CHAPTER 10:
MONITORING AND CONTROLLING THE PROJECT
EARNED VALUE

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INTRODUCTION

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The Project Control Process

1. Control
   - The process of comparing actual performance against plan to identify deviations, evaluate courses of action, and take appropriate corrective action.
2. Project Control Steps
   1. Setting a baseline plan.
   2. Measuring progress and performance.
   3. Comparing plan against actual.
   4. Taking actions

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Monitoring Time Performance

1. Tools used to catch negative variances from plan and communicate project schedule status:
   - Tracking and baseline Gantt charts
     - Show expected, actual, and trend data for event duration performance.
   - Control charts
     - Plot the difference in scheduled time on the critical path with the actual point on the critical path.

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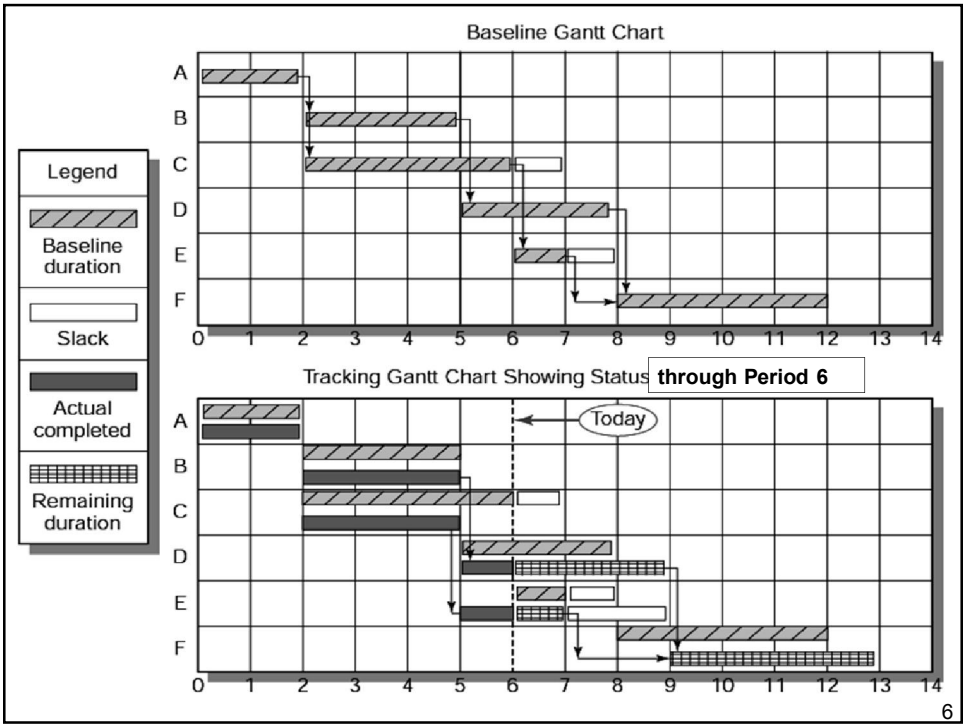

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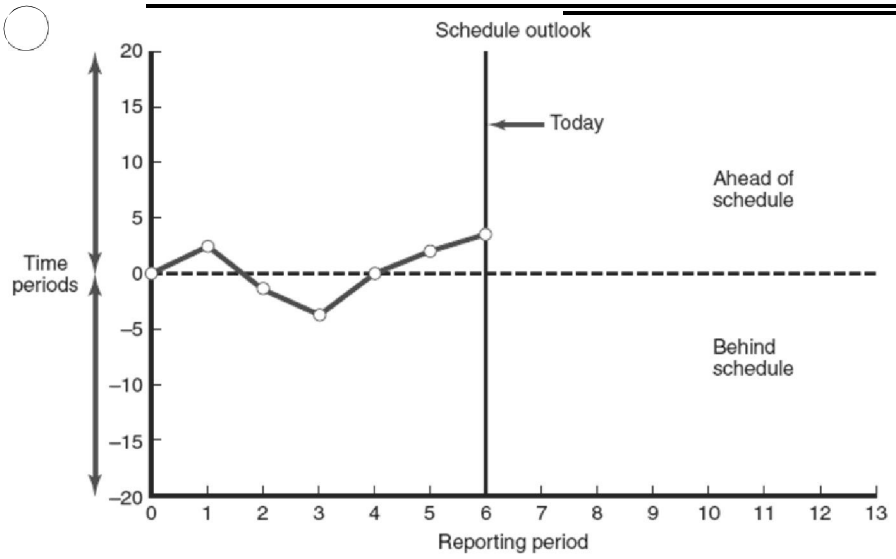
Project Schedule Control Chart



