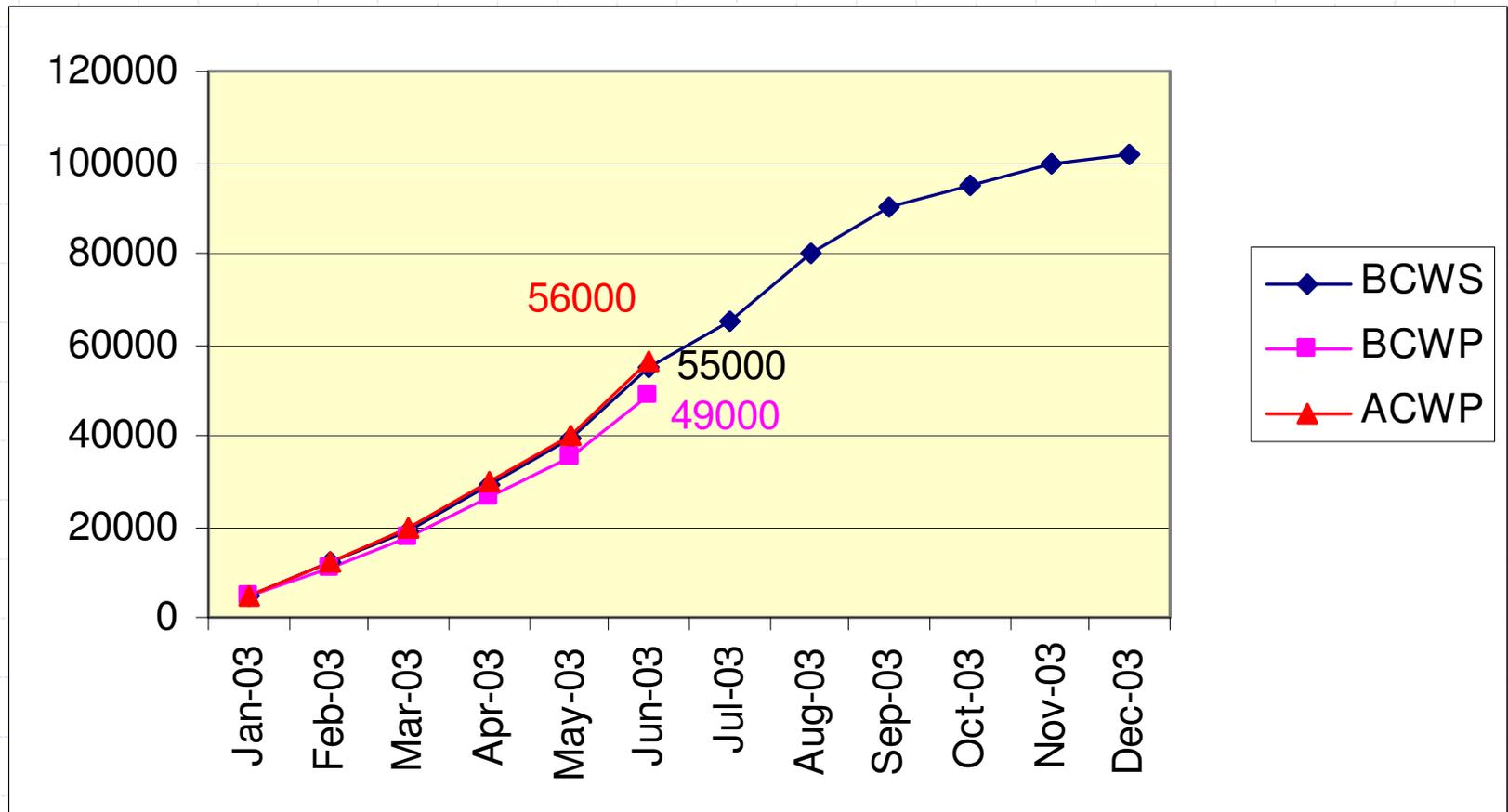
◆ BCWP: Budgeted Cost of Work Performed

The <u>planned</u> (not actual) cost to complete the work <u>that has been done</u>.

