

Introduction to Earned Value Method

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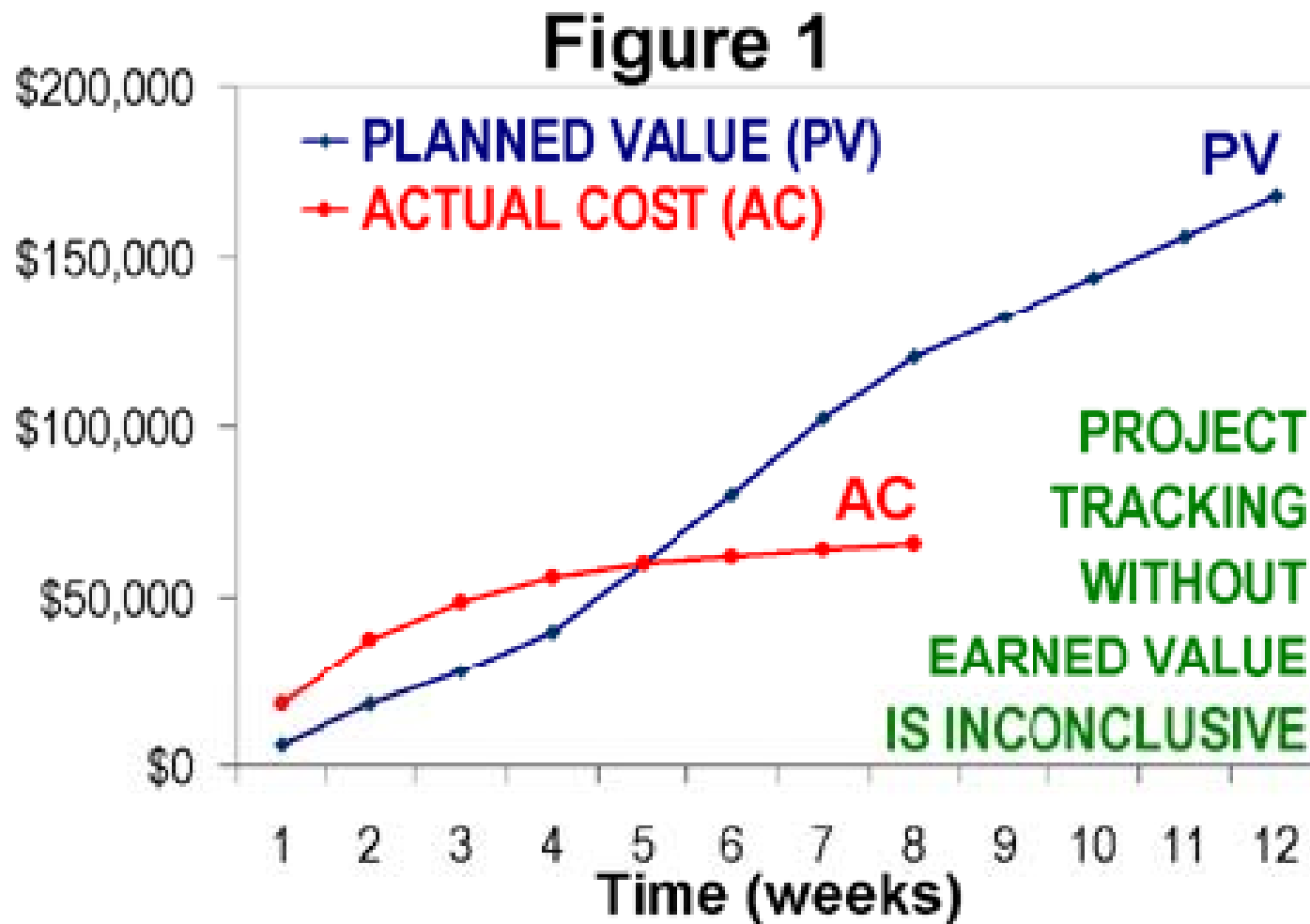
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Introduction

- EVM as a project management technique to measure project progress quantitatively
- Combination of measurements of scope, schedule and cost
- As an early warning of performance problems
- Key parameters
 - Project plan
 - Planned Value (PV): value of planned work
 - Earned Value (EV): earning rule, metrics, Budgeted Cost of Work Performed (BCWP) to quantify the accomplished work

