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University

PMG 506

Advanced Project Management

LECTURE 10: PROJECT MONITORING AND CONTROLLING

دكتور مهندس استشاري ادارة المشروعات

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PMG506

ADVANCED PROJECT MANAGEMENT (APM)



Introduction:

Lecture 1 Introduction to APM and Initial Project Strategy

Lecture 2 Project Quality Management

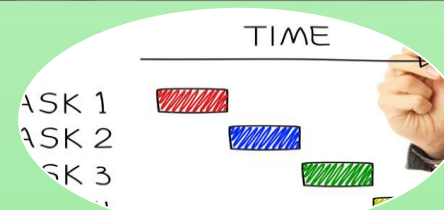


Project Initiation:

Lecture 3 Project Communication and team Management

Lecture 4 Managing conflicts and the art of communication

Lecture 5 Strategic Management and project selection



Project planning

Lecture 6 Initial project coordination and the project Charter

Lecture 7 Starting the project plan: The WBS

Lecture 8 Project risk management

Lecture 9 Budgeting, Estimating times and costs



Project **Integration**

Lecture 10 Monitoring and **Controlling**

Lecture 11 **PMOs and OPM**

Lecture 12 **Social and Professional Responsibility**

Lecture 13 **Open Discussion**

RECOMMENDED READINGS

- Product Breakdown Structure – PBS
- Work Breakdown Structure – WBS
- Organizational Breakdown Structure – OBS
- Cost Breakdown Structure – CBS
- RACI Matrix
- Project Charter
- Team Charter

INTRODUCTION

	1994	2015
Successful Projects	16 %	34 % (PMP 51%)
Cost Overrun	180 %	43 % (PMP 23%)
Books on PM	20	100K+ books

SIX PRINCIPLES FOR EFFECTIVE PM

- **First Principle:** Inputs to PM are:
 - Information
 - Resources
 - Material
 - *Site planning, facilities and utilities*
 - *Plan and schedule*
- **Second Principle:** Management is divided into: Administration & Leadership
- **Third Principle:** Maintain Visibility Using: S curves & EVA
- **Fourth Principle:** Differentiate between Project Life Cycle and PM Life Cycle
- **Fifth Principle:** Differentiate between Project Deliverables and PM Deliverables
- **Sixth Principle:** Use PM Software for all projects proficiently

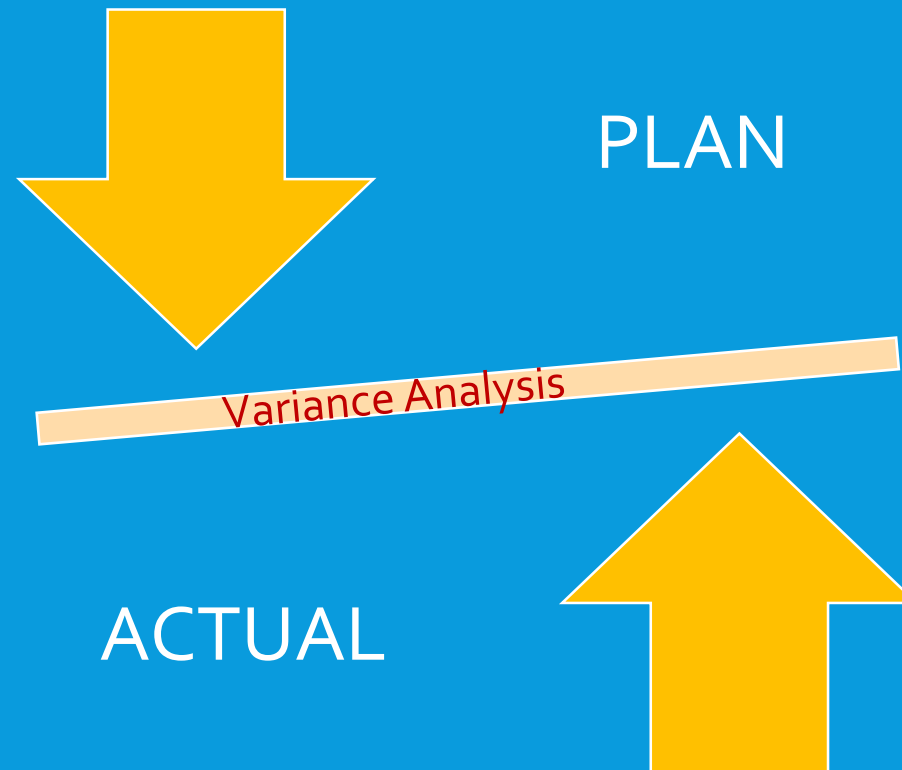


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Knowledge Areas	Project Management Process Groups				
	Initiating	Planning	Executing	Monitoring and Controlling	Closing
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
9. Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
11. Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
12. Project Procurement Management		12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	

