Earned Value Analysis

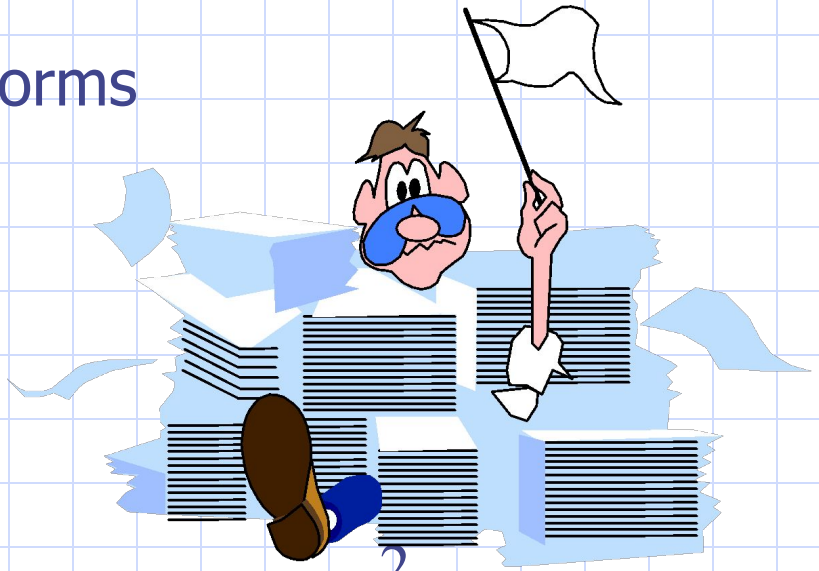
What Is It ?: the time, cost, and how much work done is the value and when some work/activity is completed then it earns the value and on basis of that value, analysis of the project status is done.

Why Do I Need It ?

How Do I Do It?

Today's Situation

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



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

Source:The Standish Group

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

- There is a requirement of knowing about some important characteristics in order to ensure that the work being done is correct and leading to success or not.
- 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.

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

You need the WBS structure to be able to quantify output (what is the deliverable?)

Baselines provide a measuring stick.

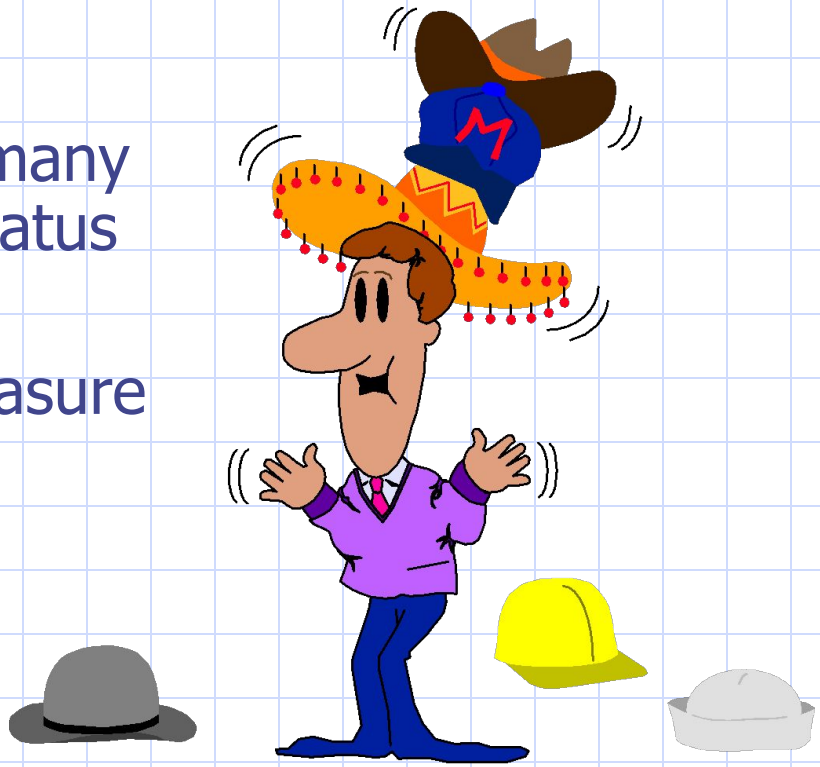
And if there are not good management practices in place, it won't work.

