MONASH University

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	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Integration Management	1. Develop Project Charter	2. Develop Project Management Plan	3. Direct & manage project work 4. Manage Project Knowledge	5. Monitor & control projectwork	6. Close Project or Phaase
Project Scope Management		1. Plan Scope Management 2.. Collect requirements 3. Define Scope 4. Create WBS		5. Validate Scope; 6. Control Scope	
Project Schedule Management		1. Plan Schedule Management 2. Define Activities 3. Sequence Activities 4. Estimate Activity Durations 5. Develop Schedule		6. Control Schedule	
Project Cost Management		1. Plan Cost Management 2. Estimate Costs 3. Determine Budget		4. Control Costs	

Source: PMBOK® Guide, Sixth Edition, 2017.

Continued…

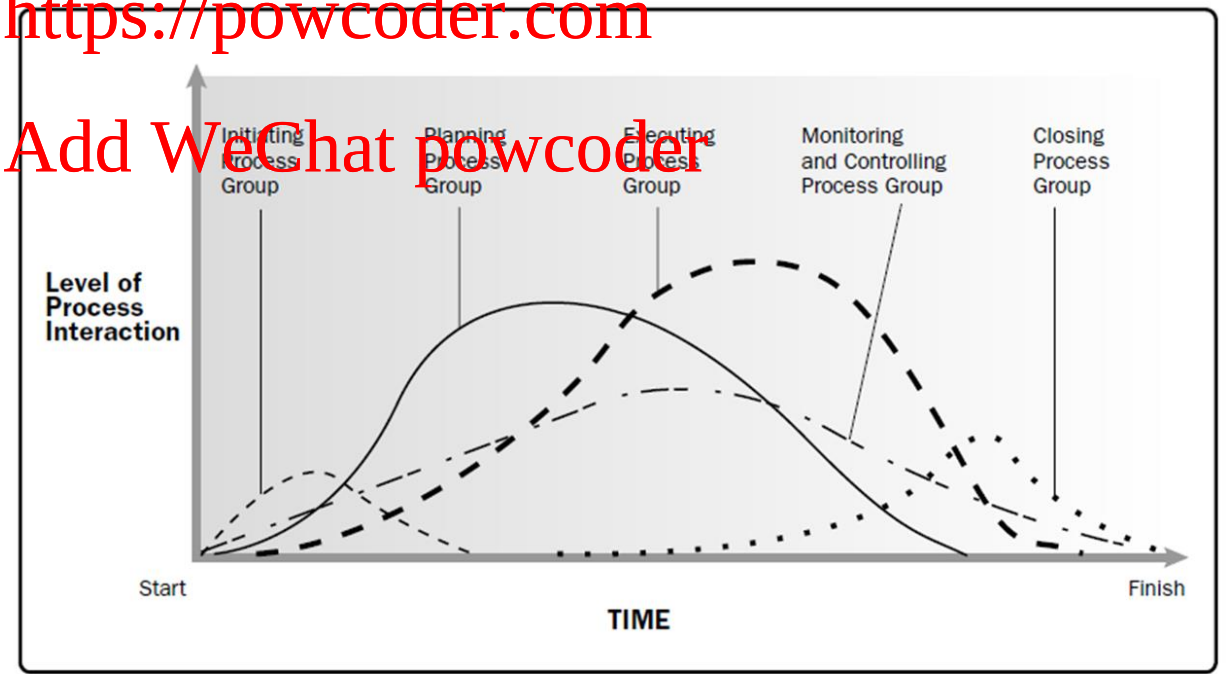
Knowledge Areas	Project Management Process Group				
	Initiating	Planning	Executing	Monitoring & Controlling	Closing
Project Quality Management		1. Plan Quality Management	2. Manage Quality	3. Control Quality	
Project Resource Management		1. Plan Resource Management 2. Estimate Activity Resources	3.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