Project Tracking without EVM



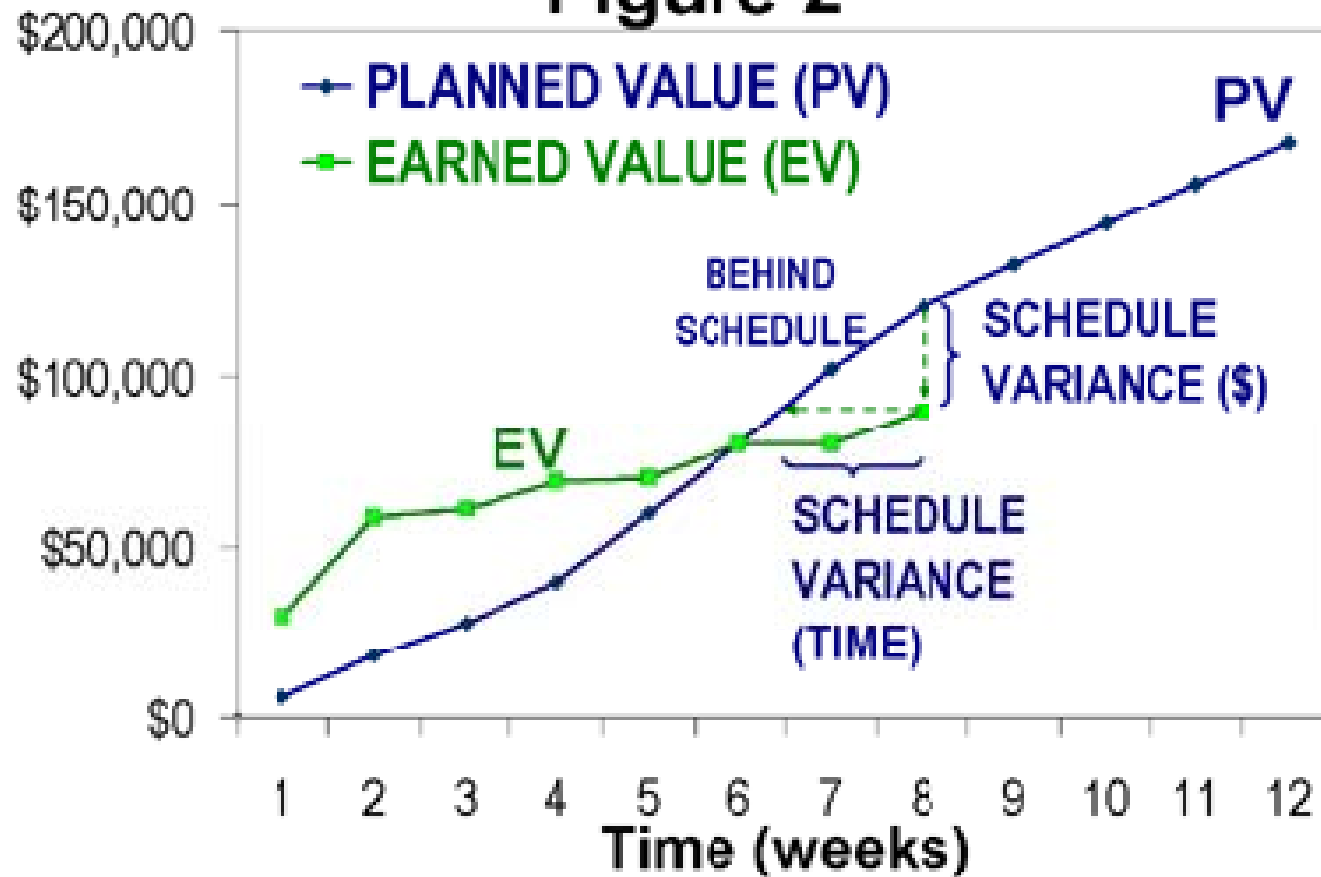
Simple EVM Implementation

(Emphasis on Technical Performance)

- 1. Define the work (WBS)
- 2. Assign a value to each activity (Planned Value (PV))
- 3. Define earning rules for each activity
 - 0/100: no credit if it is not finished
 - Other schemas: 50/50, 25/75, 20/80
- 4. Compute Earned Value (EV) regularly (weekly, monthly, ...) $EV = \sum PV$