Why You Need EVA

?

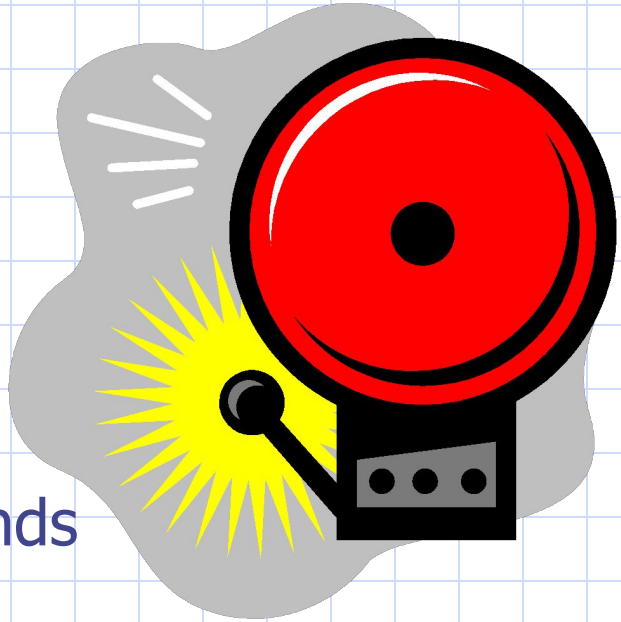
Earned Value needed because...

- 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



So, Is This Stuff New ?

"Cost/Schedule Control Systems Criteria" (C/SCSC)
It needs to be followed by the organization for maintaining the standards in response to a need to keep track of very large and very complex contracts.

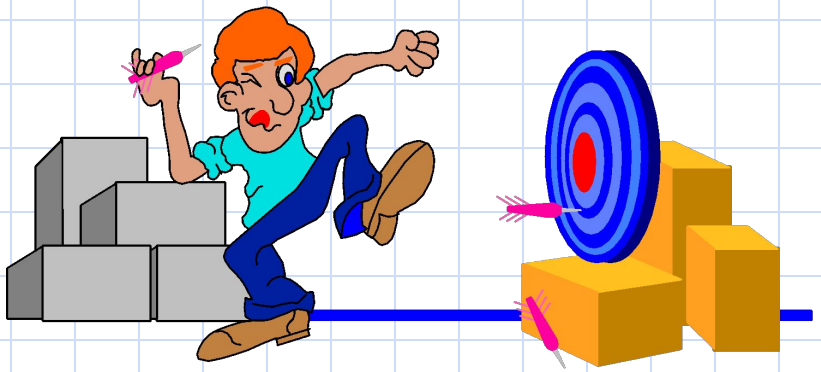
Examples of informal Earned Value Analysis

It's done informally without realizing it.