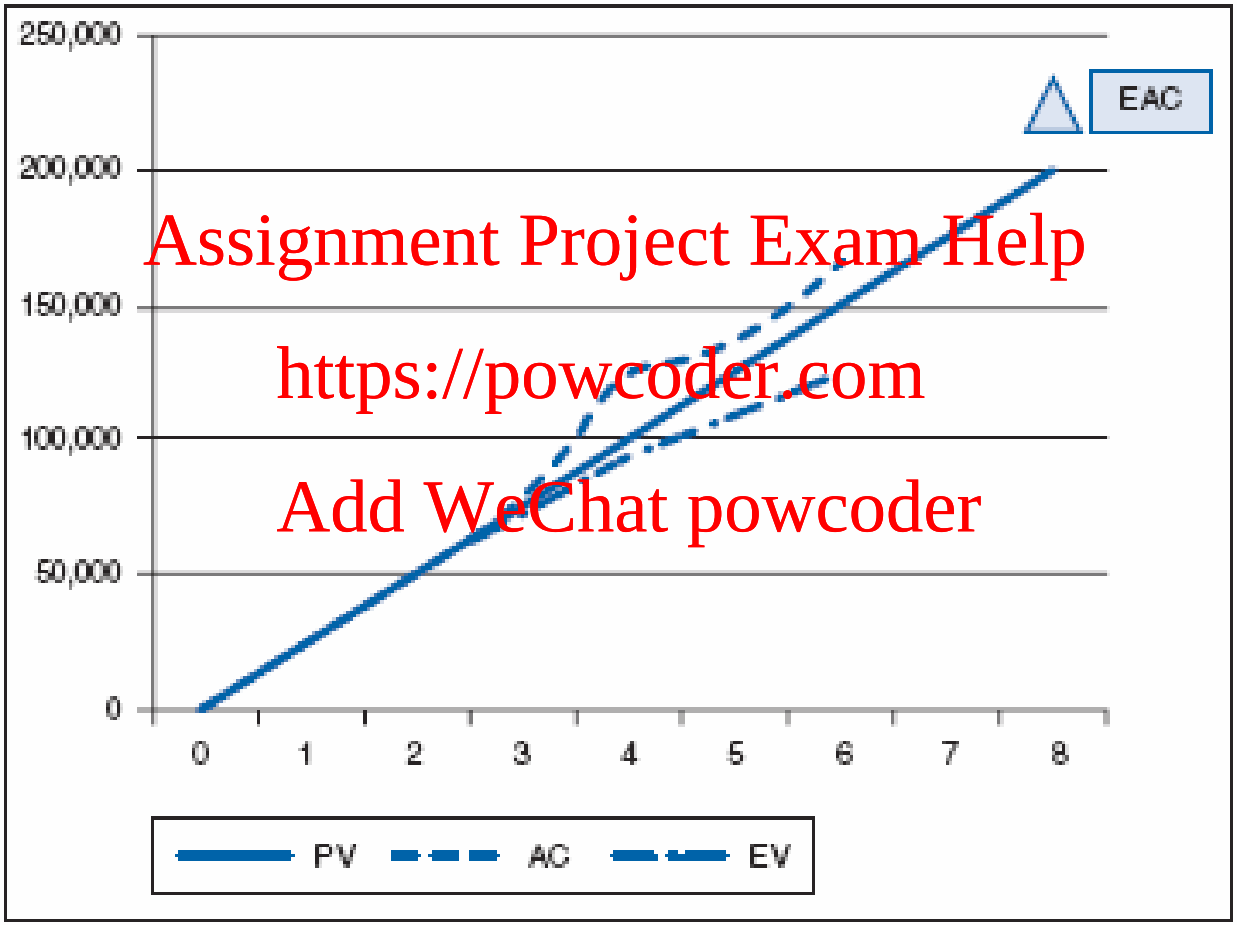
Recall from Lecture 6…

- ***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

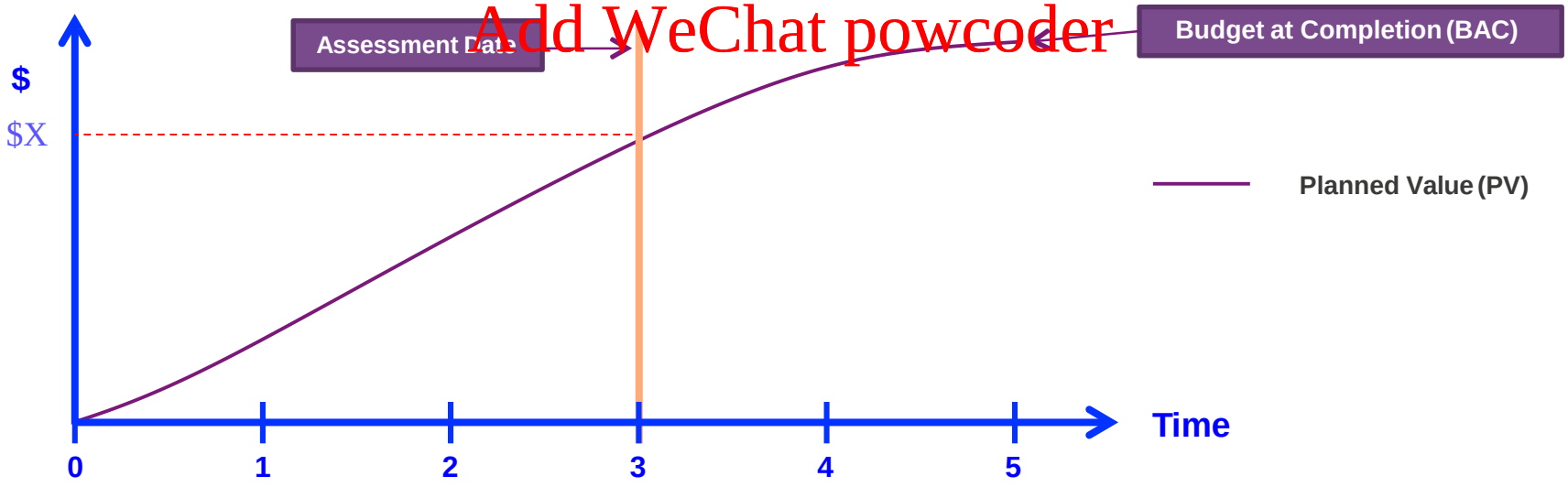
PV, AC and EV



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

Planned value (PV)

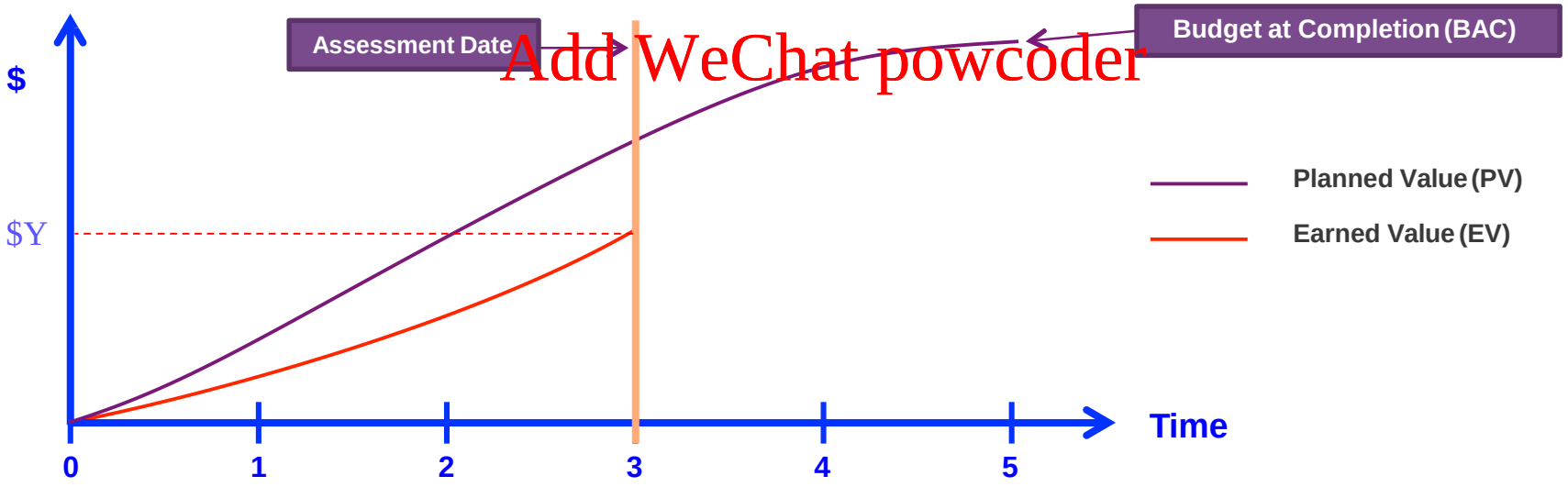
- Planned Value (PV) – is the **budgeted cost for the work scheduled** to be completed on a task, work package, or activity up to a given point in time
- Also referred to as the budgeted cost of work scheduled (BCWS).
- The final PV of a task is equal to the task's budget at completion (BAC), i.e. the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



Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

Earned value (EV)