PROJECT PERFORMANCE MANAGEMENT

- Schedule
- Budget
- Scope
- Quality
- Communications
- Risk
- Procurement
- Stake Holder Engagement
- Change



CORRECTIVE ACTIONS

- Critical Path
- Dependencies
- Assignment (PM Activities)
- Resource Allocation (Project Activities)



PROJECT RECOVERY TECHNIQUE

- Cost Crashing
- Fast Tracking
- Redefine Scope
 - (Less Features)
 - (Control Changes)



- Re-plan Quality
 - (Less Testing)
 - (Lower Grade)
 - (Cheaper Resources)
 - (Available Resources)
 - (Replace Suppliers)
 - (Re-negotiate sub-contractors)
- Re-plan Risk
- Reassign Management Resources

MOVING FORWARD

- In the previous phases of the Project Management Life Cycle (Planning Phase), ground work for success is laid. Detailed plans, schedules and budgets were created and accepted by the stakeholders.
- **The Implementation Phase**

Implementation Phase	Deliverables
Working the Plan Monitoring Progress Taking Corrective Actions Reporting Progress	Status/ Progress Report Earned Value Analysis Change Requests

THE TOOLS TO SUCCEED

Project Manager must facilitate for the team:

- Access to resources (people, equipment, supplies)
- Access to information (status reports, technical data, external benchmarks)
- Access to training (specialized skill-building needed for project work)
- Access to expectations (plans, work package specifications, team rules)

Boundary Management:

- Managing the interfaces between your functional or project area, and those outside it.

MONITORING FOR PROJECT PROGRESS

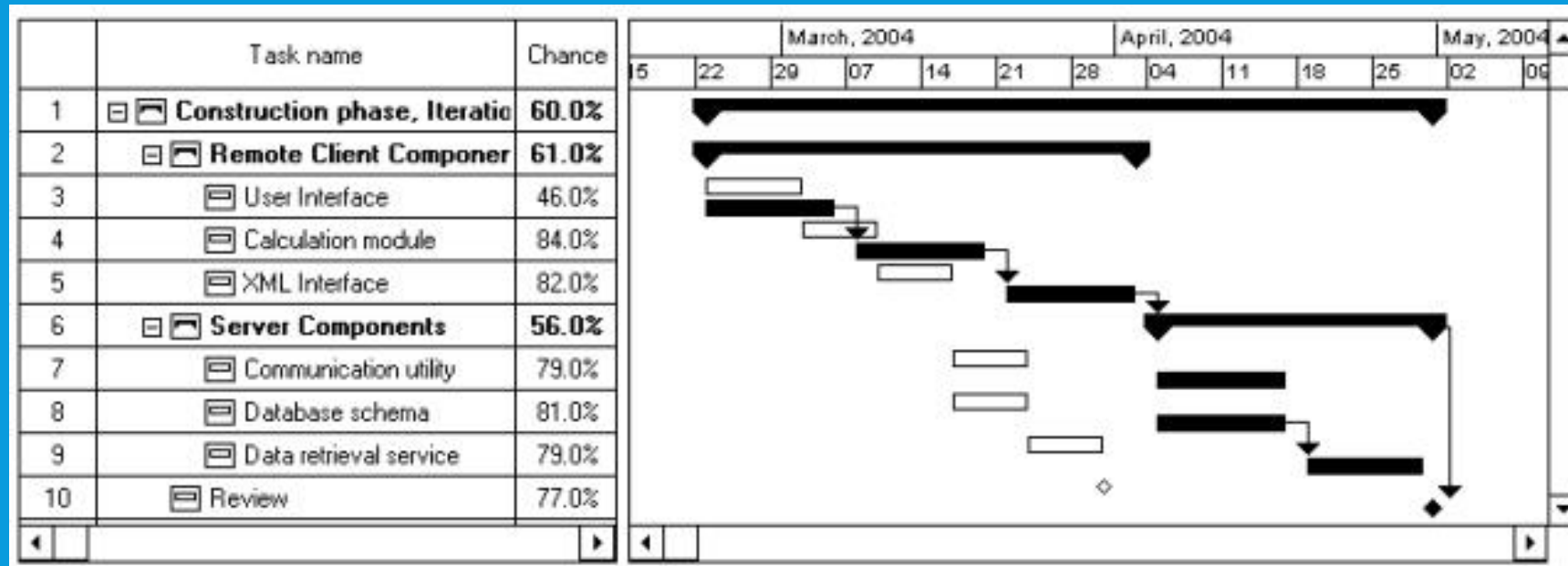
- Identifying Variances
 - For each package, owners have to report
 - How much time has been spent to date.
 - How much money has been spent to date
 - How complete is the work (0%, 50%, 100%)
 - Status Charts