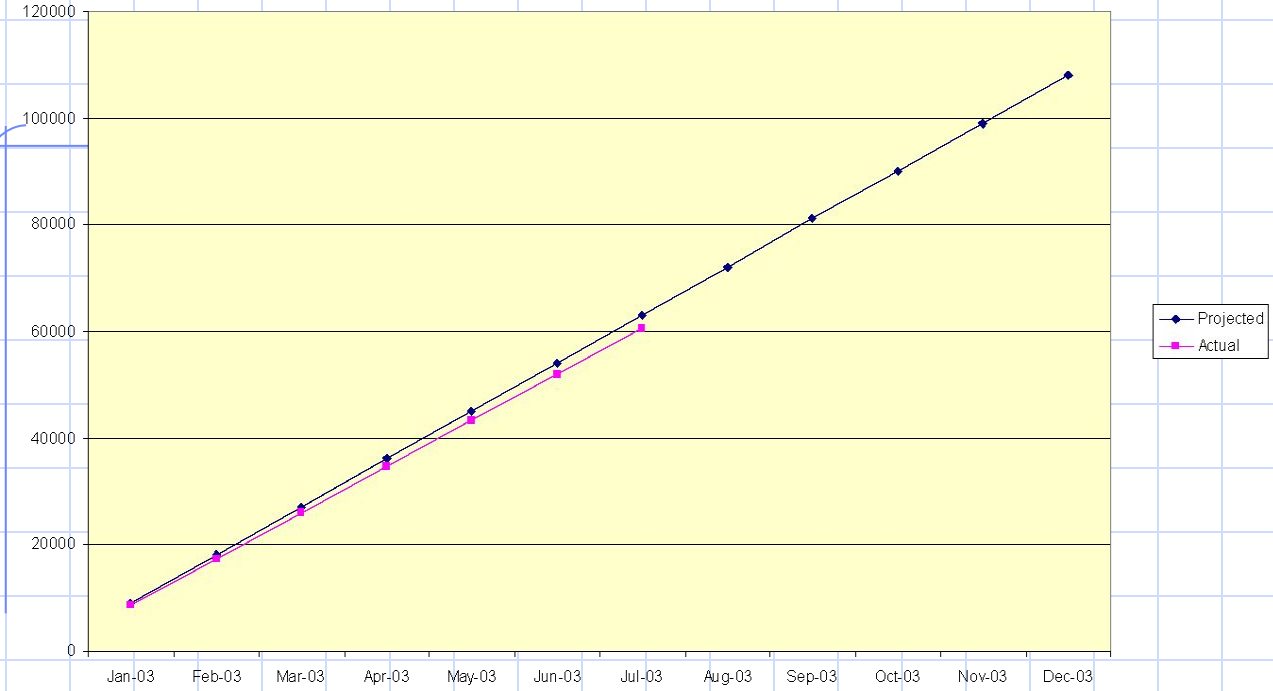
- 30% time used,
- 30% **$$** spent
- So, if 30% of the work is done, I must be OK ??

- Shop floor estimates

- Cost comparisons
  Budget vs. Actual



How's this project doing?



We're looking at a year-long project; Comparing our budget with our expenditures,
Complete through about July, and we don't appear to be TOO far off track.

BUT, what we don't know is:

How much WORK have we gotten done?

How tough - in terms of BOTH time and money - will it be to get back on track?

How EVA works?

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? WBS needs to be broken down into manageable, meaningful pieces.

•The more complex the project, the more difficult it is to tell where you are.

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

The WBS should describe
What is to be done
When it is to be completed
How much it will cost

Let's Look at an example:

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

The Work Package needs to be of the size that it can be handed off to a task manager.

Too large and you have multiple people responsible for the work.
Too small and the program manager winds up micro-managing everything.

The "accompanying narrative" is really an SOW – or Statement of Work.

Some New Terms

- BCWS - Budgeted Cost of Work Scheduled
- ACWP - Actual Cost of Work Performed
- BCWP - Budgeted Cost of Work Performed

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Earned Value Definitions

- BCWS: "Budgeted Cost of Work Scheduled"

  Planned cost of the total amount of work scheduled to be performed by the milestone date.

