Chapter 7: Project Cost Management
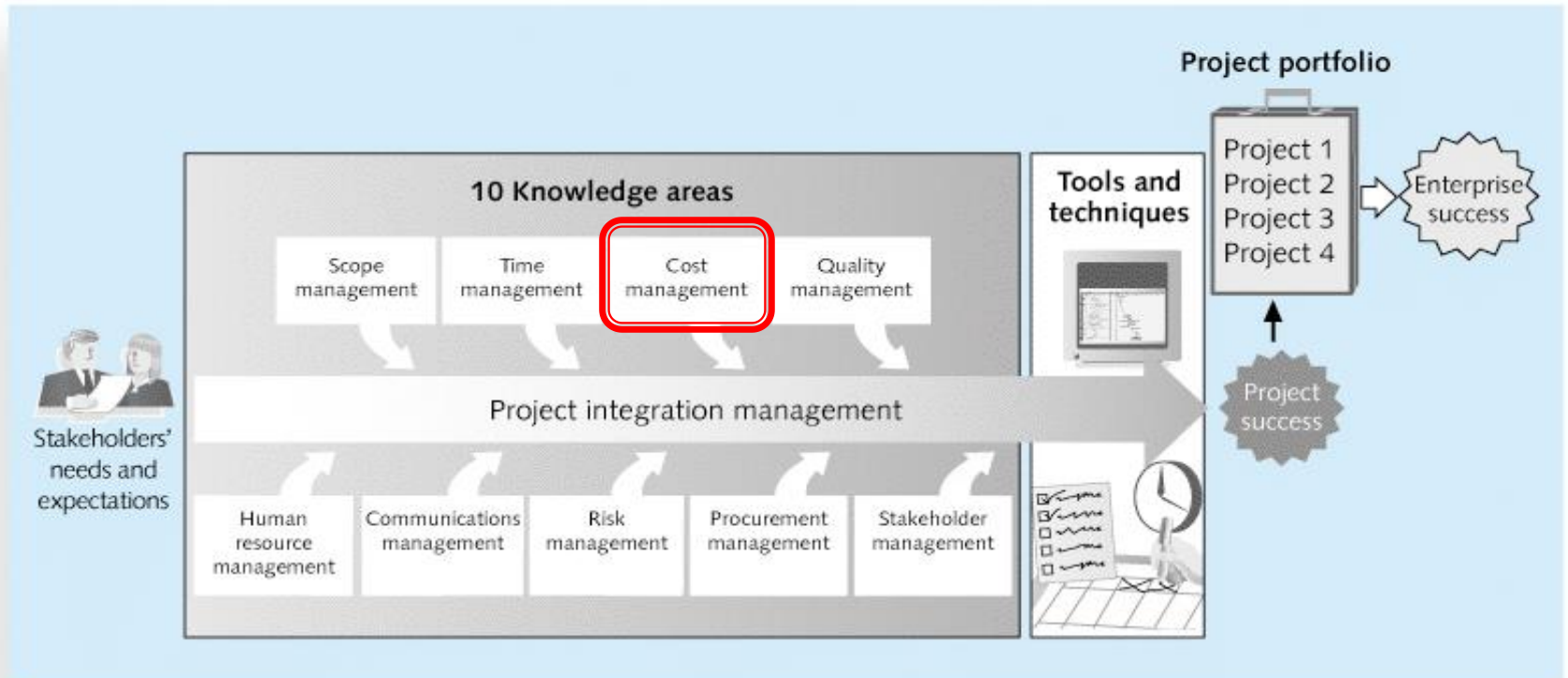
Information Technology Project Management, Seventh Edition

Information Technology
PROJECT MANAGEMENT | 7e

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Learning Objectives

‣ Explain basic project cost management principles, concepts, and terms

‣ Describe the process of planning cost management

‣ Discuss different types of cost estimates and methods for preparing them

‣ Understand the processes of determining a budget and preparing a cost estimate for an information technology (IT) project

What is Cost and Project Cost Management?