BCWP - Budgeted Cost of Work Performed

The Whole Story

Some Derived Metrics

◆ SV: Schedule Variance (BCWP-BCWS)
- A comparison of amount of work performed during a given period of time to what was scheduled to be performed.
- A negative variance means the project is behind schedule

◆ CV: Cost Variance (BCWP-ACWP)
- A comparison of the budgeted cost of work performed with actual cost.
- A negative variance means the project is over budget.

Schedule Variance & Cost Variance

Schedule Variance = BCWP-BCWS

$$\begin{array}{r} \$49,000 \\ -\ \underline{55,000} \\ SV \ = - \$ \ 6,000 \end{array}$$

Cost Variance   = BCWP-ACWP

$$\begin{array}{r} \$49,000 \\ \underline{56,000} \\ CV \ = - \$7,000 \end{array}$$

Some More Derived Metrics

◆ SPI: Schedule Performance Index

SPI=BCWP/BCWS

SPI<1 means project is behind schedule

◆ CPI: Cost Performance Index

CPI= BCWP/ACWP

CPI<1 means project is over budget

◆ CSI: Cost Schedule Index (CSI=CPI x SPI)

The further CSI is from 1.0, the less likely project recovery becomes.

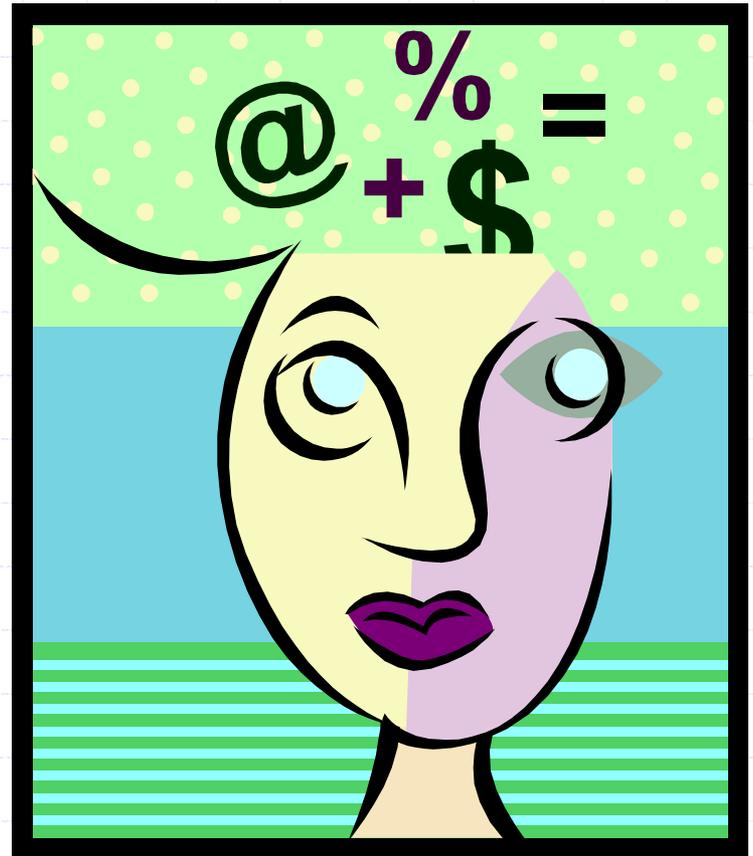# Performance Metrics