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Disparity Among Monitoring Systems

1. Time-Phase Baseline Plan
   - Corrects the failure of most monitoring systems to connect a project's actual performance to its schedule and forecast budget.
   - Example: Weekly report of a construction project

Planned cost of week 2: 12.000$	**Actual cost of week 2: 14.000$**	**Difference at the end of week 2: 2.000$**
Accumulatively planned cost at the end of week 2: 25.000$	**Accumulatively actual cost at the end of week 2: 29.000$**	**Accumulative difference at the end of week 2: 4.000$**

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- Common problems:
  - Systems that measure only cost variances do not identify resource and project cost problems associated with falling behind or progressing ahead of schedule.
    - If expenditures are lower than expected for a given period it may be good or bad, depending on whether progress is line with that amount of expenditure.
    - If expenditures are higher than expected, this may be acceptable if progress is sufficiently greater than planned for that period

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1. Earned Value Cost/Schedule System

- An integrated project management system based on the earned value concept that uses a time-phased budget baseline to compare actual and planned schedule and costs.

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EARNED VALUE COST/SCHEDULE SYSTEM

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Developing an Integrated Cost/Schedule System

1. Define the work using a WBS.
   a. Scope
   b. Work packages
   c. Deliverables
   d. Organization units
   e. Resources
   f. Budgets
2. Develop work and resource schedules.
   a. Schedule resources to activities
   b. Time-phase work packages into a network
3. Develop a time-phased budget using work packages included in an activity. Accumulate budgets (PV).
4. At the work package level, collect the actual costs for the work performed (AC).
5. Multiply percent complete times original budget (EV).`
6. Compute the schedule variance (EV-PV) and the cost variance (EV-AC).

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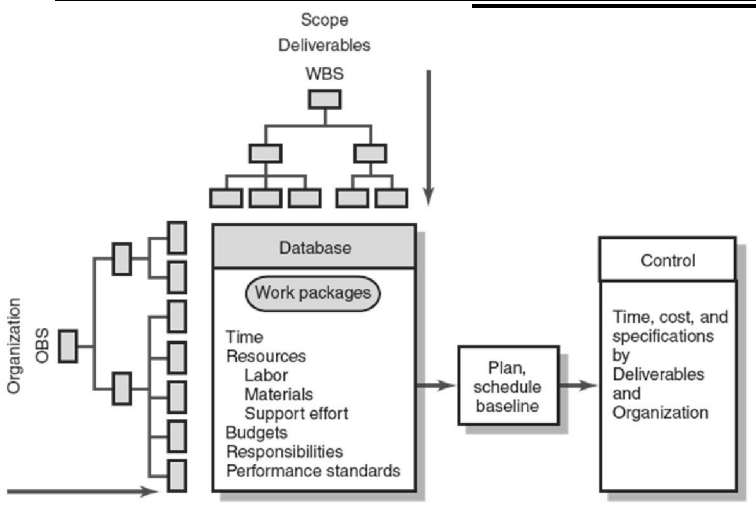
Project Management System Overview