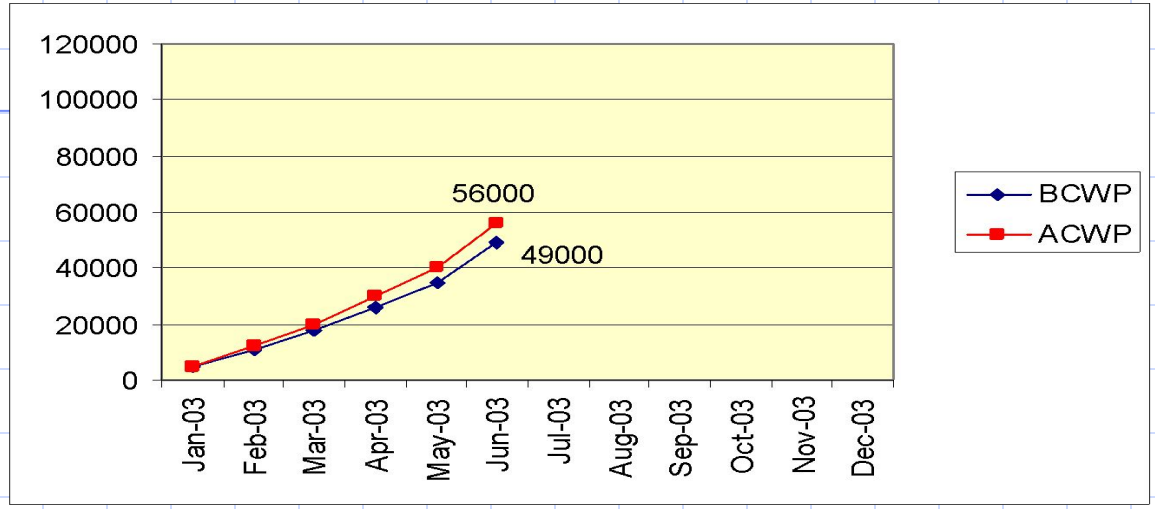
Earned Value Definitions (cont.)

- ACWP: "Actual Cost of Work Performed"

  Cost incurred to accomplish the work that has been done to date.

This is simply the actual cost to date.

ACWP - Actual Cost of Work Performed



And here's that dreaded actual vs. planned situation.

Well the project is "somewhat" over cost.

"Somewhat" could have a lot of different meanings.

So far we've spent 56K when we should have spent 49K.

OK, we're 7K over budget, is that bad? Well, let's find out how bad.

Earned Value Definitions (cont.)