SPI: BCWP/BCWS

    49,000/55,000 = 0.891

CPI: BCWP/ACWP

    49,000/56000 = 0.875

CSI: SPI x CPI

    .891 x .875 = 0.780

Making Projections

Once a project is 10% complete, the overrun at completion will not be less than the current overrun.
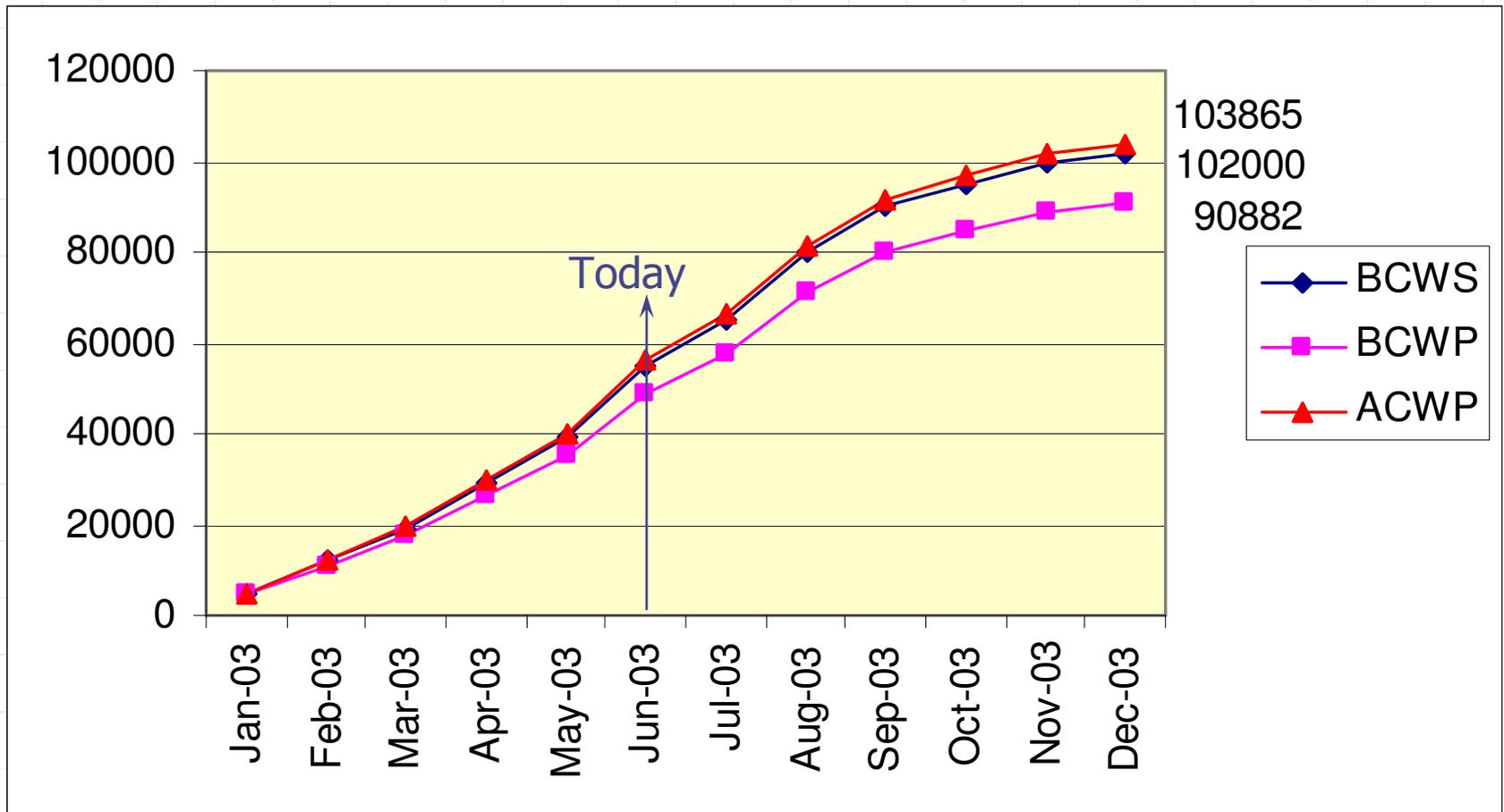
Once a project is 20% complete, the CPI does not vary from its current value by more than 10%.
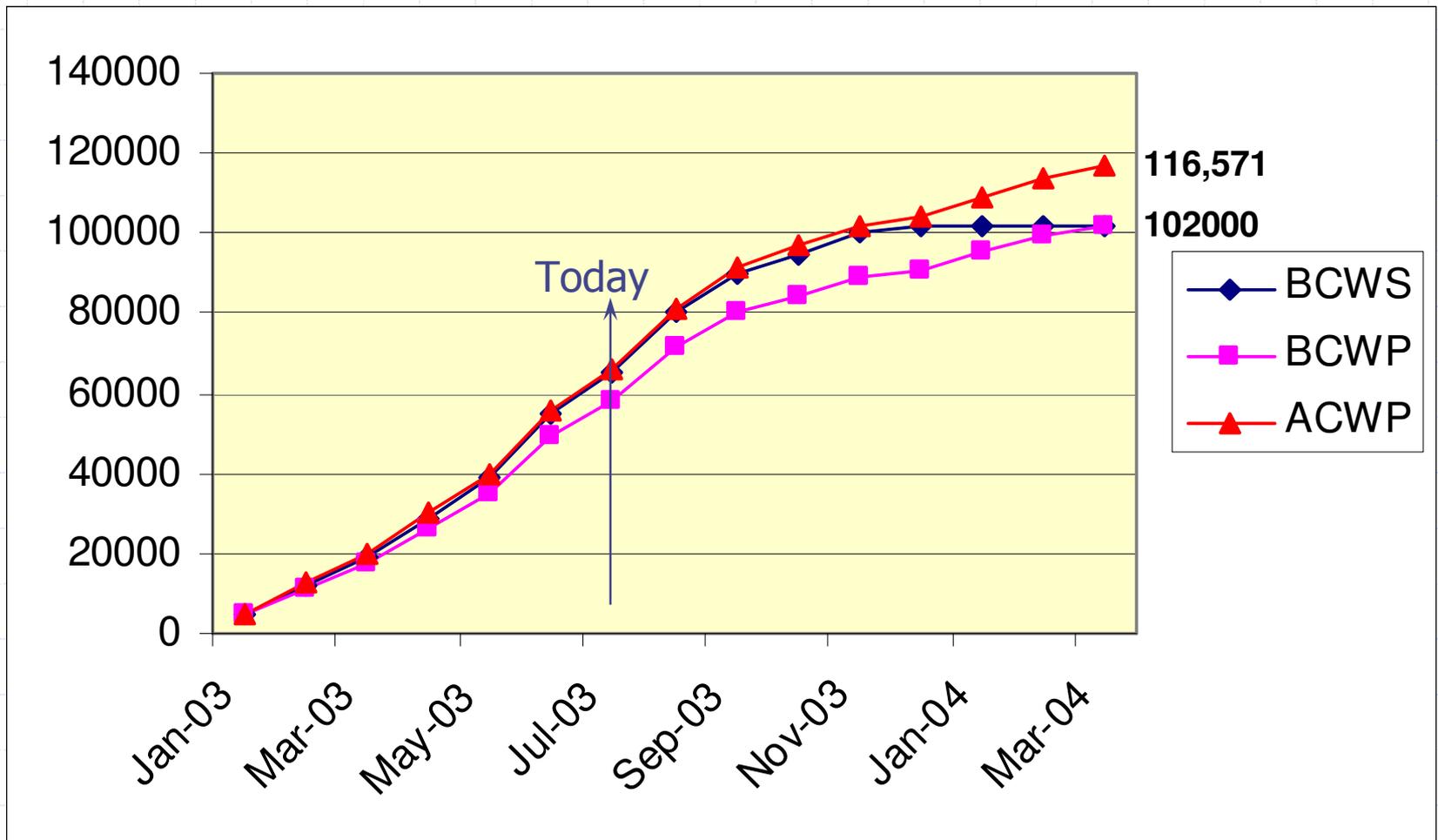
The CPI and SPI are statistically accurate indicators of final cost results.