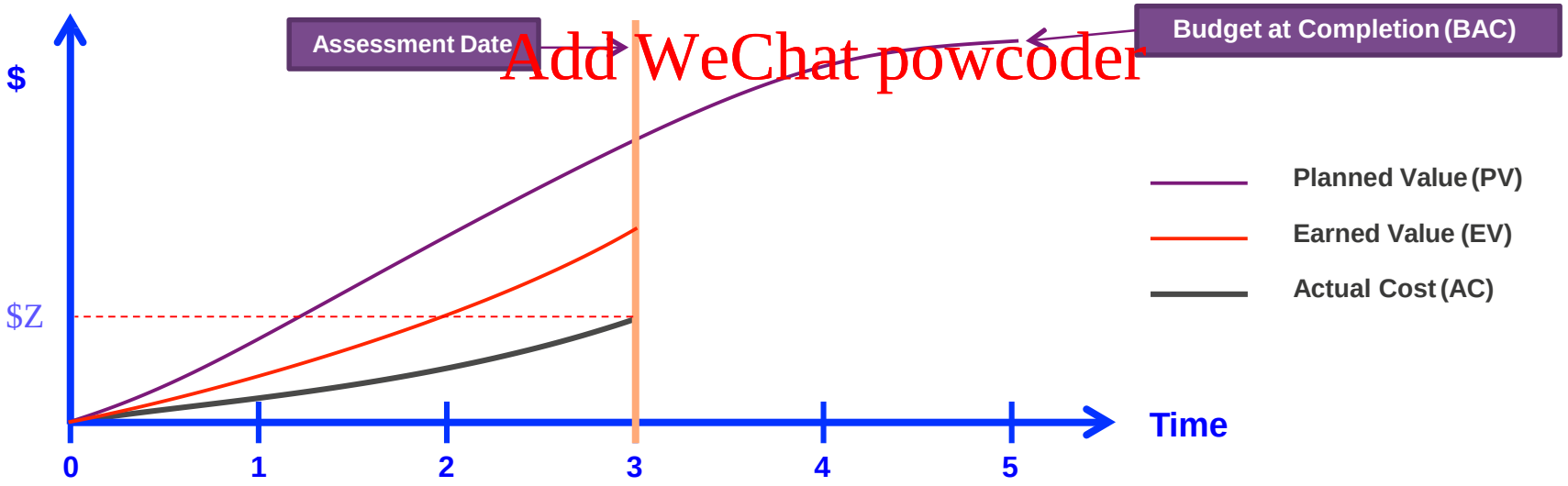
- **Earned Value (EV)** – is the **budgeted amount for the work actually completed** on the task during a given time period (BCWP)
  - EV = (Project Budget)*(percent complete)
- Also referred to as the ***budgeted cost of work performed*** **(BCWP).**



Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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).**



Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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.

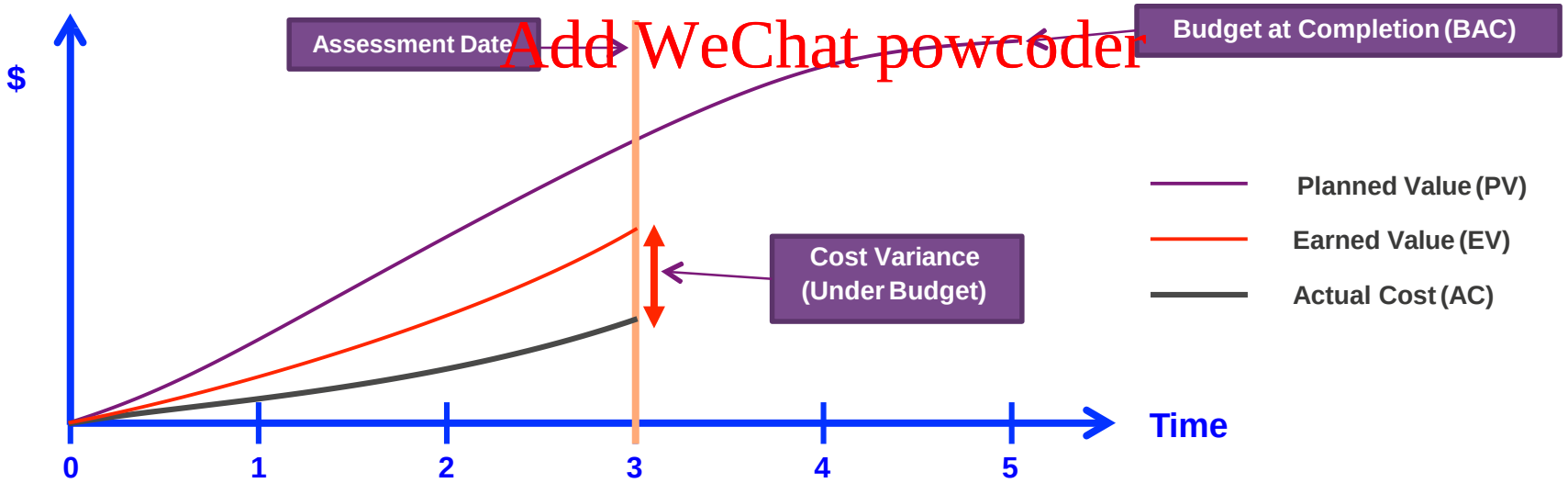
- Budgeted Cost scheduled for each month is = $10M/10 months = $1M
- **Planned Value (BCWS)** = $2M
- **Earned Value (BCWP)** = $10M * 5% = $0.5M
- **Actual Cost (ACWP)** = $1M