Task	Budget to date (\$)	Actual to Date (\$)	Budget under-run (\$)	Budget over-run (\$)	Total budget (\$)	Estimated at end (\$)
6	6,000	5,000	1,000		7,500	6,500
8	10,000	11,000		1,000	12,000	13,000

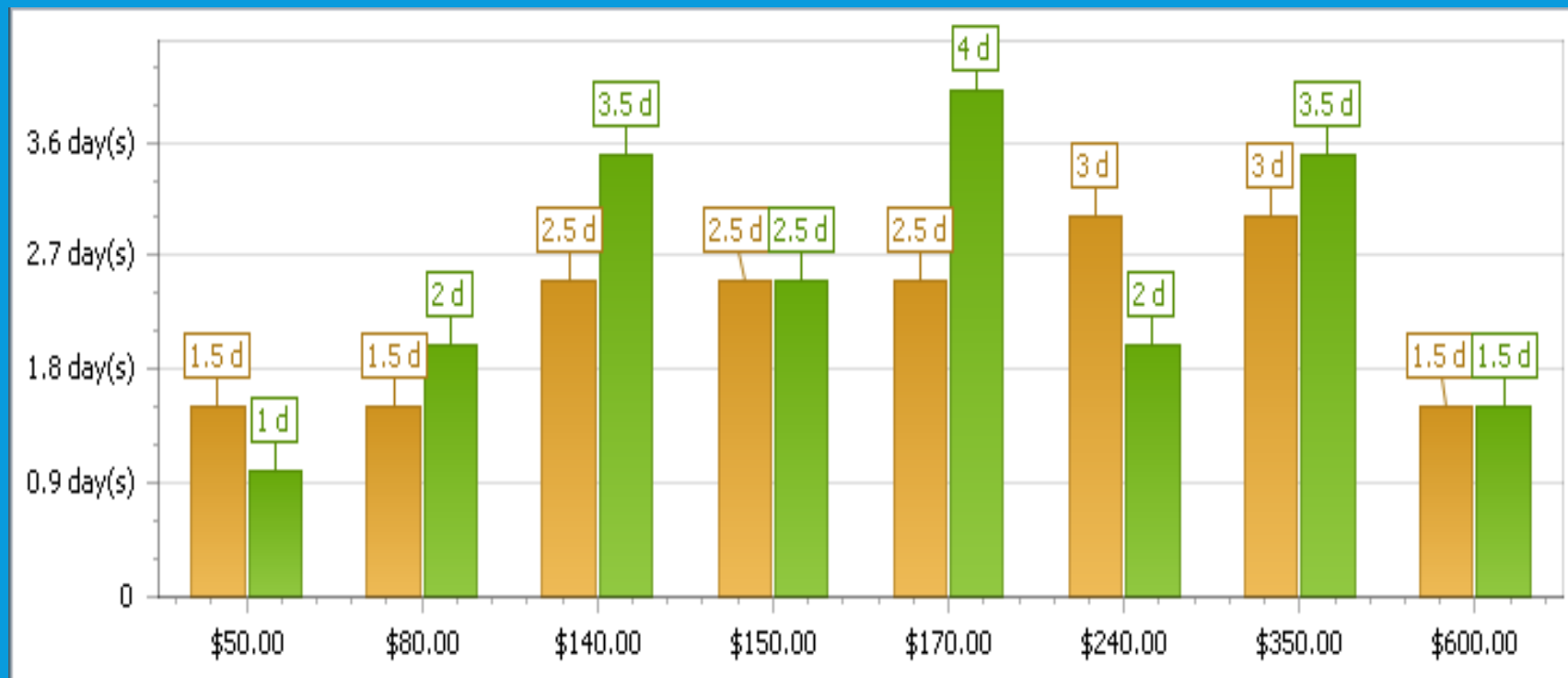
PROJECT BASELINING



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PROJECT VARIANCE BAR CHART



EARNED VALUE MANAGEMENT

- Combines Scope, Schedule and Budget
- Provides a true “Project Health Indicator”
- Uses past to predict the future
- Only as reliable as the FACTS

EARNED VALUE BASICS

- $PV = \text{Planned Value} = \text{Baseline} = BCWS$ (Budgeted Cost of Work Scheduled)
- $AC = \text{Actual Cost} = \text{Actual Costs Incurred} = ACWP$ (Actual Cost of Work Performed)
- $EV = \text{Earned Value} = \text{Cost of Value Delivered} = BCWP$ (Budgeted Cost of Work Performed)

