

Information Technology

FIT2002 IT Project Management

Lecture 10 (Part 2)
Monitoring and Controlling

Learning Objectives

- Understand what is meant by monitoring and control
- Understand the integrated change control process
- Understand how to monitor and control schedule and cost issues
- A revisit of Earned Value Management (EVM)

Mapping Project Management Process Groups to Knowledge Areas

Knowledge Areas		1			
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manageproject work4. Manage ProjectKnowledge		6. Close Project or Phaase
Project Scope Management		 Plan Scope Management Collect requirements Define Scope Create WBS 		5. Validate Scope; 6. Control Scope	
Project Schedule Management		 Plan Schedule Management Define Activities Sequence Activities Estimate Activity Durations Develop Schedule 		6. Control Schedule	
Project Cost Management		 Plan Cost Management Estimate Costs Determine Budget 		4. Control Costs	



Source: PMBOK® Guide, Sixth Edition, 2017.

Continued...

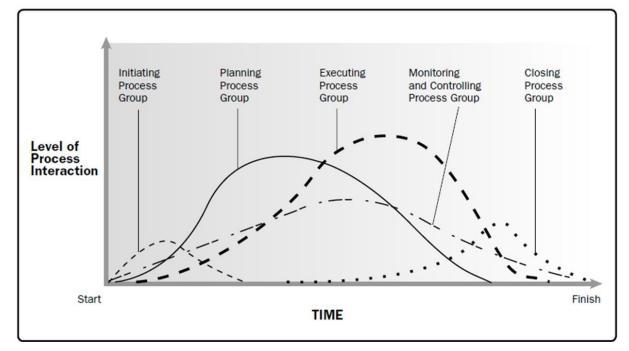
Knowledge Areas	Project Management Process Group						
	Initiating	Planning	Executing	Monitoring & Controlling	Closing		
Project Quality		1. Plan Quality	2. Manage Quality	3. Control Quality			
Management		Management					
		1. Plan Resource	3. Acquire Resources	6. Control Resources			
Project Resource		Management	4. Develop Team				
Management		2. Estimate Activity	5. Manage Team				
		Resources					
Project		1. Plan Communications	2. Manage	3. Monitor			
Communication		Management	Communications	Communications			
Management							
Project Risk Management		 Plan Risk Management Identify Risks Perform Qualitative Risk Analysis Perform Quantitative Risk Analysis Plan Risk Responses 	6. Implement Risk Responses	7. Monitor Risks			
Project		1. Plan Procurement	2. Conduct	3. Control			
Procurement		Management	Procurements	Procurements			
Management							
Project Stakeholder	1. Identify	2. Plan Stakeholder	3. Manage	4. Monitor			
Management	Stakeholders	Management	Stakeholder	Stakeholder			
wianagement			Engagement	Engagement			

Source: PMBOK® Guide, Sixth Edition, 2017.

Monitoring & Control

• Monitoring and Control processes are used to measure and report progress, handle changes to scope, time, cost, and quality, manage the project team, manage risk mitigation strategies, and monitor procurement contracts

Process overlap





Monitoring Vs. Control

- Monitoring is collecting and reporting information concerning previously defined project performance elements
- Control uses the information supplied by the monitoring techniques in order to bring project actual results in line with stated project performance standards

Keys to Effective Monitoring and Controlling

- The organisation and project manager must foster an environment that allows for the honest reporting of results
- To reduce the chances for biased reporting the process should be as automated as possible and there needs to be a separation of responsibilities
- Time must be allocated in the project schedule to perform the tasks of monitoring and control
- Lastly, all members of the project team, stakeholders, and other management resources should receive training on effective monitoring and control techniques

Integration Management Processes

- Develop the Project Charter
- Develop the project management plan
- Direct and manage project execution
- Monitor and control the project work: Oversee project work to meet the performance objectives of the project
- Perform integrated change control: Coordinate changes that affect the project's deliverables and organisational process assets



Integrated Change Control (refer to lecture 3 video 4)