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.



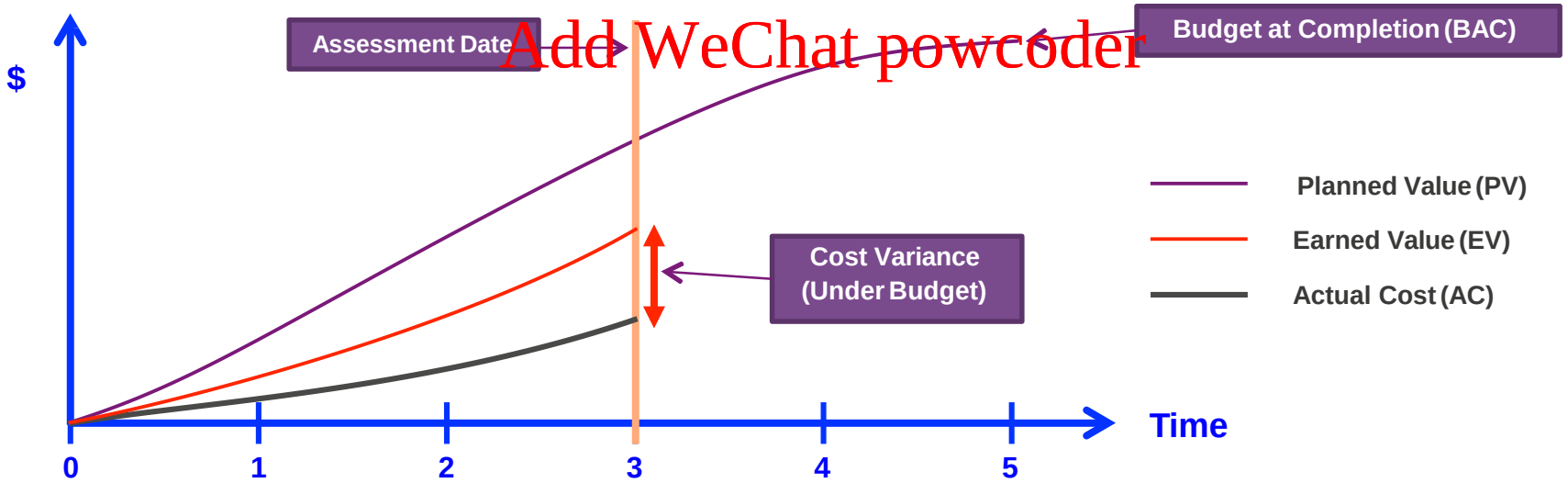
Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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