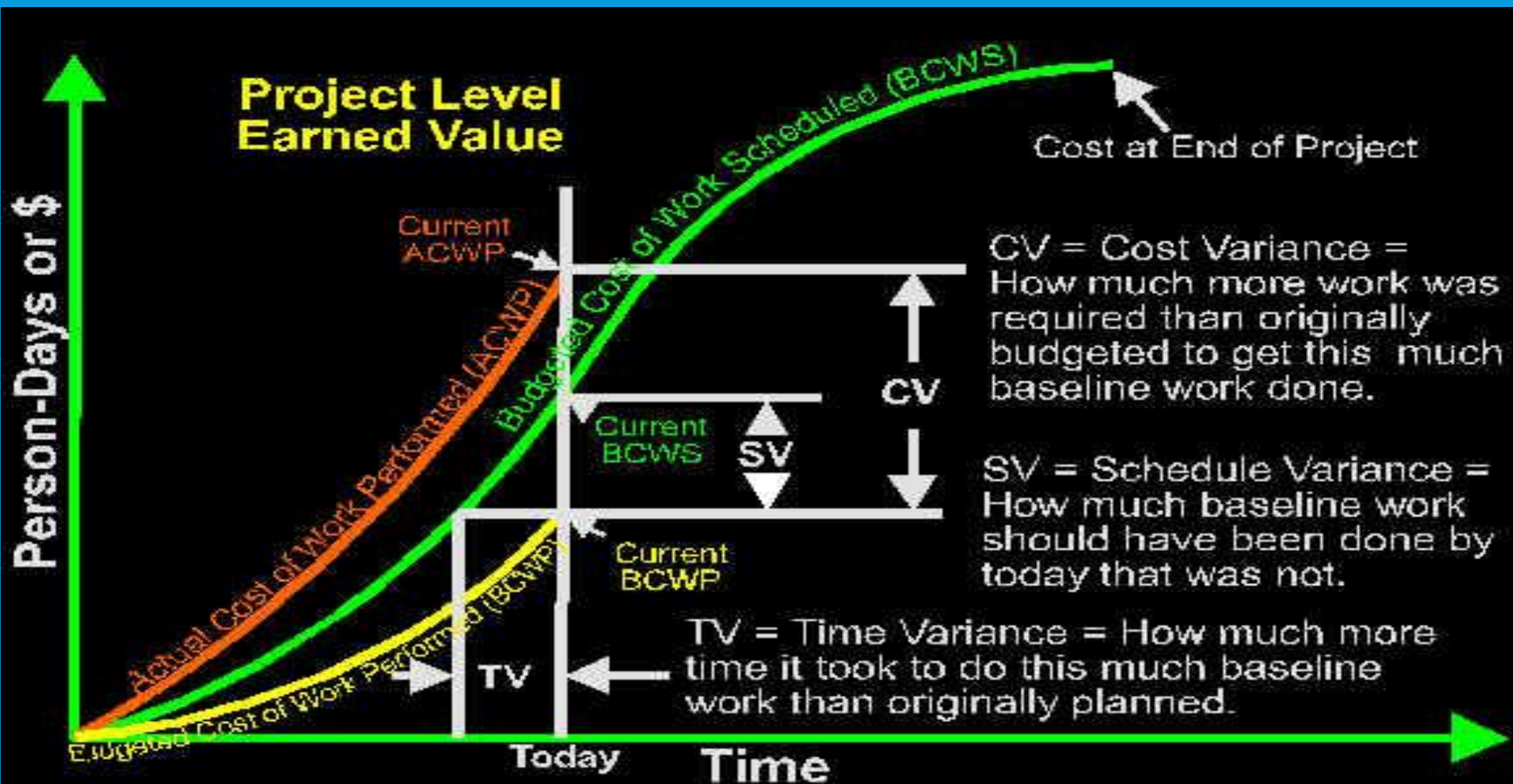
VARIABLES USED IN EVA

Acronym	Variable
BCWS	Budgeted Cost for Work Scheduled: The amount budgeted for a task between its start day and today. For example, say that you expected a task to take 10 days and \$1000. Today is day 3. The BCWS on day 3 is \$300. <u>Planned Value</u>
BCWP	Budgeted Cost for Work Performed/ <u>Earned Value</u>: The percentage of the task budget that corresponds to the task's completion status. For example, if the \$1000 task is only 10% complete on day 3, its BCWP is \$100
ACWP	Actual Cost for Work Performed: The actual cost of the task so far. For example, if have spent \$500 of your \$1000 by day 3, the ACWP is \$500. <u>Actual Cost</u>