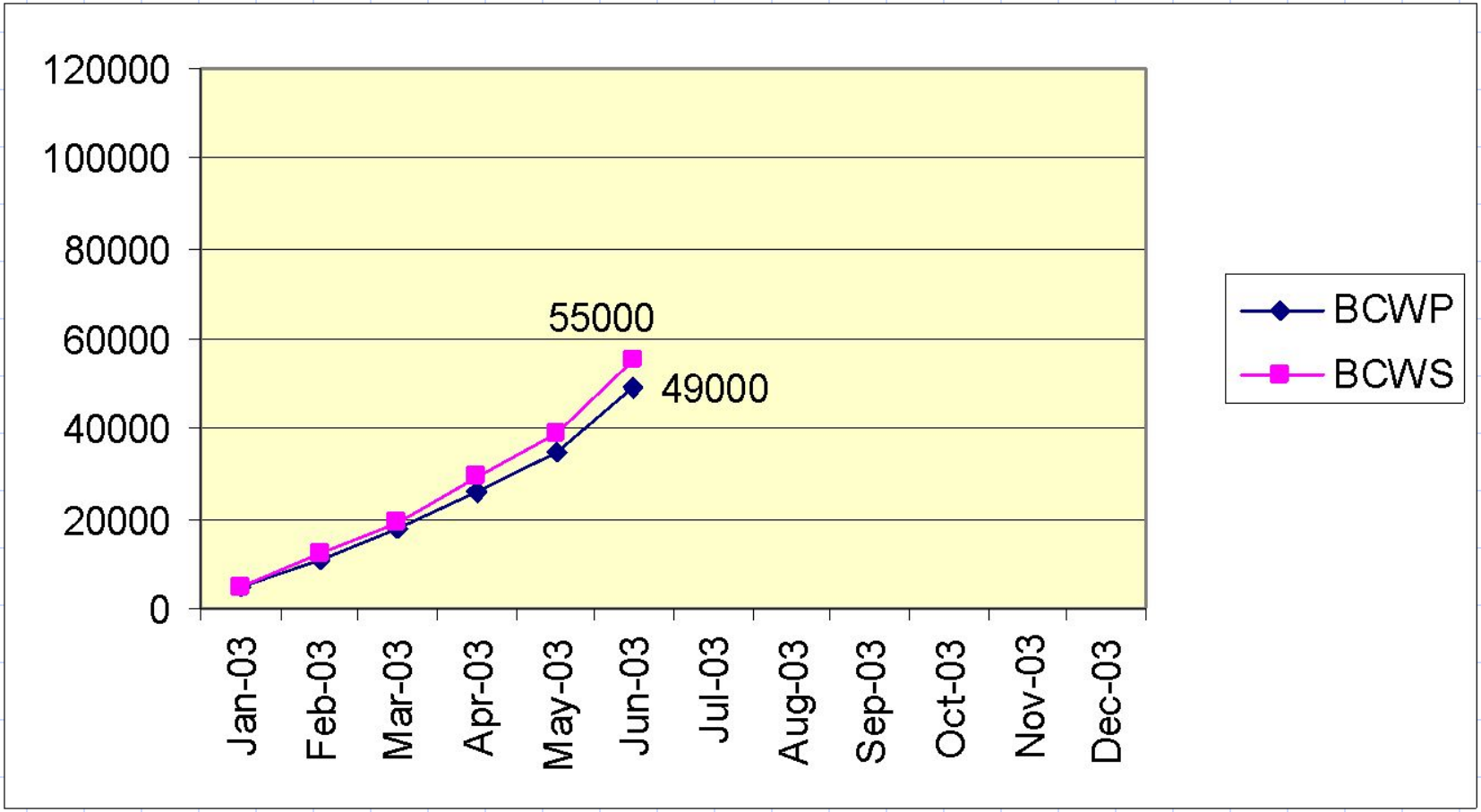
- BCWP: Budgeted Cost of Work Performed

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

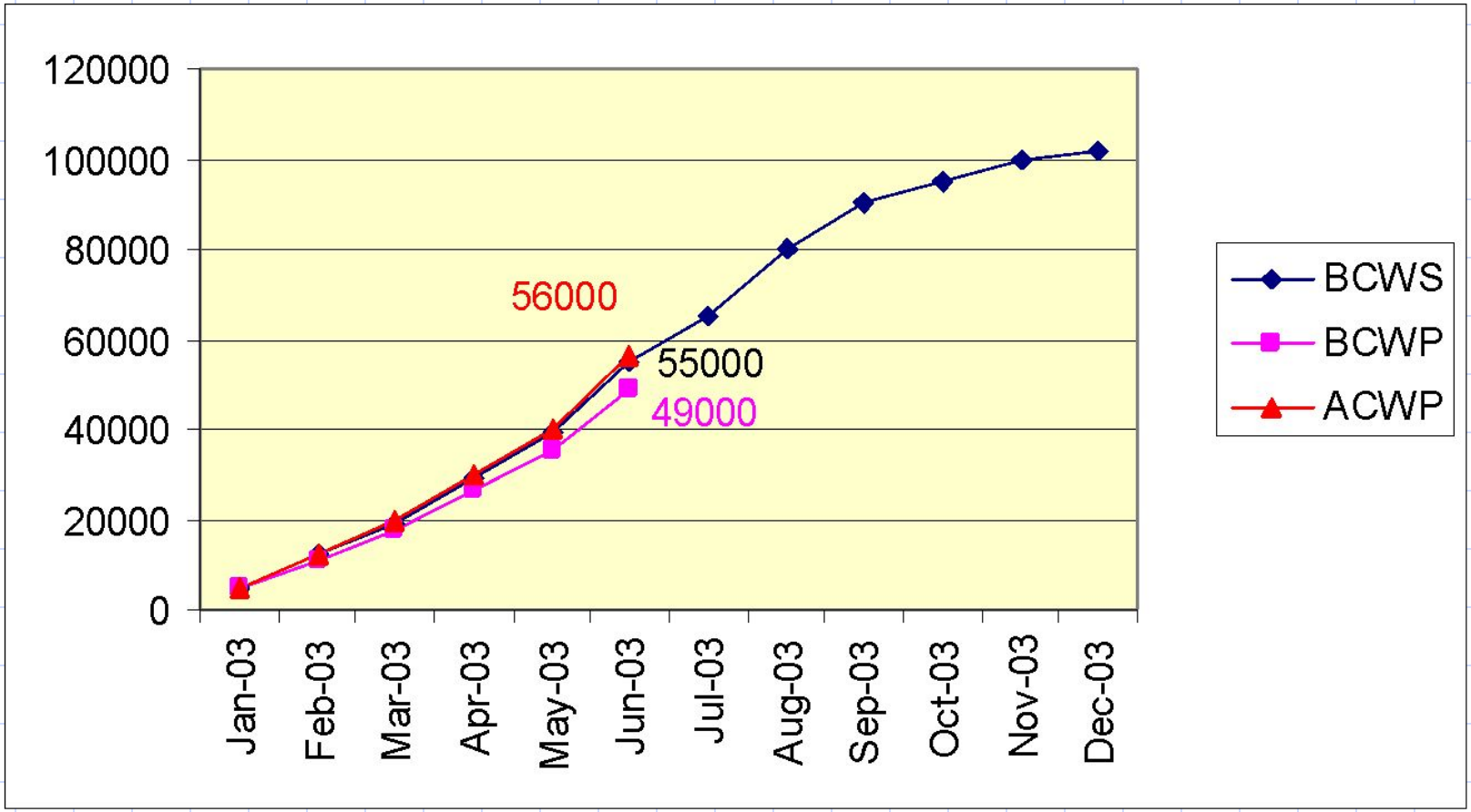
The next factor is BCWP and this is the factor that rounds out EVA and makes it possible to capture the full picture of where the project stands.

Note that this is the cost of the work performed and,it is the budgeted amount, not the actual amount.

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.

Oh Boy! Some derived metrics – you were all waiting for some of those, weren't you?

Cost Variance and Schedule Variance are simply arithmetic differences of where we are and where we should be.

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.

Well, we know we're behind schedule and over cost,
and we know exactly much for each one, but so what?

Well, now we can begin to integrate these two pieces of information and get an overall picture.

The Performance Indices are really just a way of calculating, on a percentage basis, where we are.

SPI
CPI

Making Projections

Once a project is 10% complete, the overrun at completion will not be less than the current overrun.