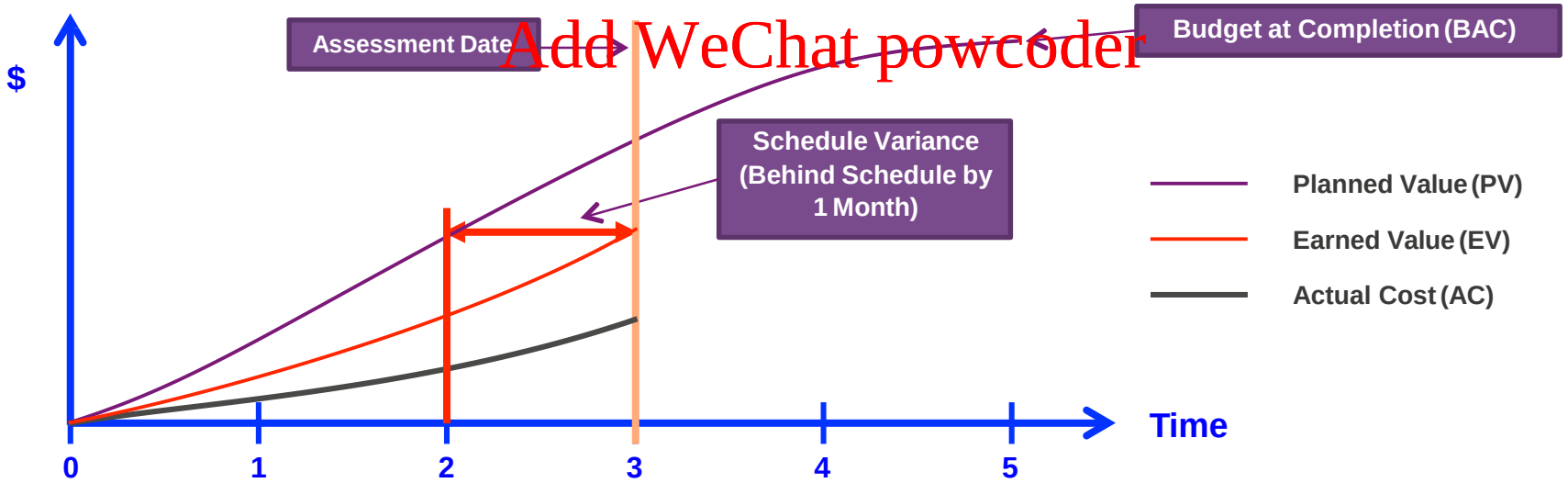
Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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.



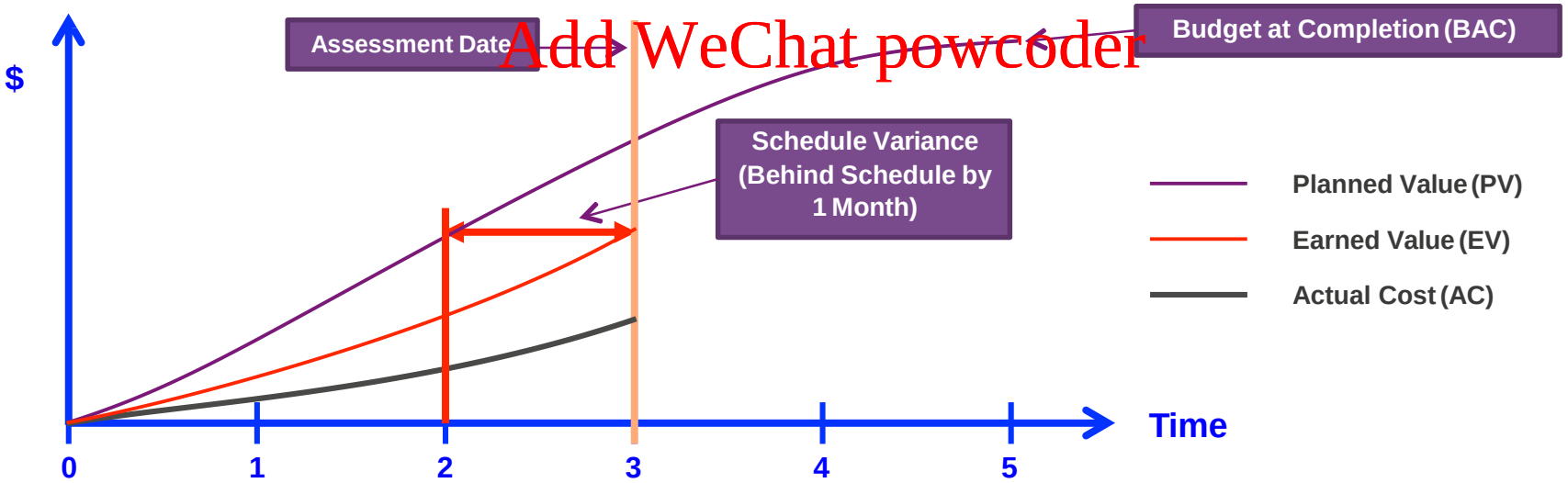
Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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