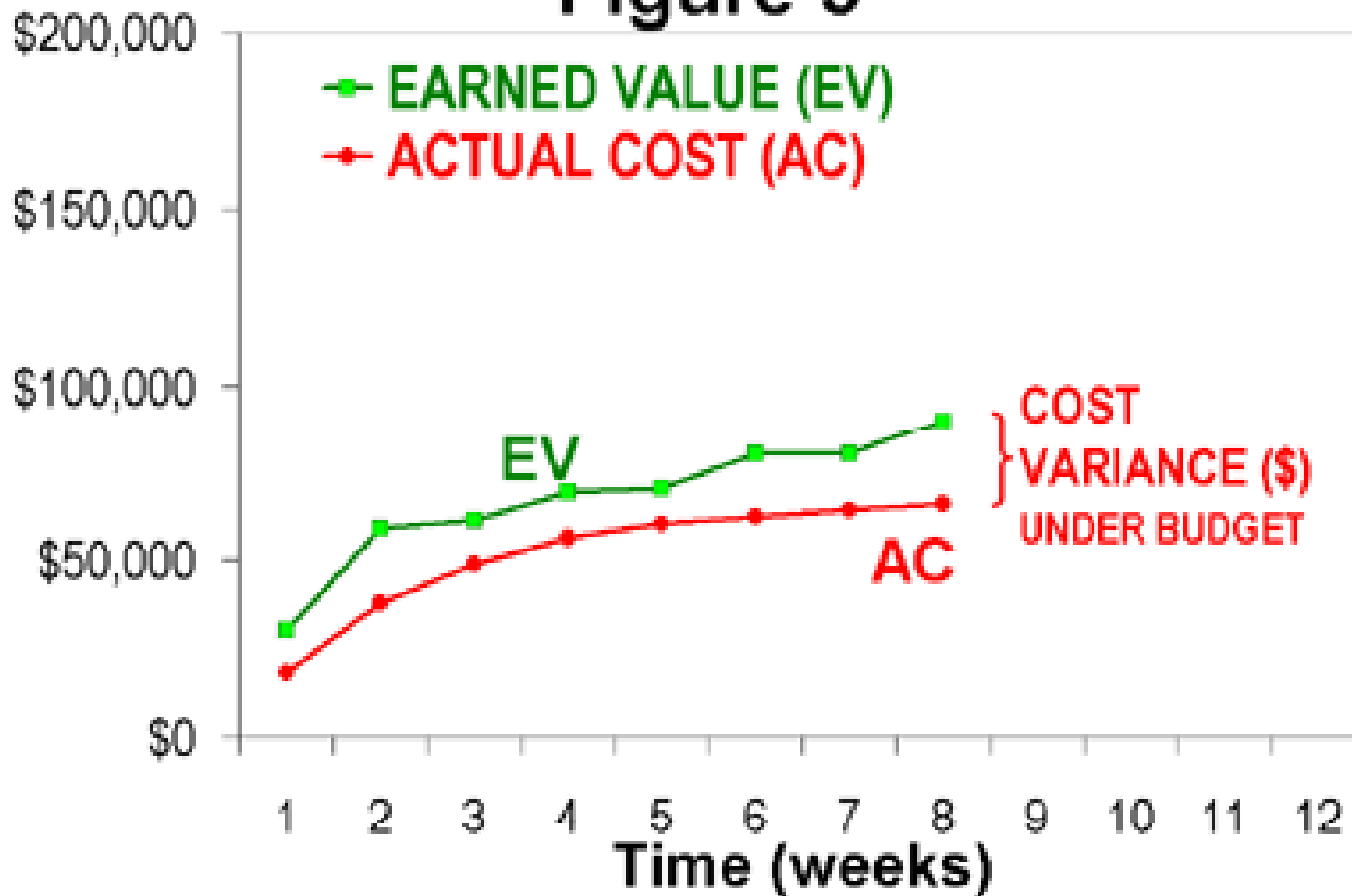
Project Tracking with EVM

Figure 2



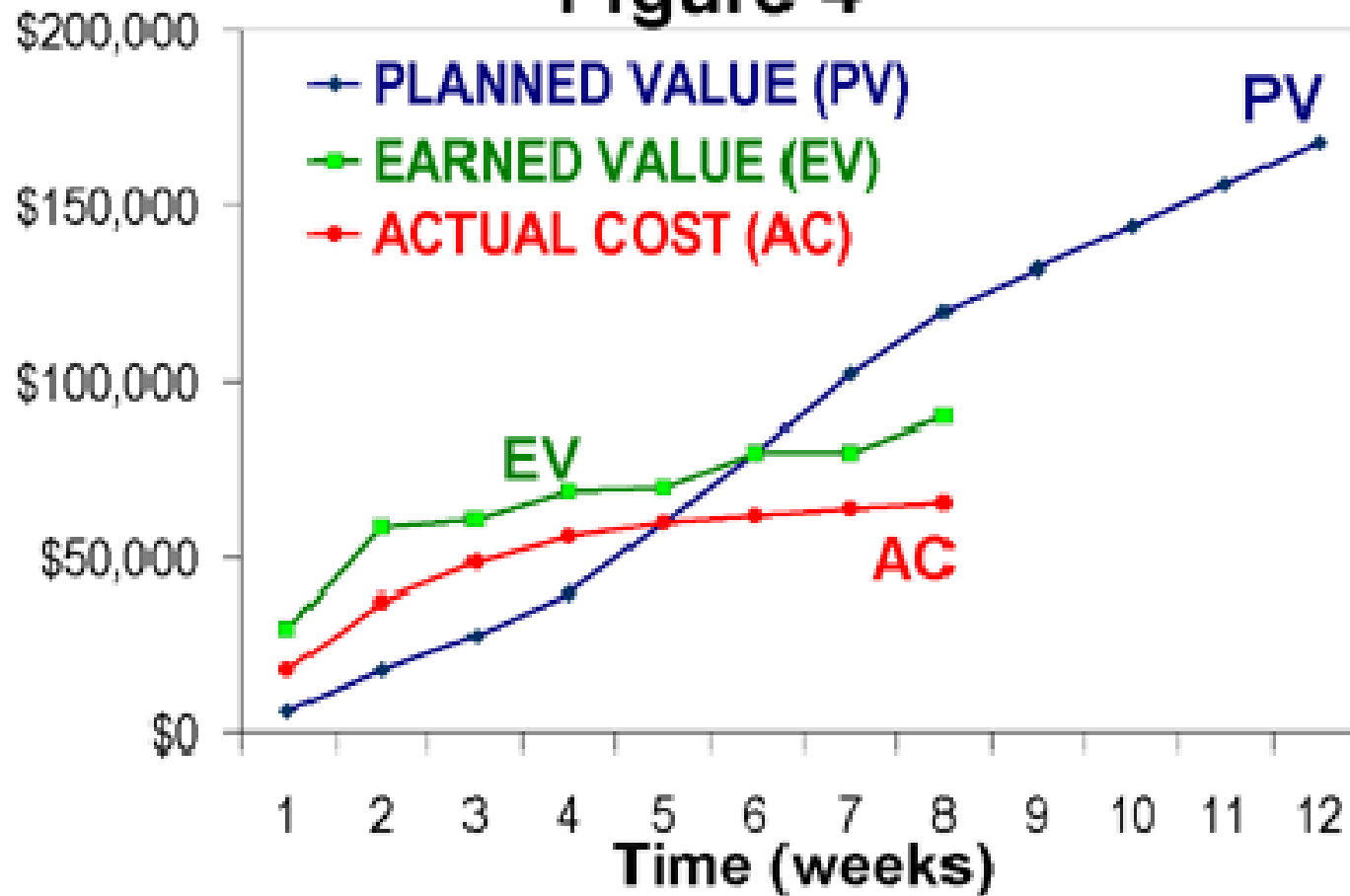
Project Tracking with EVM

Figure 3



Project Tracking with EVM

Figure 4



Intermediate Implementations

Integrating Technical and Schedule Performance

- Schedule Variance (SV)
 - $SV = EV - PV$, if $SV > 0$ then ahead of schedule
- Schedule Performance Index (SPI)
 - $SPI = EV/PV$, if $SPI > 1$ then ahead of schedule

