

 POLITECNICO DI MILANO

Dipartimento di  
Elettronica e Informazione

Session 9

# Project Control

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- This slides are largely based on Prof. John Musser class notes on “Principles of Software Project Management”
- Original slides are available at <http://www.projectreference.com/>
- Reuse and republish permission was granted

# Today

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- Session 8 Review
- Project Control
- Status Reporting
- Earned Value Analysis

## Session 8 Review

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- Project roles and team structure
- CMM
- Requirements

- Ongoing effort to keep your project on track
- 4 primary activities:
  1. Planning performance
    - A SDP, schedule, and a control process
  2. Measuring status of work performed
    - Actuals
  3. Comparing to baseline
    - Variances
  4. Taking corrective action as needed
    - Response
- Prerequisite to good control is a good plan

- “Control”
  - Power, authority, domination. No.
  - Guiding a course of action to meet an objective. Yes.
  
- Principles
  - Work is controlled, not workers
    - Control helps workers be more effective & efficient
  - Control based on work completed
    - Use concrete deliverables
  - Balance
    - Appropriate level between too much and too little
    - Includes:
      - Micro-managing vs. neglect
      - Too much tracking detail vs. too little

- The 3 key Progress Monitoring Questions
  - What is the actual status?
  - If there's a variance, what is cause?
  - What to do about it?
  
- Possible responses
  1. Ignore
  2. Take corrective action
  3. Review the plan

- Monitoring rates
  - Daily, weekly, monthly
  - If problems occur – then adjust
    - You may have to monitor problem areas more closely
    - For some period of time
    - Almost always there's one or more areas under closer scrutiny
  
- Status Reporting
  - Part of the communications management plan
    - Which is usually just a section of Software Development Plan (SDP)

- From team to PM, from PM to stakeholders
- Typical format for latter
  - Summary
  - Accomplishments for this period (done)
    - Tasks, milestones, metrics
  - Plans for next period (to-do)
  - Risk analysis and review
  - Issues & Actions
- Shoot for weekly updates
  - Email notes, then hold brief meeting
  - More frequently during crises

- A programmer reports that he's 90% done.
  - What does this mean?
  
- A programmer reports completing 4,000 LOC on estimated 5,000 LOC effort.
  - Is this 80% complete?
  - Quality?
  - Ratio, estimated to completed?
    - Your estimates could have been wrong
  - If you can't measure scope or quality you don't know "reality"
  - You really only know cost (hours spent)
  - How can you improve this?

- tasks can only be in one of 2 states: complete or incomplete
  - No partial credit
- Preferred to anything subjective!
- “90% Complete Syndrome”
  - Software is 90% complete 90% of the time
- Use lower-level task decomposition
- Tangible exit criteria

- a.k.a. Earned Value Management (EVM)
- a.k.a. Variance Analysis
- Metric of project tracking
- “What you got for what you paid”
  - Physical progress
- Pre-EVA ‘traditional’ approach
  1. Planned time and costs
  2. Actual time and costs
  3. Progress: compare planned vs. actual
- EVA adds third dimension: value
  - Planned, actual, earned

# Traditional Analysis vs. Earned Value Analysis

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## Traditional Measurement

Merely economic evaluation comparing budget and actual costs

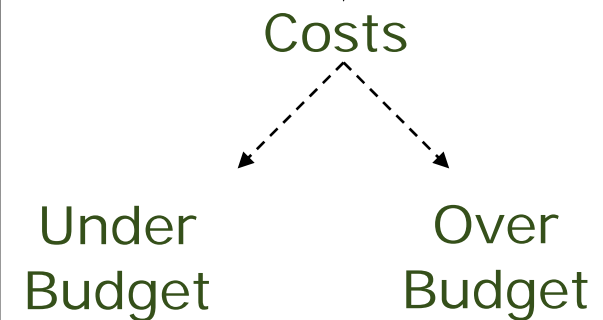


- Is it possible to reduce the delay/keep the advantage?

- How can we improve our efficiency?
- How can we transfer our efficiency to other projects?