- A formal process used to approve and manage all necessary project document and deliverable changes
- Key activities
 - Identifying that a change needs to occur or has occurred
 - Establishing a governance structure for reviewing and approving requested changes
 - Managing the approved changes when and as they occur
 - Maintaining the integrity of project artifacts, as changes occur
 - Communication to all relevant stakeholders
 - Configuration management



Project Cost Management Processes

- Plan Cost Management
- Estimate costs
- Determine budget
- Control Cost: controlling changes to the project budget

Cost Control

- Is concerned with:
 - influencing the factors that create cost variances on the project and
 - controlling changes to the project's budget
- Like the other monitoring and control processes, cost control is
 a continual process of comparing the current actual project
 expenditures to the defined budget and determining when
 issues have arrived that need to be dealt with
- Almost every change made on an IT project will affect Cost in some manner



Earned Value Management (EVM)

- A technique used to help determine and manage project progress and the magnitude of any variations from the planned values concerning cost, schedule, and performance
- The technique was created to help the project team and stakeholders gain a better understanding of just how the project is performing
- Many project managers fail to evaluate performance properly
 - How much work has <u>actually</u> been completed and how much work <u>actually</u> remains
 - Not necessarily how many hours have been worked



Percent Complete

- Often times IT projects can be difficult to estimate progress
 - 0-100 percent rule
 - 50-50 percent rule
 - Interval percent rule (0, 25, 50, 75, 100)



EVM Key Values

Recall from Lecture 6...

- Planned Value (PV) is the budgeted cost for the work scheduled to be completed on a task, work package, or activity up to a given point in time (BCWS)
- Actual Cost (AC) is the total cost incurred in accomplishing work on the task during a given time period (ACWP)
- Earned Value (EV) is the budgeted amount for the work
 actually completed on the task during a given time period or EV =
 (PV)*(percent complete) (BCWP)

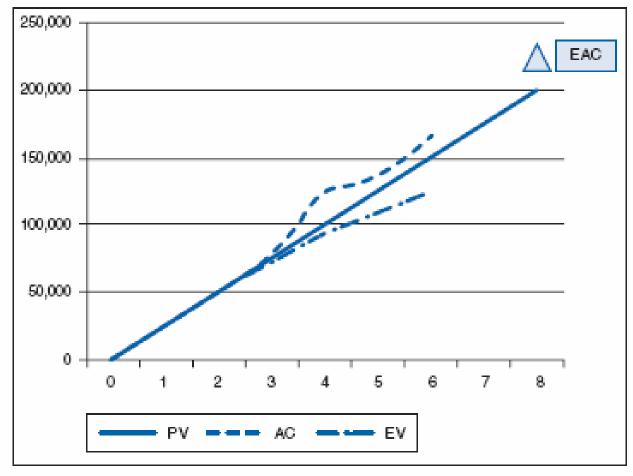
EVM Key Values

- Cost Variance (CV) equals earned value (EV) minus actual cost
 (AC) or CV = EV AC
- Schedule Variance (SV) equals earned value (EV) minus planned value (PV) or SV = EV PV
- Cost Performance Index (CPI) = equals the ratio of EV to the AC,
 or CPI = EV/AC
 - Equal to 100% then Actual = Planned
 - Less than 100% then project is over budget
- Schedule Performance Index (SPI) equals the ratio of EV to the PV, or SPI = EV/PV
 - Equal to 100% then Actual = Planned
 - Less than 100% project is behind schedule



15

PV, AC and EV

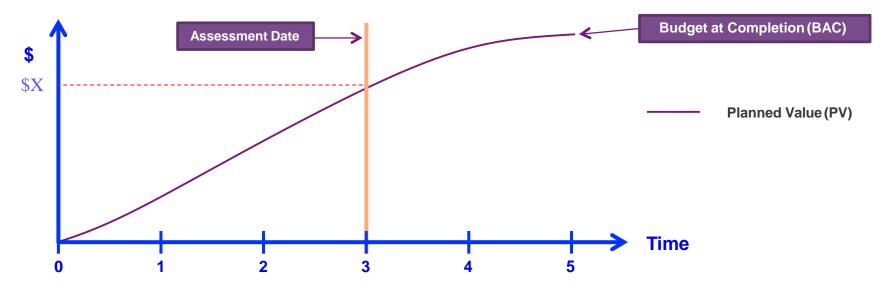


Brewer (2013). Methods of Information Technology Management .p.365.