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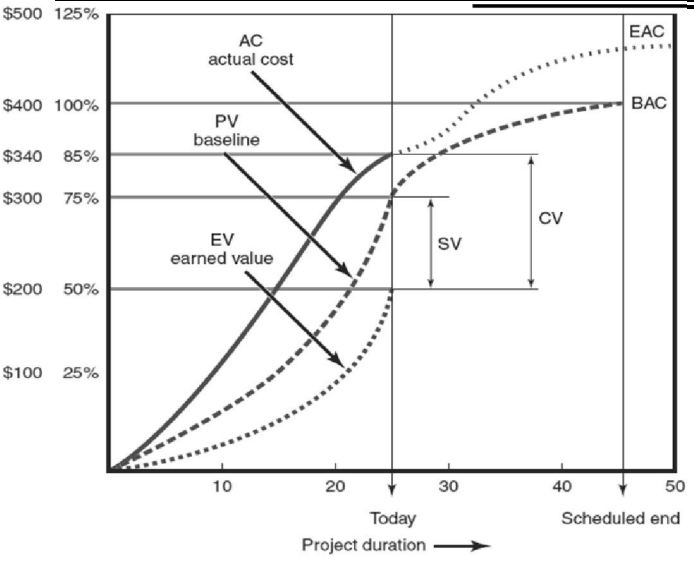
Cost/Schedule Graph



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Earned Value Example

- Suppose that work on a project task was expected to cost $1500 to complete the task and the workers were originally scheduled to have finished today. As of today, however, the workers have actually expended $1350, and our best estimate is that they are about 2/3 finished.
- Evaluate the progress of project task by EV, PV, AC, CV, SV, CPI, SPI, BAC, ETC, EAC, VAC

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Glossary of Terms

1. EV (Earned Value)
   - The percent complete times its original budget. The percent of the original budget that has been earned by actual work completed. The older acronym for this value was BCWP—budgeted cost of the work performed.
2. PV (Planned Value)
   - The time-phased baseline of the value of the work scheduled. An approved cost estimate of the resources scheduled in a time-phased cumulative baseline (BCWS—budgeted cost of the work scheduled).
3. AC (Actual Cost)
   - The actual cost of the work completed. The sum of the costs incurred in accomplishing work. (ACWP—actual cost of the work performed).

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Glossary of Terms

1. CV (Cost Variance)
   - Cost variance is the difference between the earned value and the actual costs for the work completed to date where **CV=EV-AC**.
2. SV (Schedule Variance)
   - Schedule variance is the difference between the earned value and the baseline line to date where **SV=EV-PV**.

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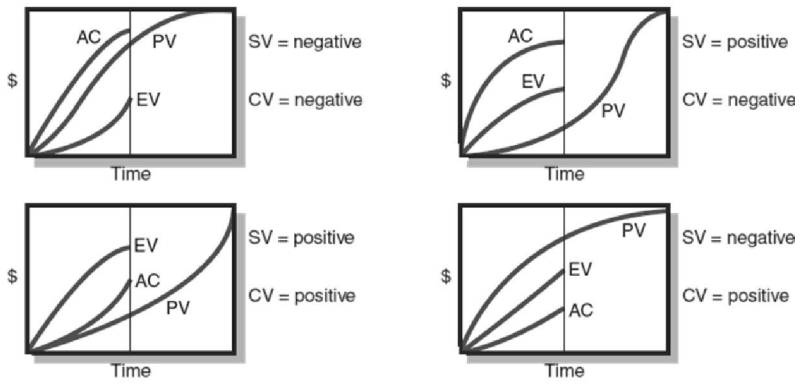
Glossary of Terms



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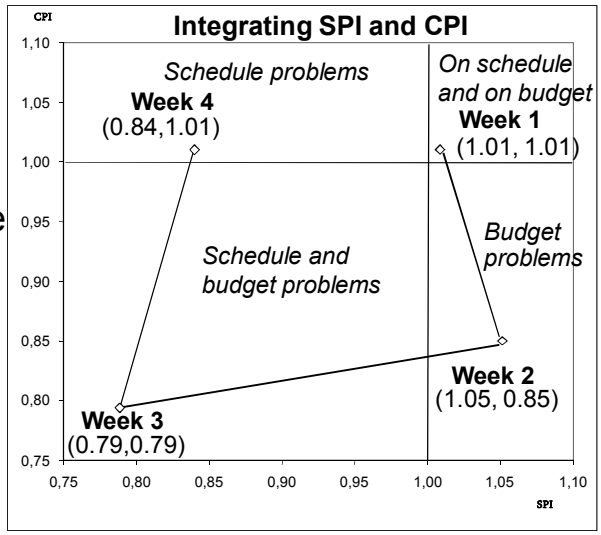
Glossary of Terms