EARNED VALUE ANALYSIS AND S-CURVES



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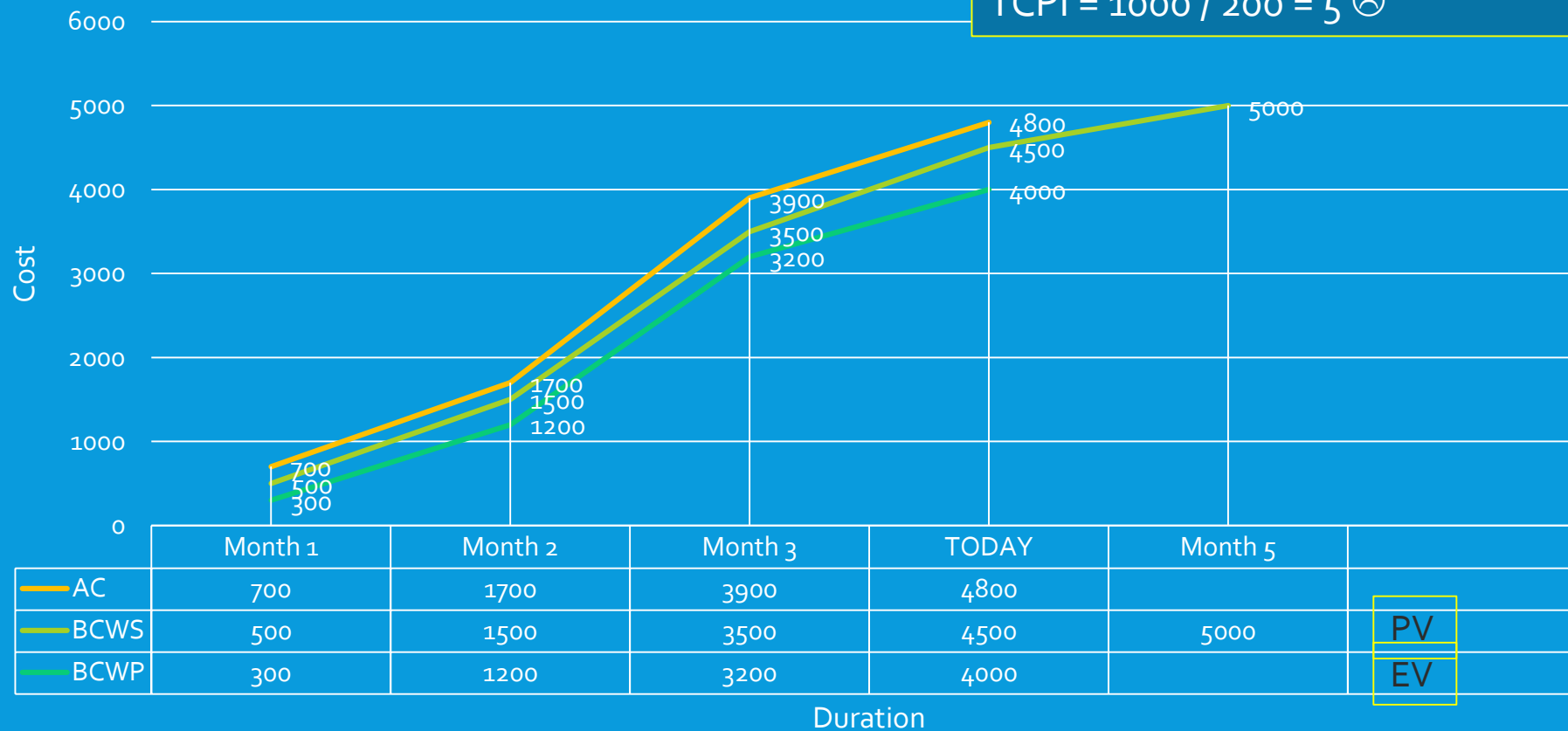


S – CURVES



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$$\begin{aligned} \text{TCPI} &= (\text{BAC} - \text{BCWP}) / (\text{BAC} - \text{AC}) \\ \text{TCPI} &= (5000 - 4000) / (5000 - 4800) \\ \text{TCPI} &= 1000 / 200 = 5 \text{ 😞} \end{aligned}$$



$$\begin{aligned} \text{CV} &= \text{BCWP} - \text{ACWP} \\ \text{CV} &= 4000 - 4800 \\ \text{CV} &= -800 \end{aligned}$$



$$\begin{aligned} \text{SV} &= \text{BCWP} - \text{BCWS} \\ \text{CV} &= 4000 - 4500 \\ \text{CV} &= -500 \end{aligned}$$



$$\begin{aligned} \text{SPI} &= \text{BCWP} / \text{BCWS} \\ \text{SPI} &= 4000 / 4500 \\ \text{SPI} &= 0.89 \end{aligned}$$



$$\begin{aligned} \text{CPI} &= \text{BCWP} / \text{ACWP} \\ \text{CPI} &= 4000 / 4800 \\ \text{CPI} &= 0.83 \end{aligned}$$



$$\begin{aligned} \text{STC} &= \text{Duration} / \text{SPI} \\ \text{STC} &= 5 / 0.89 = 5.62 \end{aligned}$$