- **Cost** is a resource sacrificed or foregone to achieve a specific objective or something given up in exchange.
- Costs are usually measured in monetary units like dollars.
- **Project cost management** includes the processes required to ensure that the project is completed within an approved budget.

Project Cost Management Processes

- **7.1.Planning cost management** :determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost.

- **7.2.Estimating costs:** developing an approximation or estimate of the costs of the resources needed to complete a project

- **7.3.Determining the budget:** allocating the overall cost estimate to individual work items to establish a baseline for measuring performance

- **7.4.Controlling costs:** controlling changes to the project budget

Figure 7-1. Project Cost Management Summary

Planning
Process: **Plan cost management**
Outputs: Cost management plan
Process: **Estimate costs**
Outputs: Activity cost estimates, basis of estimates, project documents updates
Process: **Determine budget**
Outputs: Cost baseline, project funding requirements, project documents updates

Monitoring and Controlling
Process: **Control costs**
Outputs: Work performance information, cost forecasts, change requests, project management plan updates, project documents updates, organizational process assets updates

Project Start   **Project Finish**

Basic Principles of Cost Management

▸ Most members of an executive board better understand and are more interested in financial terms than IT terms , so IT project managers must speak their language

- ◦ **Profits** are revenues minus expenditures
- ◦ **Profit margin** is the ratio of revenues to profits
- ◦ **Life cycle costing** considers the total cost of ownership, or development plus support costs, for a project

Types of Costs and Benefits

- **Tangible costs** or **benefits** are those costs or benefits that an organization can easily measure in dollars
- **Intangible costs** or **benefits** are costs or benefits that are difficult to measure in monetary terms
- **Direct costs** are costs that can be directly related to producing the products and services of the project
- **Indirect costs** are costs that are not directly related to the products or services of the project, but are indirectly related to performing the project
- **Sunk cost** is money that has been spent in the past; when deciding what projects to invest in or continue, you should *not* include sunk costs

7.1.Planning Cost Management

▸ The project team uses expert judgment, analytical techniques, and meetings to develop the cost management plan

▸ A cost management plan includes:
  ◦ Level of accuracy and units of measure
  ◦ Organizational procedure links
  ◦ Control thresholds
  ◦ Rules of performance measurement
  ◦ Reporting formats
  ◦ Process descriptions

7.2.Estimating Costs

- Project managers must take cost estimates seriously if they want to complete projects within budget constraints

- It's important to know the types of cost estimates, how to prepare cost estimates, and typical problems associated with IT cost estimates

Table 7-2. Types of Cost Estimates

TYPE OF ESTIMATE	WHEN DONE	WHY DONE	HOW ACCURATE
Rough Order of Magnitude (ROM)	Very early in the project life cycle, often 3–5 years before project completion	Provides estimate of cost for selection decisions	−50% to +100%
Budgetary	Early, 1–2 years out	Puts dollars in the budget plans	−10% to +25%
Definitive	Later in the project, less than 1 year out	Provides details for purchases, estimates actual costs	−5% to +10%

Cost Estimation Tools and Techniques

▸ Basic tools and techniques for cost estimates:

◦ **Analogous** or **top-down estimates:** use the actual cost of a previous, similar project as the basis for estimating the cost of the current project

◦ Advantages: Fast, archive

◦ Disadvantages:

- **Bottom-up estimates:** involve estimating individual work items or activities and summing them to get a project total
- Advantages: exactlty
- Disadv: Slowly

▸ **Parametric modeling** uses project characteristics (parameters) in a mathematical model to estimate project costs

Typical Problems with IT Cost Estimates

- Estimates are done too quickly
- People lack estimating experience
- Human beings are based toward underestimation
- Management desires accuracy

7.3.Determining the Budget

- Cost budgeting involves allocating the project cost estimate to individual work items over time

- The WBS is a required input to the cost budgeting process since it defines the work items