## Earned Value Measurement

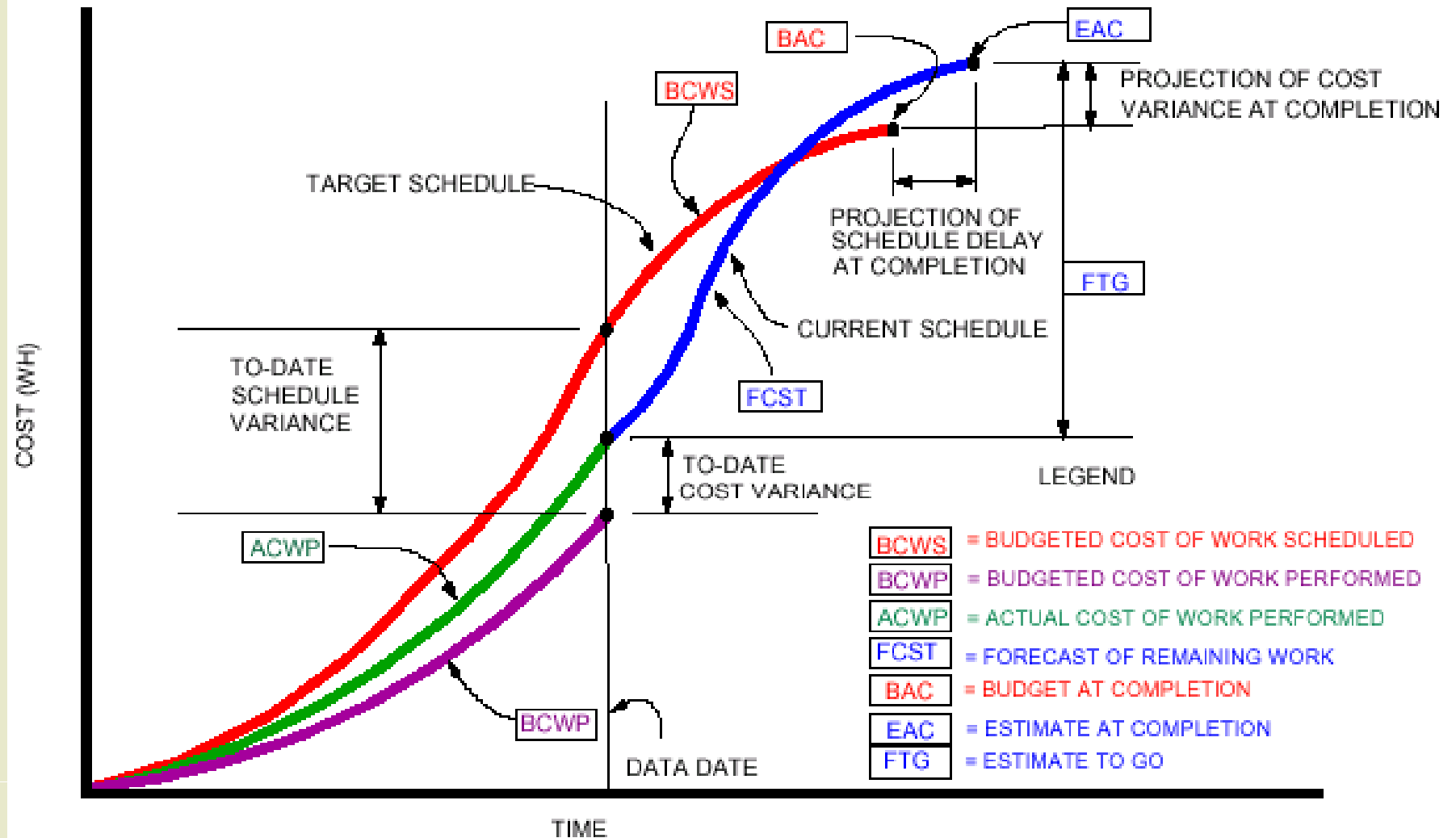
Time/Costs Integrated Monitoring



- Are there more/less costs because of progress status or because inefficiencies?