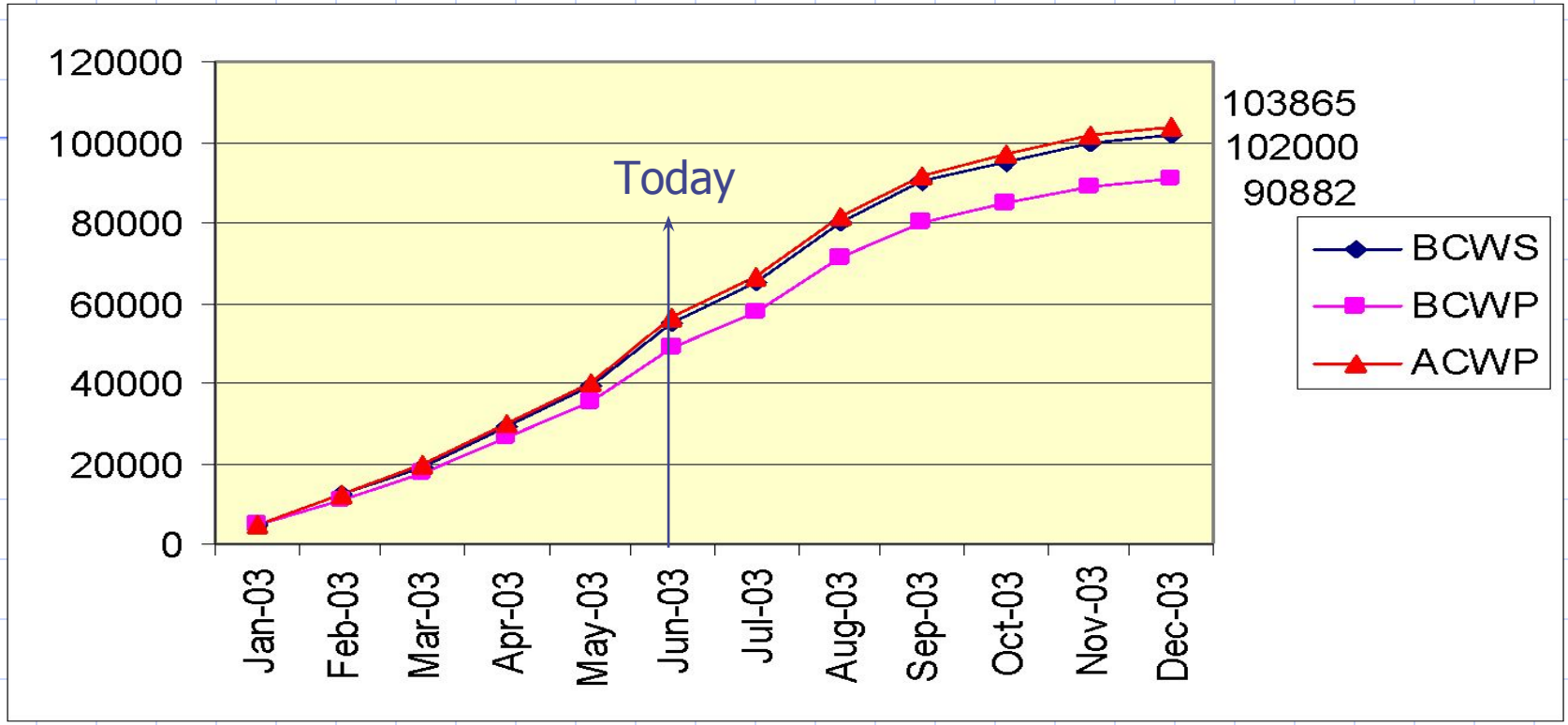
Once a project is 20% complete, the CPI does not vary from its current value by more than 10%.

The CPI and SPI are statistically accurate indicators of final cost results.

Unlike the stock market, in the program management world, Past Performance is an indicator of future results.

Let's take a look at what this would mean for our sample project.