Source: http://www.dummies.com/how-to/content/earned-value-management-terms-and-formulas-for-pro.html

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)
- **CPI = EV / AC**
  = 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)

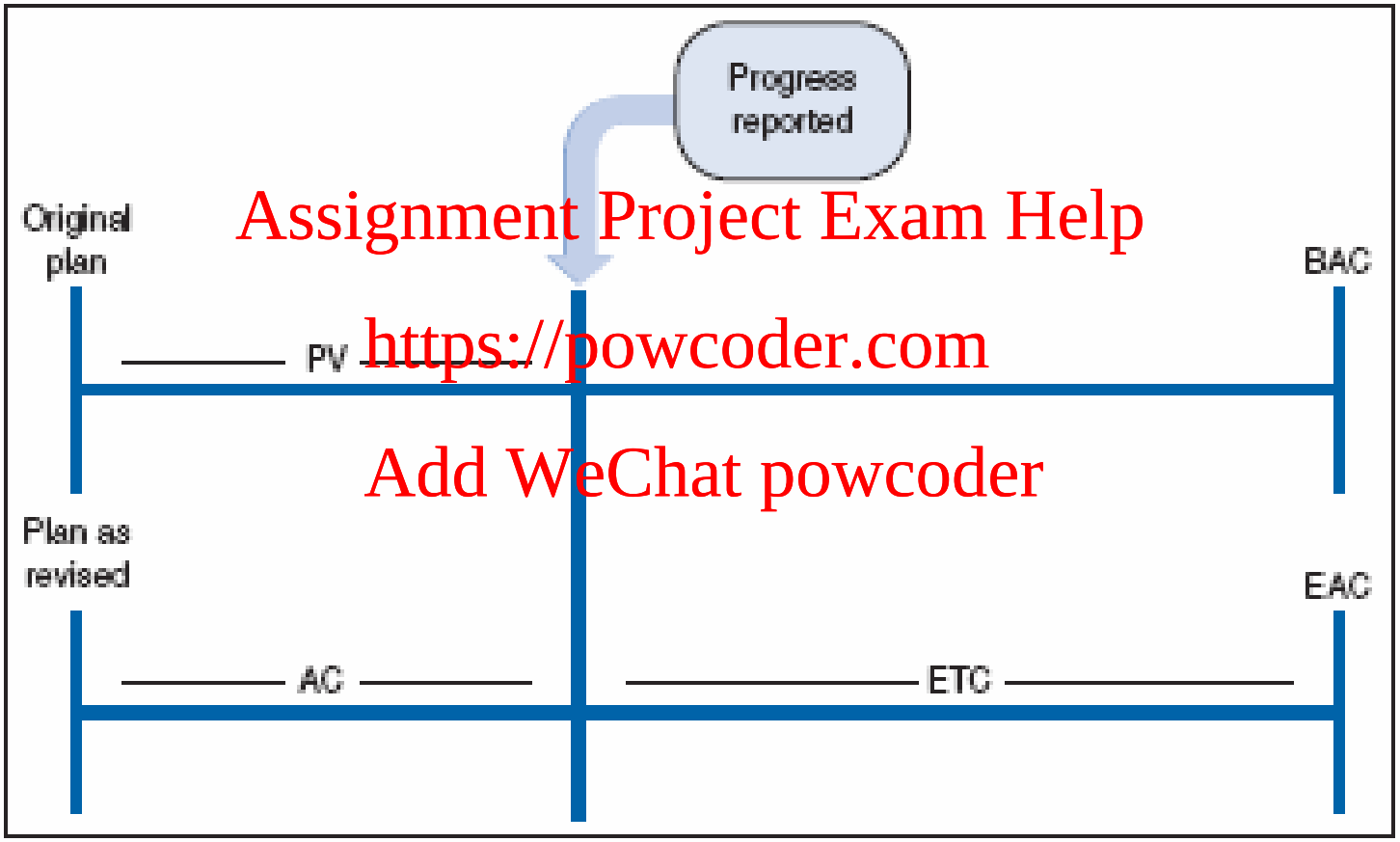
- **SPI = EV / PV**
  = 0.5 / 2
  = 0.25 (Behind schedule)

- 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, how much MORE do we expect it to cost to finish the job?***
  - ETC = (BAC- EV)/CPI
- **EAC** Estimate at Completion
  - ***What do we currently expect the TOTAL project to cost?***
  - EAC = AC + ETC

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

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