Planned value (PV)

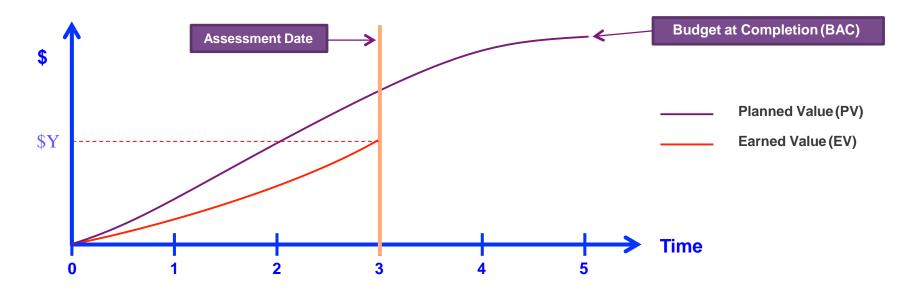
- Planned Value (PV) is the budgeted cost for the work scheduled to be completed on a task, work package, or activity up to a given point in time
- Also referred to as the budgeted cost of work scheduled (<u>BCWS</u>).
- The final PV of a task is equal to the task's budget at completion (BAC), i.e. the total amount budgeted for the task.





Earned value (EV)

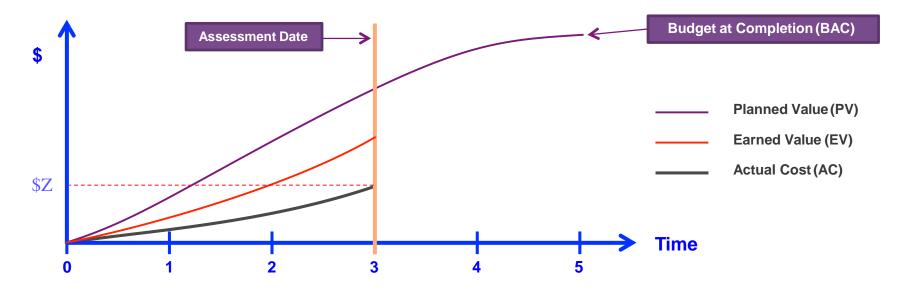
- Earned Value (EV) is the budgeted amount for the work
 actually completed on the task during a given time period (BCWP)
 - EV = (Project Budget)*(percent complete)
- Also referred to as the budgeted cost of work performed (BCWP).





Actual Cost (AC)

- Actual Cost (AC) is the total cost incurred in accomplishing work on the task during a given time period
- Also referred to as the actual cost of work performed (ACWP).





Example

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

- Budgeted Cost scheduled for each month is = \$10M/10 months = \$1M
- Planned Value (BCWS) = \$2M
- **Earned Value (BCWP)** = \$10M * 5% = \$0.5M

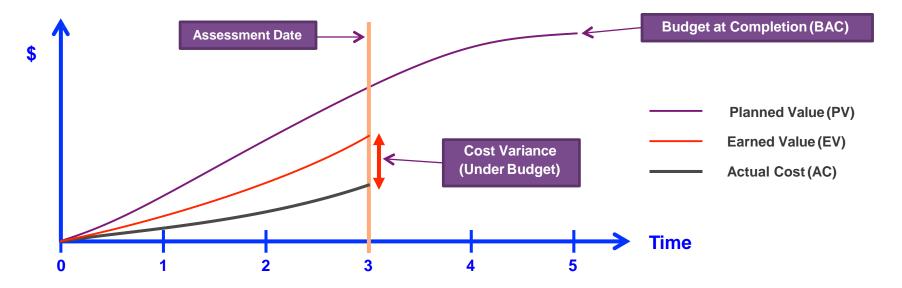
Actual Cost (ACWP) = \$1M

Cost Variance (CV)

Shows whether and by how much the project is under or over the approved budget.

CV = EV - AC

- Negative CV means the project is over the budget (cost overrun).
- Positive CV means the project is below the budget.
- This is the actual dollar value by which a project is either overrunning or under running its estimated cost.