Making Projections



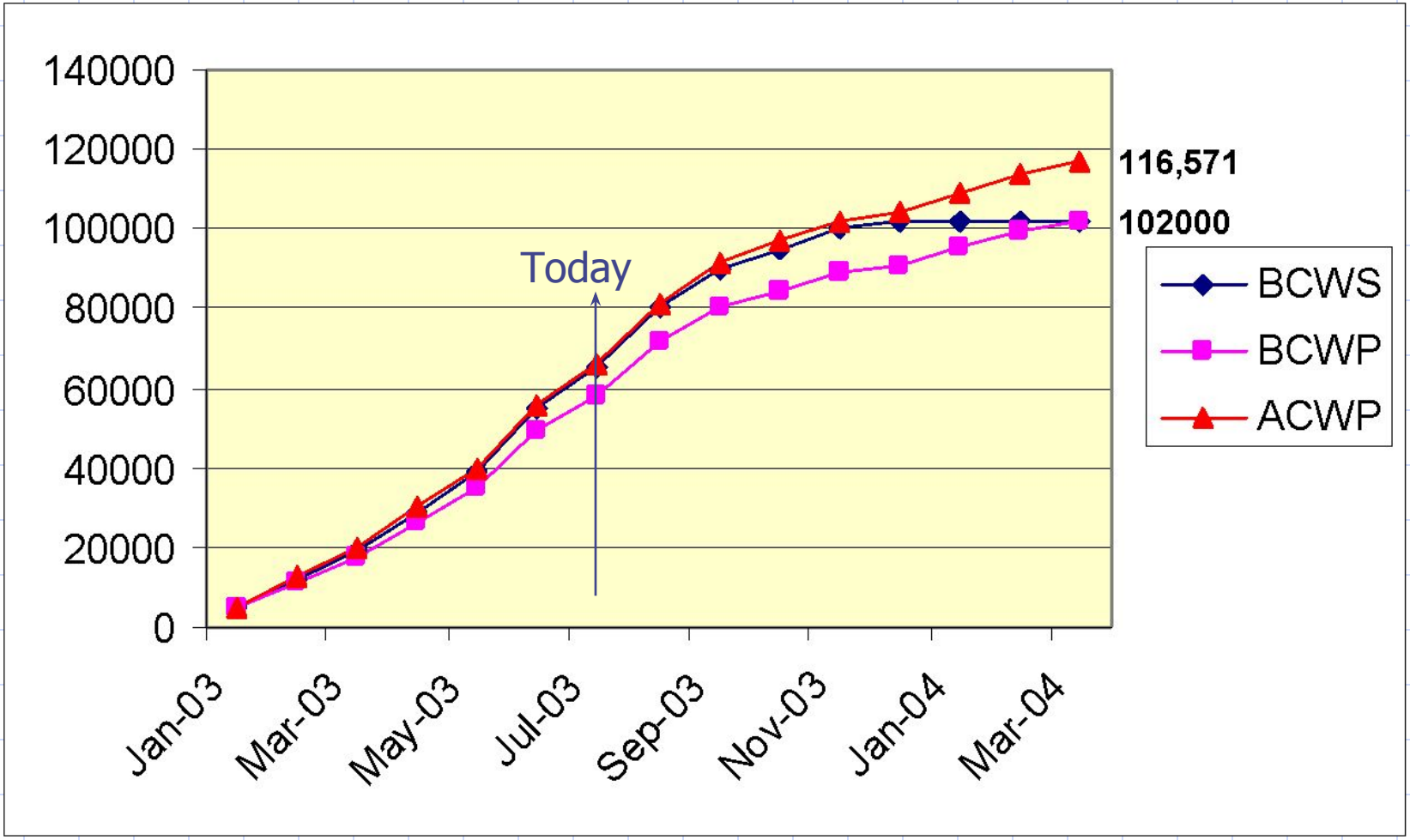
We can expect to finish the year having spent a bit more than was budgeted.

But look at the ACWP curve: We have only delivered 89% of the product
but we've spent everything we had, plus more.

Final line? Without a change in performance, we would have to spend an additional 28% of our budget to complete the job.

Why 28% when we're only 11% behind? Because our Cost/Schedule Index says we will only be able to perform to a 78% level, and we'll continue to fall behind.

Estimate to Complete



A New Criteria

Activities "earn value" as they are completed.

- *The value earned is the WBS budgeted cost of the activity completed to date.*

Value of Earned Value

- Schedule Status Reporting
- Cost Status Reporting
- Forecasting

Shortcomings of Earned Value

- Quantifying/measuring work progress can be difficult.
- Time required for data measurement, input, and manipulation can be considerable.

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
- Incorporate into contracts

OMB requirements are going to be strongly focused on Project Management and Performance Measurement

But Earned Value makes sense without OMB's motivation

OMB's requirement applies specifically to contractors.