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Making Projections

Estimate to Complete

A New Criteria
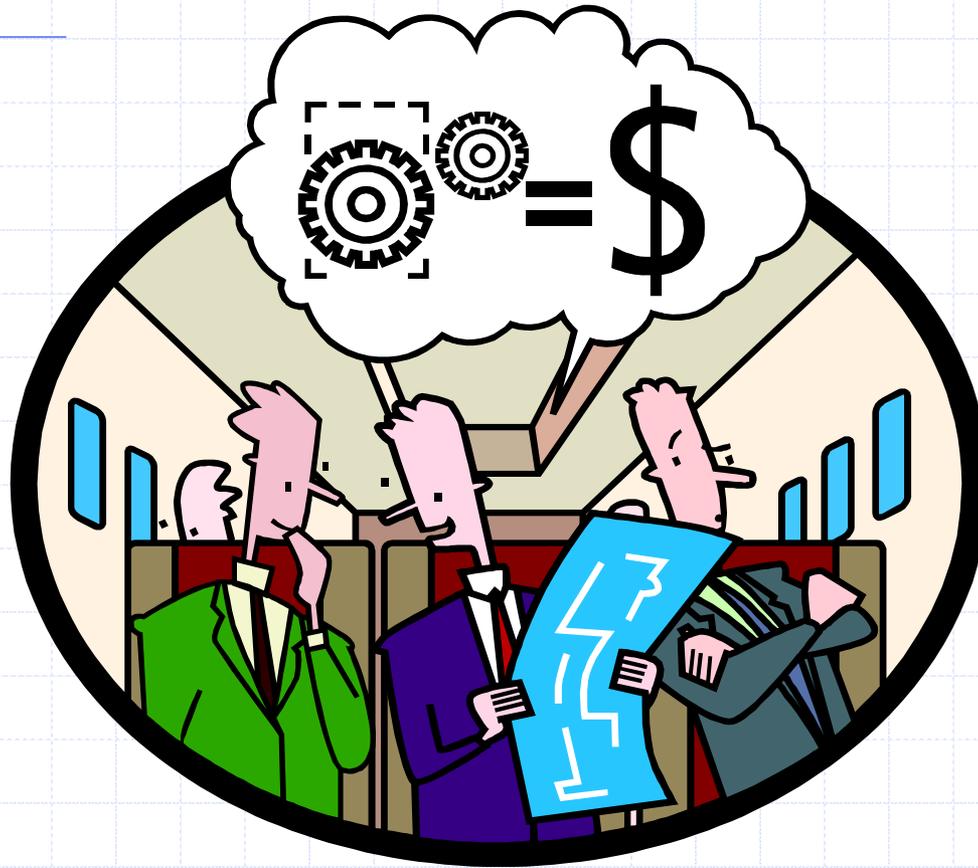
Activities "earn value" as they are completed.

- ◆ *The value earned is the WBS <u>budgeted cost</u> of the activity completed to date.*

Value of Earned Value

◆ Schedule Status Reporting

◆ Cost Status Reporting

◆ Forecasting

But How Do I Do All This Stuff ?

With an Earned Value Management System

Requirements of Earned Value

◆ Proper WBS Design

◆ Baseline Budget Control Accounts

◆ Baseline Schedule

◆ Work measurement by Control Account

- work-hours, dollars, units, etc.

◆ Good Project Management Practices

Summary

- EVA & EVMS will help reduce guesswork in:
  - Measuring performance
  - forecasting
- Need to get beyond misleading measures of progress.
- Reasons to use EVA and EVMS:
  - Good project management practice
  - OMB requirement

Earned Value Resources

◆http://www.pmi.org/

◆http://www.acq.osd.mil/pm/

Checkitweb makes it easy to use the Earned Value method in your projects.