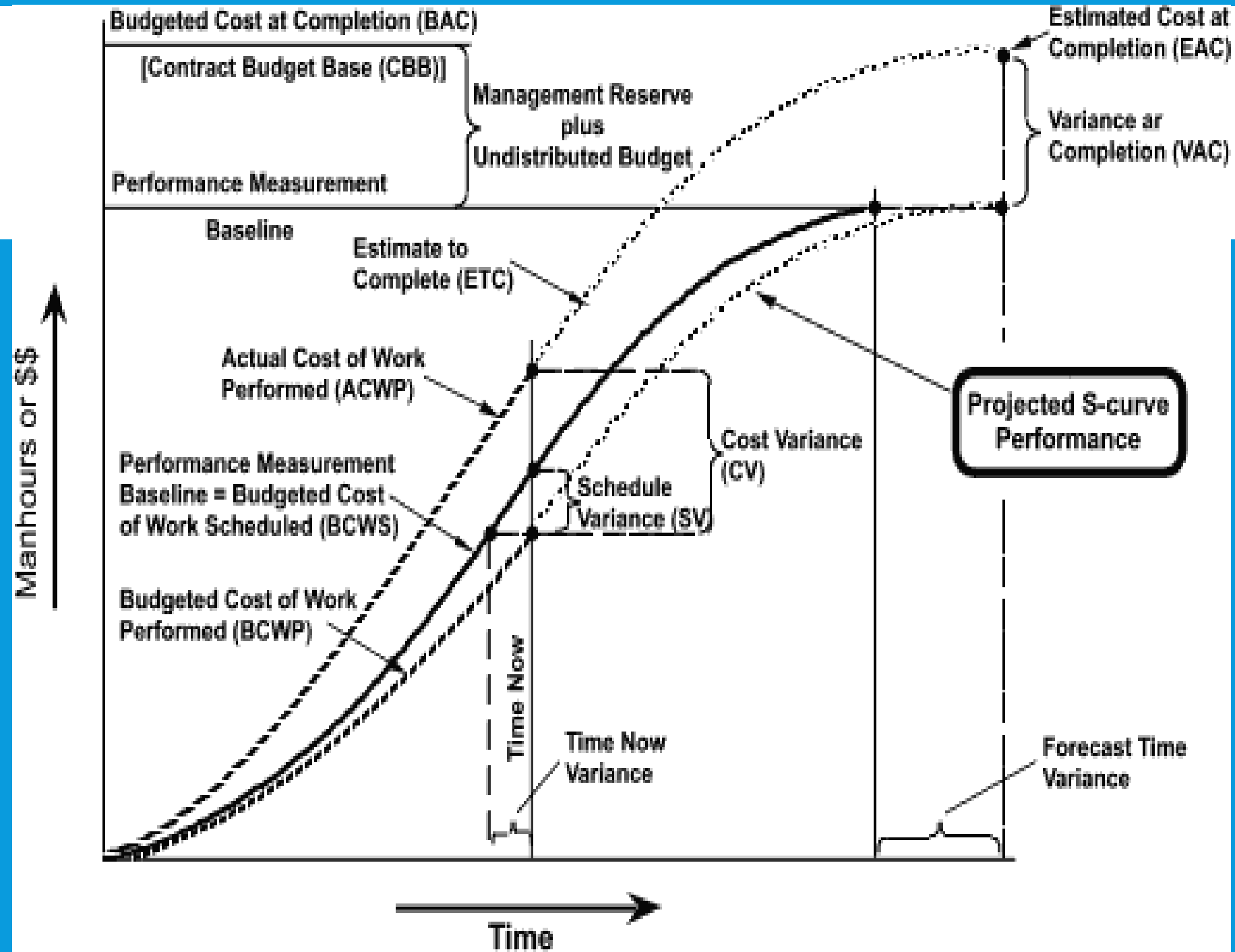
$$\begin{aligned} \text{EAC} &= \text{BAC} / \text{CPI} \\ \text{EAC} &= 5,000 / 0.83 = 6,025 \end{aligned}$$

$$\begin{aligned} \text{CV} &= \text{EV} - \text{AC} \\ \text{SV} &= \text{PV} - \text{PV} \end{aligned}$$

$$\begin{aligned} \text{CPI} &= \text{EV} / \text{AC} \\ \text{SPI} &= \text{EV} / \text{PV} \end{aligned}$$