Advanced Implementations

Integrating Cost, Schedule, and Technical Performance

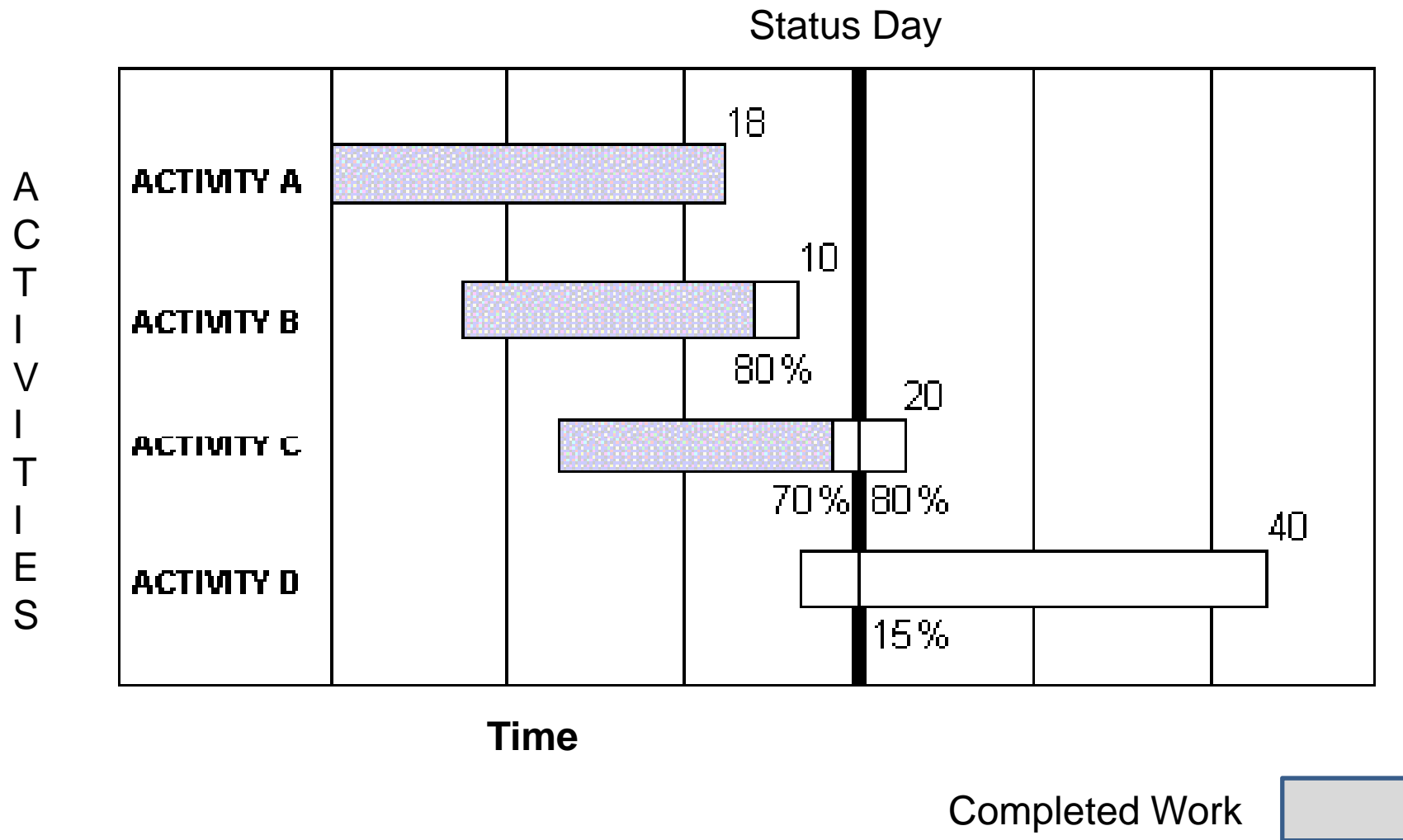
- Planned Value (Budgeted Cost of Work Scheduled (BCWS))
- Earned Value (Budgeted Cost of Work Performed (BCWP))
- Planned Value curve (Performance Measurement Baseline (PMB))
- Actual Cost (Actual Cost of Work Performed (ACWP))
- Budget at Completion (BAC): Total PV at the end of project
- Cost Variance (CV)=EV-AC. If $CV > 0$ then under budget
- Cost Performance Index (CPI)=EV/AC. If $CPI > 1$ then under budget
 - $CPI < 1$ is bad. Cost of completing work higher than planned
 - $CPI = 1$ is good. Cost of completing work equal to planned
 - $CPI > 1$ is good/bad. Cost of completing work less than planned

Advanced Implementations

Integrating Cost, Schedule, and Technical Performance

- Estimate at Completion (EAC)
 - Total cost of the project at completion
 - $EAC = AC + (BAC - EV) / CPI = BAC / CPI$
- Estimate to Complete (ETC)
 - $ETC = EAC - AC$
- To-Complete Performance Index (TCPI)
 - The anticipated performance required to achieve BAC or EAC
 - TCPI based on BAC (describing the performance required to meet the original BAC budgeted total):
 - $TCPI(BAC) = (BAC - EV) / (BAC - AC)$
 - TCPI based on EAC (describing the performance required to meet a new, revised budget total EAC):
 - $TCPI(EAC) = (BAC - EV) / (EAC - AC)$
- Independent Estimate at Completion (IEAC)
 - a metric to project total cost using the performance to date to project overall performance
 - $IEAC = \sum AC + (BAC - EV) / CPI$

EVM Example



EVM Example

- Activity A: Value \$18, 100% Complete
- Activity B: Value \$10, 80% Complete, 100% should have been completed
- Activity C: Value \$20, 70% Complete, 80% should have been completed
- Activity D: Value \$40, 0% complete, 15% should have been completed
- $PV = 18 + 10 + 16 + 6 = \50
- $EV = 18 + 8 + 14 + 0 = \$40$
- $AC = \$45$ From Accounting Dept.
- $SV = 40 - 50 = -\$10$
- $SPI = 40 / 50 = 0.8$

EVM Limitations

- No provision to measure quality of project
- Not good for agile project management systems