- Forecasting
  - Old models include cost & expenditure
  - EVA adds schedule estimation
- Measured in money or time
  - Often time used in software projects
- Performance Measurement Baseline (PMB)
  - Time-phased budget plan against which contract performance is measured
  - Cost & schedule variances go against this
  - Best via a bottom-up plan

- Different methods are available
  - Binary Reporting
  - Others include
    - Based on % complete
    - Weights applied to milestones
- EVA can signal errors as early as 15% into project
- Alphabet Soup :-/



- 3 major components
  - BCWS: Budgeted Cost of Work Scheduled
    - Also called “Planned Value” (PV)
    - “Yearned”
    - How much work should be done?
  - BCWP: Budgeted Cost of Work Performed
    - Also called “earned value” (EV)
    - “Earned”
    - How much work is done?
    - $BCWS * \% \text{ complete}$
  - ACWP: Actual Cost of Work Performed
    - Also called “Actual Cost” (AC)
    - “Burned”
    - How much did the work done cost?

- “What is the project status”?
  - You can use Derived EVA variances to answer this
- SV: Schedule Variance
  - $BCWP - BCWS$
  - Planned work vs. work completed
- CV: Cost Variance
  - $BCWP - ACWP$
  - Budgeted costs vs. actual costs
- Negatives are termed ‘unfavorable’
- As showed at slide 15, EVA can be plotted on ‘spending curves’
  - Cumulative cost (Y axis) vs. Time (X axis)
  - Typically in an ‘S’ shape

- SPI: Schedule Performance Index
  - $BCWP / BCWS$
- CPI: Cost Performance Index
  - $BCWP / ACWP$
- Problems in project if either of these less than 1 (or 100%)

- Other Derived Values
  - BAC: Budget At Completion
    - Sum of all budgets (BCWS). Your original budget.
  - EAC: Estimate At Completion
    - Forecast total cost at completion
    - $EAC = ((BAC - BCWP)/CPI) + ACWP$
    - Unfinished work divided by CPI added to sunk cost
    - If  $CPI < 1$ , EAC will be  $> BAC$
  - CR: Critical Ratio
    - $SPI \times CPI$
    - 1: everything on track
    - $> .9$  and  $< 1.2$  ok
    - Can be charted

# EVA Example

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Project Data	Completion Date		Cost	
	Planned	Actual	Planned	Actual
WBS Milestone				
A	1-Apr	20-Apr	25,000	20,000
B	1-May	28-May	15,000	10,000
C	1-Jun	18-Jun	10,000	15,000
D	1-Jul		15,000	
E	1-Aug		10,000	
Totals			75,000	45,000

- As of 1-July where are we?
- BCWS
- BCWP
- ACWP

# EVA Example

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WBS Milestone	Completion Date		Cost	
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Totals			75,000	45,000

- CV
- SV
- CPI
- SPI
- CR

- For solution see [http://www.emanueledellavalle.org/slides/P&MSP2009\\_17\\_EAV-example.xls](http://www.emanueledellavalle.org/slides/P&MSP2009_17_EAV-example.xls)

- BCWS
  - Use 'loaded labor' rates if possible
    - Direct pay + overhead
- Remember it's an aggregate figure
  - May hide where the problem lies
  - Beware of counterbalancing issues
    - Over in one area vs. under in another

- Benefits
  - Consistent unit of measure for total progress
  - Consistent methodology
    - Across cost and completed activity
    - Apples and apples comparisons
  - Ability to forecast cost & schedule
  - Can provide warnings early
- Success factors
  - A full WBS is required (all scope)
  - Beware of GIGO: Garbage-in, garbage-out
- A useful guide
  - <http://www.projectsmart.co.uk/docs/earned-value.pdf>

- Project plan:
  - Develop and submit an initial copy of the project plan (limited to tasks & milestones) for your project
  
  - Please Submit electronically
    - TO: [emanuele.dellavalle@polimi.it](mailto:emanuele.dellavalle@polimi.it)
    - SUBJECT: [P&MSP09] initial copy of <project-code> plan
      - e.g., [P&MSP09] initial copy of 01 plan
    - Attachment a zip named as <project-code><student-ID> + <project name>
      - e.g., 01-740648-736424-SHOP HIVE Project.zip
  
  - *Optional* means that I'm offering you an opportunity to have my advise before final submission

- Schwalbe: 7 “Project Quality Management”
- URLs
  - “Introduction to Software Testing”
    - <http://www.iplbath.com/pdf/p0820.pdf>
  - “Introduction to Software Testing Principles”
    - <http://www.qestest.com/principi.htm>

# Questions?

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