- Important goal is to produce a **cost baseline**
  - a time-phased budget that project managers use to measure and monitor cost performance
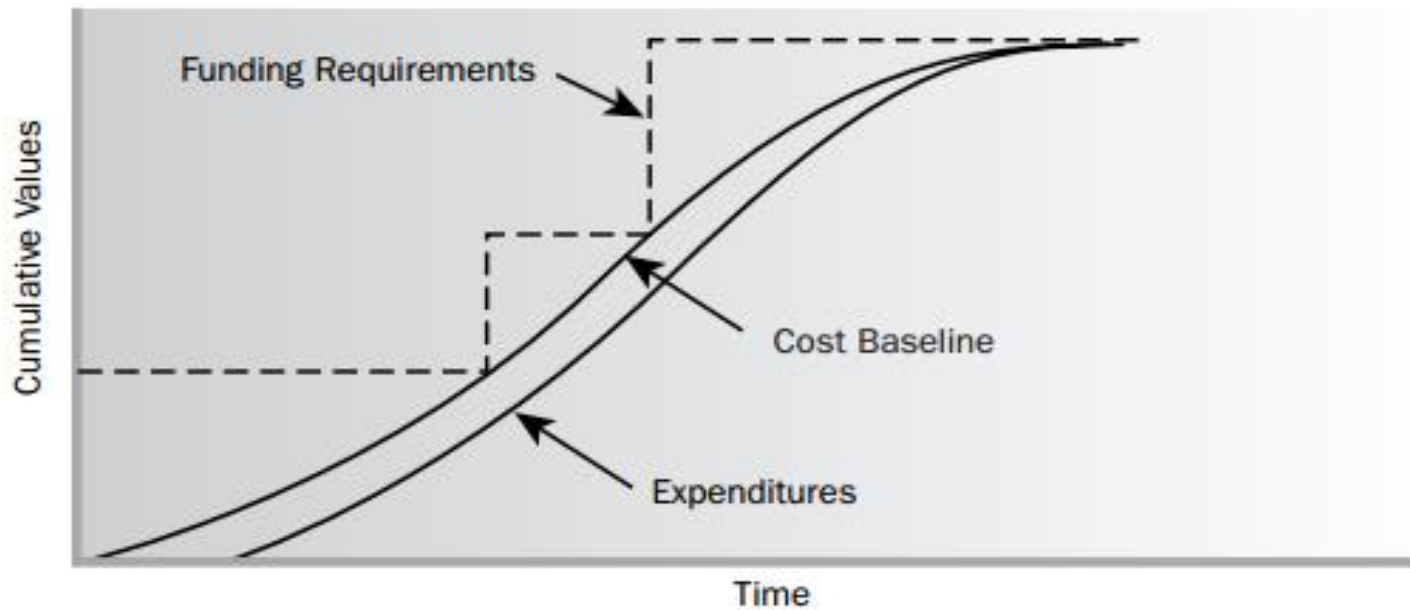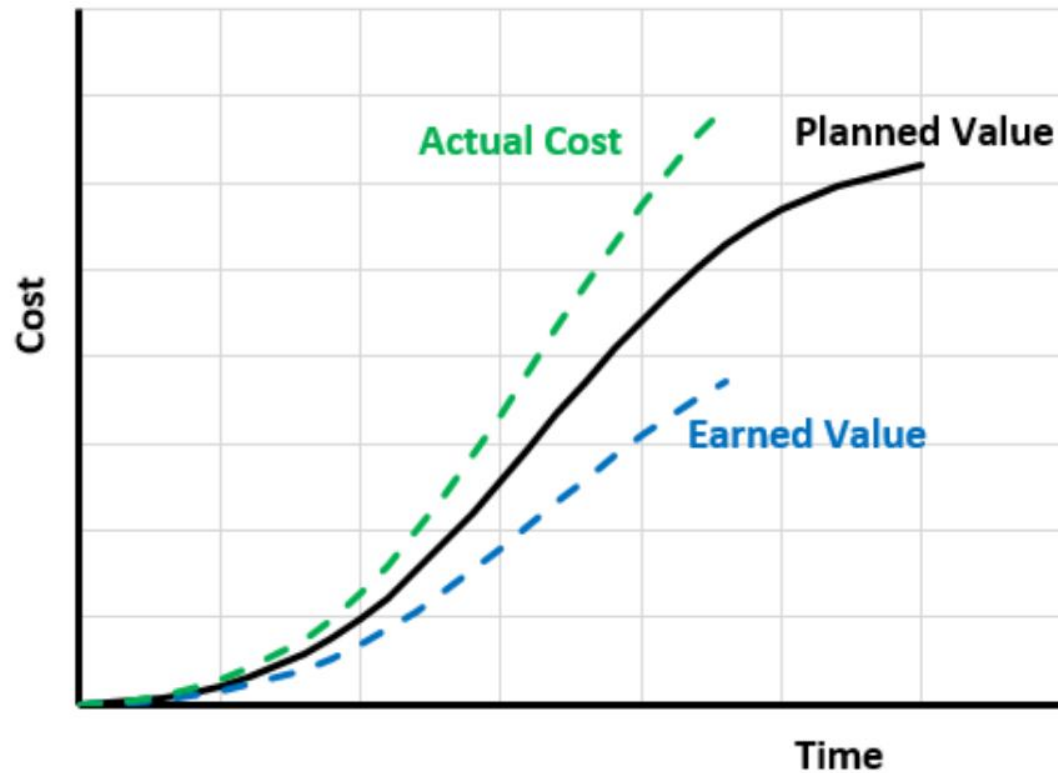
7.4.Controlling Costs