1. CPI (Cost Performance Index)

   CPI = EV/AC

2. SPI (Schedule Performance Index)

   SPI = EV/PV



Glossary of Terms

1. BAC (Budgeted cost At Completion)
   - The total budgeted cost of the baseline or project cost accounts.
2. ETC (Estimate To Complete)

   ETC = (BAC-EV)/CPI = ETCf
3. EAC (Estimated costs At Completion)
   - Estimated costs at completion. Includes costs to-date plus revised estimated costs for the work remaining.

   EAC = ETC + AC

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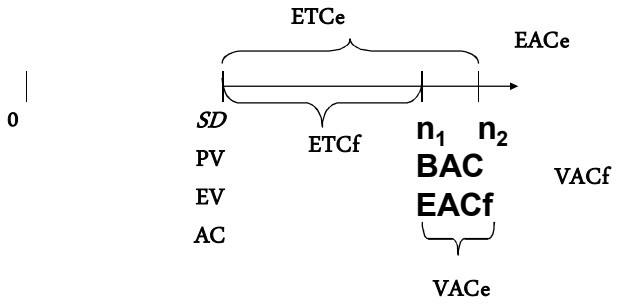
Glossary of Terms



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Glossary of Terms

1. VAC
   - Cost variance at completion (BAC-EAC_e), where EAC_e is derived by estimators in the field.
   - Or, alternatively, cost variance at completion (BAC-EAC_f), where EAC_f is derived from a formula using actual and earned value costs.
   - VAC indicates expected actual over-or underrun cost at completion.

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Glossary of Terms

1. Percent Complete Indexes
   - Indicates how much of the work accomplished represents of the total budgeted (BAC) and actual (AC) dollars to date.
   - **PCIB = EV/BAC**
   - **PCIC = AC/EAC**

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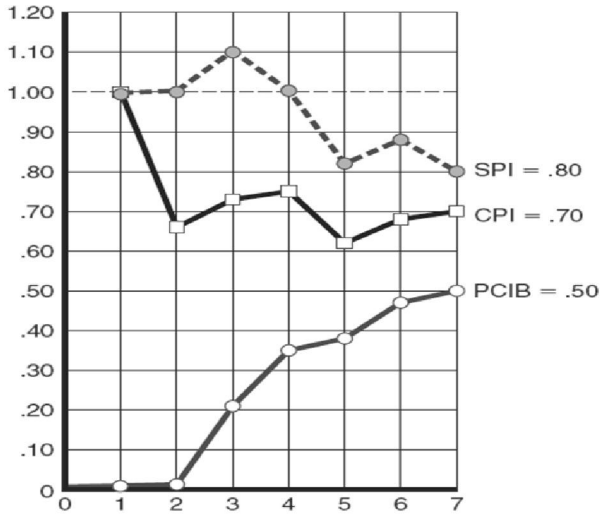
Glossary of Terms



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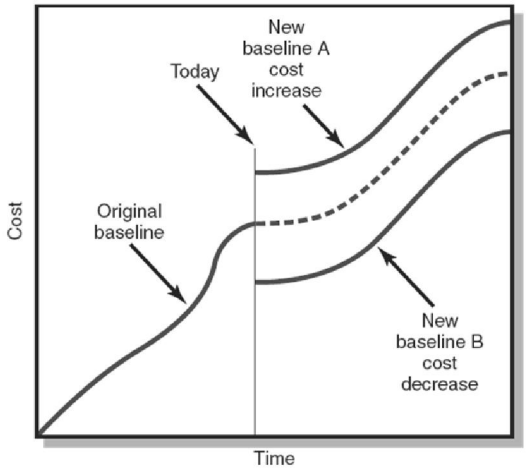
Scope Changes to a Baseline



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