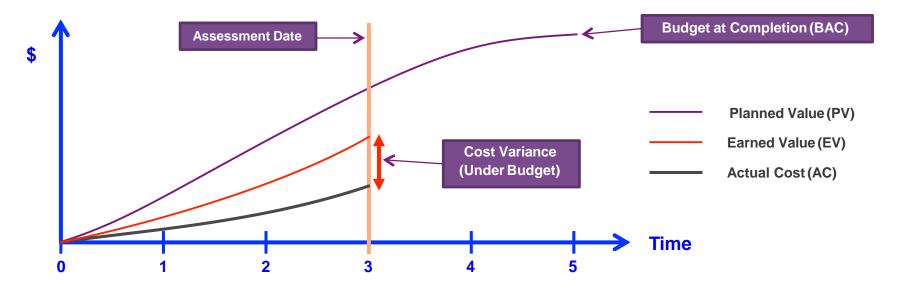


Cost Performance Indicator (CPI)

 CPI showing the project's cost efficiency or the utilisation of the resources on the project.

CPI = EV /AC

- Equal to 100% then Actual = Planned
- Less than 100% then project is over the budget
- More than 100% then project is below the budget



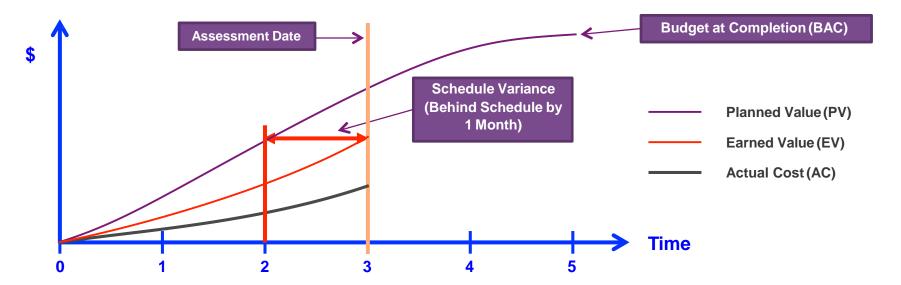


Schedule Variance (SV)

SPI shows whether your work is ahead of or behind your approved schedule.

SV = EV - PV

- Negative SV means the project is behind schedule
- Positive SV means the project is ahead of schedule
- SV is calculated in terms of the difference in **dollar value** between the amount of work that should have been completed in a given time period and the work actually completed.



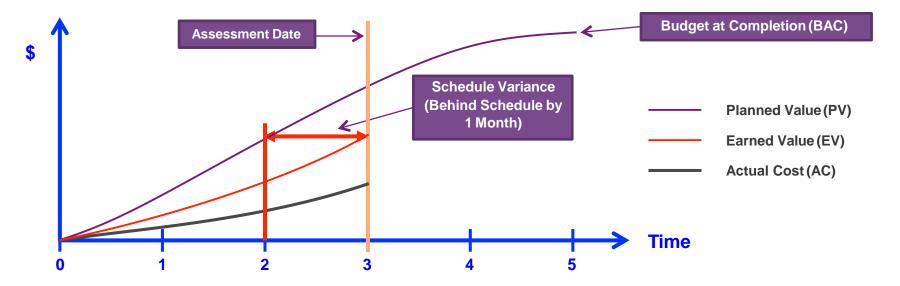


Schedule Performance Indicator (SPI)

SPI indicates the rate at which the project is progressing (ahead of or behind schedule), and is sometimes referred to as the project's schedule efficiency.