EARNED VALUE CALCULATIONS

Acronym	Variance	Calculation
CV	Cost Variance	$BCWP - ACWP$
SV	Schedule Variance	$BCWP - BCWS$
CVP	Cost Variance Percentage	$CV / BCWP \%$ (-ve value means cost overrun) ☹️
SVP	Schedule Variance Percentage	$SV / BCWP \%$ (-ve value means work is behind schedule) ☹️
EAC	Estimate At Completion	$BAC / (CPI)$
STC	Schedule to Complete	$\text{Original duration} / (SPI)$
SPI	Schedule Performance Index	$BCWP / BCWS (>1 = \text{Leading})$ 😊
CPI	Cost Performance Index	$BCWP / AC (> 1 = \text{cost underrun})$ 😊
TCPI	To Complete Performance Index	$(BAC - BCWP) / (BAC - AC) (>1 = \text{BAD})$ ☹️



TASK

1. Your team has presented you with the following status data for the Develop Recipes work package: Actual work performed = 40%; actual cost to date = \$ 2,500; budgeted cost for work packages = \$ 7,500; number of days scheduled = 30 days; actual number of days = 20 days
 - What are
 - a) BCWS
\$5000
 - b) BCWP
\$3000
 - c) ACWP
\$2500
2. What is the cost variance for this work package? What does this number mean?
 $BCWP - ACWP = \$500$
3. What is the schedule variance for this work package? What does this number mean? What calculations can you use to provide a more meaningful schedule variance number?
 $BCWP - BCWS = - \$2000$
4. What is the cost variance percentage?
 $\{(BCWP - ACWP)/BCWP\} \times 100\% = 16\%$

GETTING BACK ON TRACK

- When do you check for variances?
Before each project status report is due.
- Methodology for dealing with variance
Face the issue and deal with it as it emerges.

TASK

1. The first step in dealing with variance is to
 - a) find its cause.
 - b) Plan to take corrective action
 - c) Determine overall project impact or repetition
 - d) Present the information to stakeholders
 - e) Prepare to negotiate trade-offs

REVIEW

- A. List 3 skills that a project manager needs to establish project momentum

Boundary Management; Team Building; Conflict Management; Communication

- B. What is the word for the difference between actual and estimated costs or time

Variance

- C. The benefit of conducting EVA is

- a) It provides a more accurate project baseline than other tracking methods
- b) Management can understand EVA better than other measures
- c) It allows you to see interrelationships between cost and schedule
- d) It shows you how to get a project back on track

- D. Why is it important to monitor for cost or schedule variances systematically?

Recover project using Cost, Quality and Time "Trade Offs"

ELEMENTS OF CHANGE REQUESTS



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Element	Description
Change	Describe the change requested. Include specific criteria that can be used to measure the change
Requested By	Who is requesting the change
Reason for Change	Why the change is being made; how the change will benefit the outcome of the project
Method of Change	How the change will be implemented
Affected Parties	Who will be affected by the change
Affect on Success Criteria	How will the change affect: • Quality • Time • Cost
Back Up Information	Any additional information that is needed to support or explain the nature of the change
Sign-Offs	Who approved the change (Approve/ Reject/ Defer)
Date of Approval	When was the change approved

Update
project
baseline

RISK CONTROL

- Re-evaluate risk profile
- Identify new risks.
- Evaluate existing risks
- Retire risks
- Implement response plans
- Manage opportunities

ISSUE MANAGEMENT

- Issues
 - Response plans
 - Residual risks
- Delivery Concerns
- Action Items

RISK AUDIT

- Risk audits are used to evaluate the effectiveness of the risk identification, risk responses, and risk management process as a whole.

RISK EVENT AUDITS

- Risk events
- Causes
- Responses

Document Element	Description
Risk event audit	Event
	Cause
	Response
	Comment
	List the event from the risk register.
	Identify the root cause of the event from the risk register.
	Describe the response implemented.
	Discuss if there was any way to have foreseen the event and respond to it more effectively.

RISK RESPONSE AUDITS

- Risk event
- Responses
- Success
- Actions for improvement

Document Element	Description
Risk response audit	Event
	Response
	Successful
	Actions to improve
	List the event from the risk register.
	List the risk response from the risk register.
	Indicate if the response was successful.
	Identify any opportunities for improvement in risk response.