- Project cost control includes
  - Monitoring cost performance
  - Ensuring that only appropriate project changes are included in a revised cost baseline
  - Informing project stakeholders of authorized changes to the project that will affect costs
- EVM - Earned Value Management is a popular tool that used for controlling Cost

Earned Value Management (EVM)

- **EVM** is a project performance measurement technique that integrates scope, time, and cost data
- Given a **baseline** (original plan plus approved changes), you can determine how well the project is meeting its goals
- You must enter actual information periodically to use EVM

Earned Value Management

Work Performance Information

Controlling Cost

▸ **The Budget at Completion(BAC)** is determined at the start of the project based on the project estimates and assumptions. As the project progresses the BAC may need to be revisited based on the project forecast.

▸ Ex:

A project has a budget of $10,000,

BAC = $10,000

ID	Name	Budget	Start	End
100	Set up Database	$10,000	Mar. 1	Mar. 10

Controlling Cost

▸ The **planned value (PV),** called the budget, is that portion of the approved total cost estimate planned to be spent on an activity during a given period.

$$PV = BAC * \% \text{ Complete (Planned)}$$

Controlling Cost

▸ Ex:

ID	Name	Budget	Start	End
100	Set up Database	$10,000	Mar. 1	Mar. 10

Mar 1   Mar 5   Mar 8   Mar 10

▸ If it's March 5 today

Planned Value (PV)= *50% x $10,000 = $5,000*.

▸ If it's March 8,

Planned Value (PV) = *80% x $10,000 = $8,000*.

Controlling Cost

▸ The **earned value (EV)** is the amount of the task that is *actually* completed

<p style="text-align:center; color:red">EV = % Complete (Actual) x BAC</p>

EX:

