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## Earned Value

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### Definition

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- **Planned Value (PV) or Budgeted Cost of Work Scheduled (BCWS)**
  - Planned expenditure cash flows based on the completion of tasks in accordance with the project's budget and schedule
- **Actual Cost (AC) or Actual Cost of Work Performed (ACWP)**
  - Actual Project Expense based on completed tasks
- **Earned Value (EV) or Budgeted Cost of Work Performed (BCWP)**
  - The amount of the budget that we should have spent for a given amount of work completed

## Example - Budget, Schedule, Task

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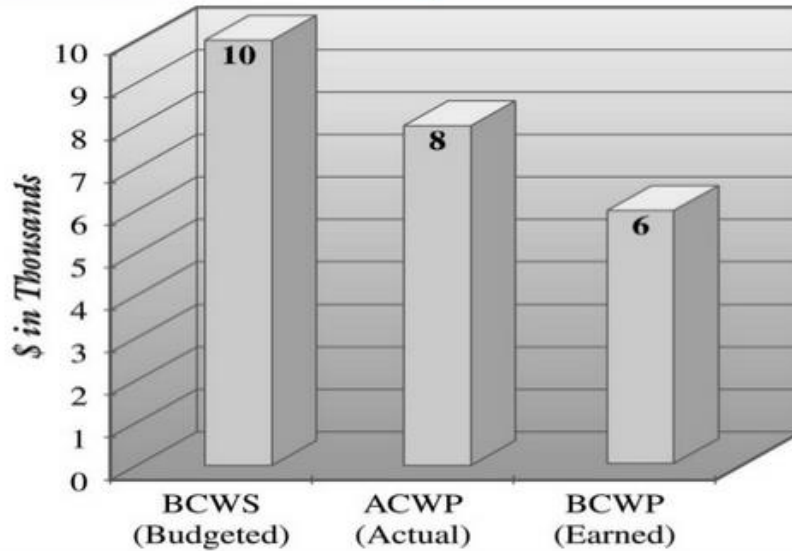
- Project Budget = \$40,000
- Schedule = 4 months
- Tasks = 20 Tasks (evenly divided over 4 months)
  - \$2,000 per task
  - 5 tasks per month
- Planned Value or BCWS = \$10,000 / month

## Example - Budget, Schedule, Tasks

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- Invoice – 1<sup>st</sup> Month Payment = \$8,000  
Actual Cost or ACWP
- Work Completed – 1<sup>st</sup> Month, 3 tasks  
costing= \$8,000 as against \$6,000  
(\$2,000 x 3)
- Earned Value or BCWP = \$6,000

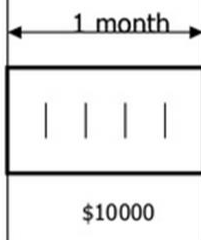
## Comparison – PV, AC & EV



## Cost Performance Indicators

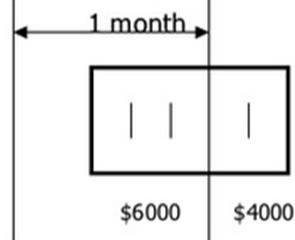


### PV / BCWS



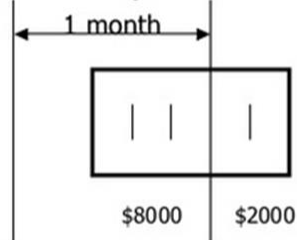
Scheduled / Budgeted  
to do \$10,000 work over  
5 tasks in a month  
window  
BCWS = \$10,000

### EV / BCWP



Schedule slippage  
permits only  
3 tasks/\$6,000  
work to be  
performed  
BCWP = \$6,000  
Schedule variance = \$4,000

### AC / ACWP



Actual cost of  
work performed = \$8,000  
ACWP = \$8,000  
Actual cost  
variance = \$2,000

## Cost Metrics

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- Cost Variance (CV) - difference between a task's estimated cost and its actual cost
  - $CV = EV - AC$  or  $BCWP - ACWP$
  - Negative Value = over budget and / or behind schedule
  - Positive Value = under budget and / or ahead of schedule
- Cost Performance Index (CPI) - percentage of work completed per dollar spent
  - $CPI = EV \div AC$  or  $BCWP \div ACWP$
  - ratio  $> 1$  = ahead of schedule and / or under budget
  - ratio  $< 1$  = behind schedule and / or over budget

## Schedule Metrics

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- Schedule Variance (SV) – the difference in terms of cost between the current progress and our originally scheduled progress
  - $SV = EV - PV$  or  $BCWP - BCWS$
- Schedule Performance Index (SPI) – a ratio of the work performed to the work scheduled
  - $SPI = EV \div PL$  or  $BCWP \div BCWS$
  - ratio  $> 1$  = ahead of schedule and / or under budget
  - ratio  $< 1$  = behind schedule and / or over budget

## Earned Value Metrics

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- Minimum Funds Needed if things do not get worse
  - Minimum funds = Original total budget  $\div$  CPI
- Funds Needed if things continue to get worse at the same level of slippage
  - Funds Needed = Original total budget  $\div$  (CPI  $\times$  SPI)

## Extra Time and Cost

- CPI = Cost Performance Index =  $EV/AC = 6/8 = 0.75$
- SPI = Schedule Performance Index =  $EV/PV = 6/10 = 0.6$

Estimate to complete (ETC)

- ETC =  $(BAC - EV) / CPI = (40k - 6k) / 0.75 = \$45,333.33$
- Time to compete =  $4 \text{ months} / SPI = 4 / 0.6 = 6.67 \text{ Months}$