RISK MANAGEMENT PROCESSES

- Process
- Compliance
- Tools and techniques used

Document Element	Description	
Risk management process audit	Plan risk management	Followed: Indicate if the various processes were followed as indicated in the risk management plan.
	Identify risks	Tools and techniques used: Identify tools and techniques used in the various risk management processes and whether they were successful.
	Perform qualitative risk analysis	
	Perform quantitative risk analysis	
	Plan risk responses	
	Control risks	

OTHER RISK AUDIT COMPONENTS

- Good practices
- Areas for improvement
- Opportunity management

Document Element	Description
Description of good practices to share	Describe any practices that should be shared for use on other projects. Include any recommendations to update and improve risk forms, templates, policies, procedures, or processes to ensure these practices are repeatable.
Description of areas for improvement	Describe any practices that need improvement, the improvement plan, and any follow-up dates or information for corrective action.

LESSONS LEARNT

- What worked and should be repeated
- What did not work and needs to be fixed
- Process Reviews
- Proactive Changes

CONTRACT MANAGEMENT

- Contract Compliance
- Change Management
- Performance Management
- Inspection and Audits
- Deliverable Acceptance
- Payment Authorization
 - Hold backs and warranties

LECTURE 10 ADDENDUM

Project Management Software Comparison

MS PROJECT VS PRIMAVERA



S.N	Primavera Software	MS-Project Software
0		
1.	It supports unlimited baselines.	MS-Project supports 11 baselines.
2.	Primavera allows multiple users to work on a single project and the specific features to be used.	Multiple User Access MS Project doesn't allow multiple users to work on a single project
3.	Primavera allows issue and risk recording.	MS-Project lacks the feature of project issues and risk tracking.

S.No	Primavera Software	MS-Project Software
4.	In Primavera web, support information like the planning and documentation of the project can be converted into HTML directly from the software without the help of any third party software.	MS-project does not provide any feature to convert data from one format to another directly from the software. Third-party software can be used for this purpose if you are using MS-project software.
5.	It allows creating sub-activities of activity by breaking the main activity into different steps with own start and finish date.	MS-Project does not provide any such functionality for creating sub-activities.
6.	Primavera allows you to create a blank custom field. However, it does not set formulas to the fields. Thus, users have to set the formulas manually in each field for	MS-Project allows creating custom fields with complex formulas and additional values to the field which reduces the manual effort of the user.

S.No	Primavera Software	MS-Project Software
7.	Primavera supports multiple activities relationship in which more than one type of relationship can be created between the activities.	MS-Project software does not support multiple activity relationship. It allows establishing only one type of relationship between activities.
8.	Primavera supports the feature of creating a Website. This project website allows creating a website comprising details like project issues, risks, resources, etc. which has been feed as input to the Primavera project management software.	MS-Project does not provide any feature for creating the project website.
9.	Primavera software supports multiple project creation, tracking, and viewing. It allows tracking, multiple projects or Work Breakdown Structure comparisons, cost and units calculations.	MS-Project allows multiple projects creation but it does not allow other functions on the multiple projects like tracking multiple projects, cost, other calculations, and comparisons simultaneously.

S.No	Primavera Software	MS-Project Software
10.	Primavera software P6 supports unique ID feature and is helpful in projects using activity ID systems.	MS-Project does not support unique ID feature and the activity ID is dependent on the position of the activity.
11.	Primavera allows activity sorting by different fields like sorting by date, activity id, etc.	Microsoft Project allows flexible activity control in which the individual activities can be moved from their positions to the position where you want it to display.
12.	Primavera allows adding different project expenses like training cost, traveling cost, etc. in addition to the project expenses.	MS-Project does not allow to calculate other expenses.

S.N	Primavera Software	MS-Project Software
13.	It supports up to 200 columns including custom columns, each column giving useful information.	MS-Project on the contrary part supports up to 40 columns only.
14.	Primavera allows the creation of WBS (Work Breakdown Structure) in which activities can be added.	In MS-Project activities are made to appear or function like WBS.
15.	Primavera supports a larger number of activities.	MS-Project supports less number of activities when compared to Primavera

S.No	Primavera Software	MS-Project Software
16.	Primavera supports shuffling of onscreen activities using sorting, grouping, etc.	MS-project lacks on-screen activity shuffling.
17.	Primavera software is best suited for developed countries.	MS-project software is best suited for developing countries.
18.	Primavera is a database based project management software.	MS-Project is file based project management software.
19.	Primavera supports a feature known as Progress spotlight to highlight table rows in a particular color.	MS-Project does not support any such direct feature instead allows you to create filters for the same.