SPI = EV / PV

- Equal to 100% then Actual = Planned
- Less than 100% project is behind schedule
- More than 100% project is ahead of schedule





EXAMPLE- Cost/Budget

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

$$PV = $2M$$

$$EV = $0.5M$$

$$AC = $1M$$

$$= CV = EV - AC$$

$$= 0.5 - 1$$

$$= -0.5M$$
 (Cost overrun)

$$= 0.5 / 1$$

= 0.5 (Cost overrun)

Example – Schedule

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

$$PV = $2M$$

$$EV = $0.5M$$

$$AC = $1M$$

$$=$$
 SV = EV $-$ PV

$$= 0.5 - 2$$

$$= -$1.5M$$
 (Behind schedule)

$$= 0.5/2$$

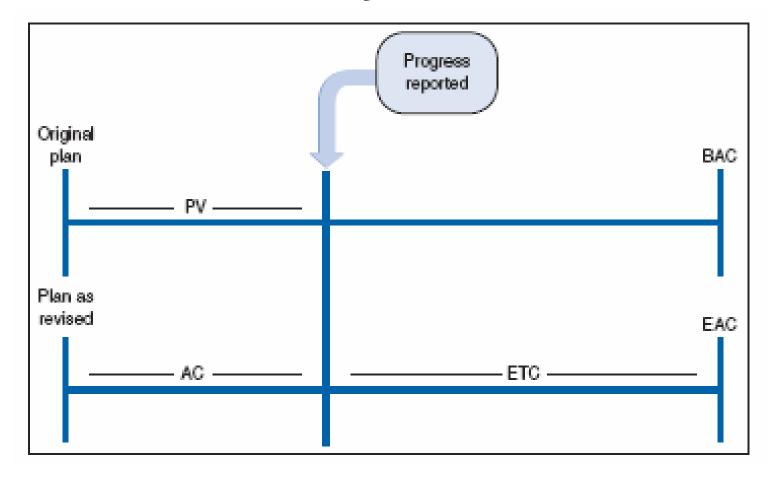
- = 0.25 (Behind schedule)
- Currently we are 75% behind schedule i.e. (1–SPI)*100%, since we have only achieved 25% of the schedule.

More EVM Key Values

- BAC Budget at Completion
 - How much did you BUDGET for the Total Job?
- **ETC** Estimate to Complete
 - From this point on, <u>how much MORE d</u>o we expect it to cost to finish the job?
 - ETC = (BAC- EV)/CPI
- **EAC** Estimate at Completion
 - What do we currently expect the <u>TOTAL</u> project to cost?
 - EAC = AC + ETC or EAC = BAC/CPI



EVM Terms Visually



Brewer (2018). Methods of Information Technology Management .p.364.



Example – Schedule part 2

Q. A project has a budget of \$10M and schedule for 10 months. It is assumed that the total budget will be spent equally each month until the 10th month is reached. After 2 months the project manager finds that only 5% of the total work is finished and a total of \$1M spent.

Find out how the project is progressing in terms of schedule and budget.

$$PV = $2M$$

$$EV = $0.5M$$

$$AC = $1M$$

$$CPI = 0.5$$

Budget at completion (BAC) = \$10m

Estimate to complete (ETC) = (BAC - EV) / CPI = (10 - 0.5) / 0.5 = \$19m

Estimate at Completion (EAC) = ETC + AC = 19 + 1 = \$20m

$$\rightarrow$$
 or EAC = BAC/CPI = 10 / 0.5 = \$20m

Report Performance

- Report Performance collecting and disseminating performance information
- Performance reporting involves the collection of all project and product related data and the distribution of performance information to stakeholders
- Project related data includes information from all areas of the project including: schedule, costs, quality, risks, human resources, and if needed procurement
- The frequency of the reports (daily, weekly, monthly) is determined by the type of report, size of the project and the importance of the project as stated in the communication plan

Performance Report Categories

- Progress reports physical progress to date, Actual data vs. planned data
- Status reports identify where the project is today (the date the report is prepared) and the information from collected performance data to calculate Schedule Variance and Cost Variance
- Projection reports calculate the following
 - Earned Value numbers Estimate at Completion (EAC), Estimate to Complete (ETC), Schedule Performance Index (SPI), and Cost Performance Index (CPI).
 - The report is forward looking giving projections/forecasts of the project finish
- Exception reports exceptions, problems, risks



Final Thoughts on EVM

- The results are only as good as the data accuracy
- If numbers generated in a timely fashion, allows the project manager to act in a proactive manner instead of a reactive mode
- Make sure to establish rules for progress reporting (percent complete) early in the project then communicate and educate all project team members for consistency across all tasks