The actual percent complete is 75% and the task budget is $10,000,
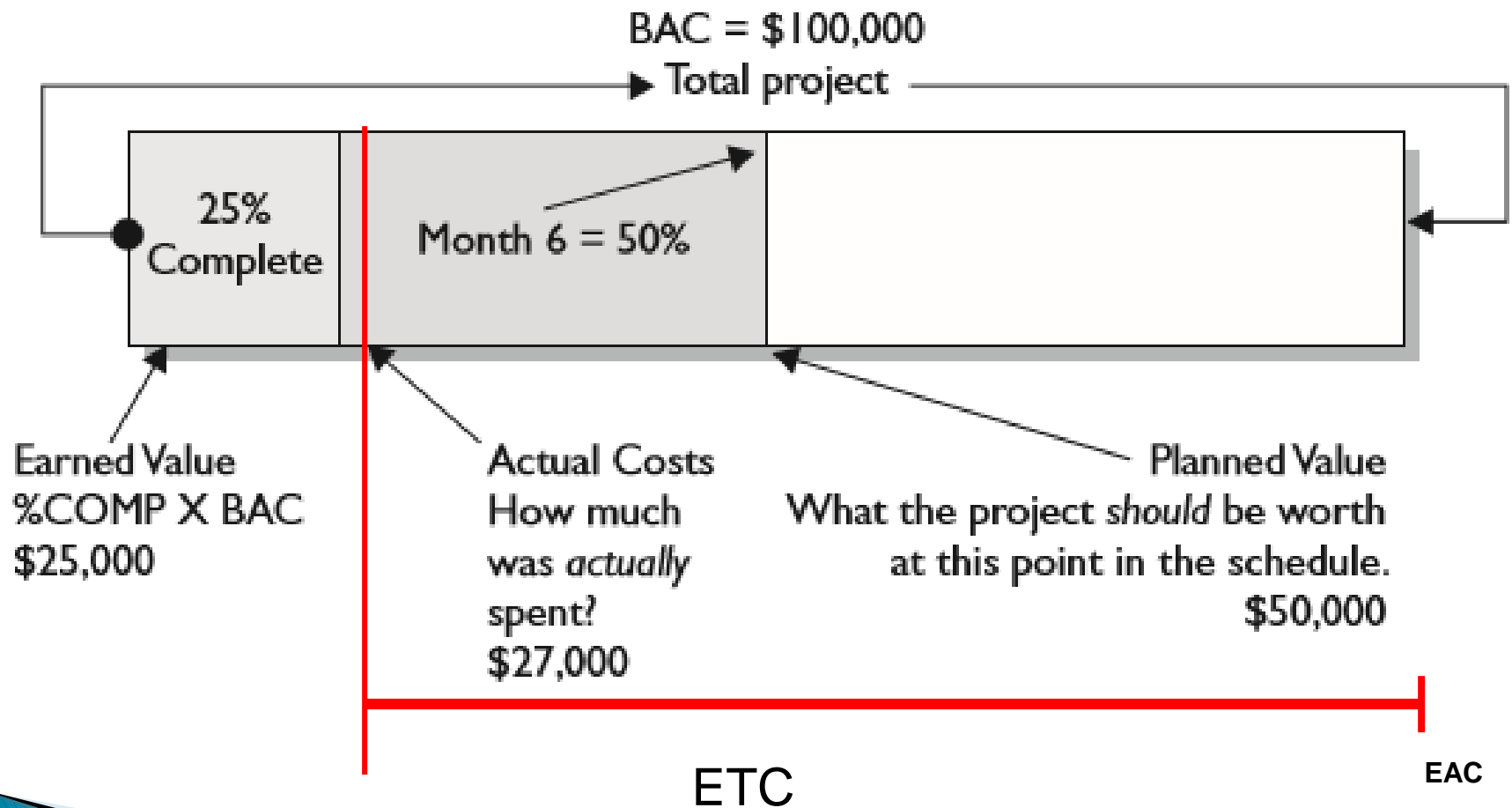
Earned Value (EV) = 75% x $10,000 = $7,500.

Controlling Cost

▸ **Actual cost (AC)** is the total of direct and indirect costs incurred in accomplishing work on an activity during a given period

▸ Ex:

The actual cost is $200 for software subscriptions and $1,000 for labor

AC = $200 + $1,000 = $1,200.

BAC = $100,000
→ Total project

25% Complete

Month 6 = 50%

Earned Value
%COMP X BAC
$25,000

Actual Costs
How much
was *actually*
spent?
$27,000

Planned Value
What the project *should* be worth
at this point in the schedule.
$50,000

ETC

EAC

Controlling Cost

▸ **Schedule Performance Index – SPI**

$$\text{SPI} = \text{EV/PV}$$

◦ *SPI < 1, the task is behind schedule.*

◦ *SPI =1 one, the task is on schedule*

◦ *SPI > 1, the task is ahead of schedule.*

▸ Schedule variance – SV

$$\text{SV} = \text{EV - PV}$$
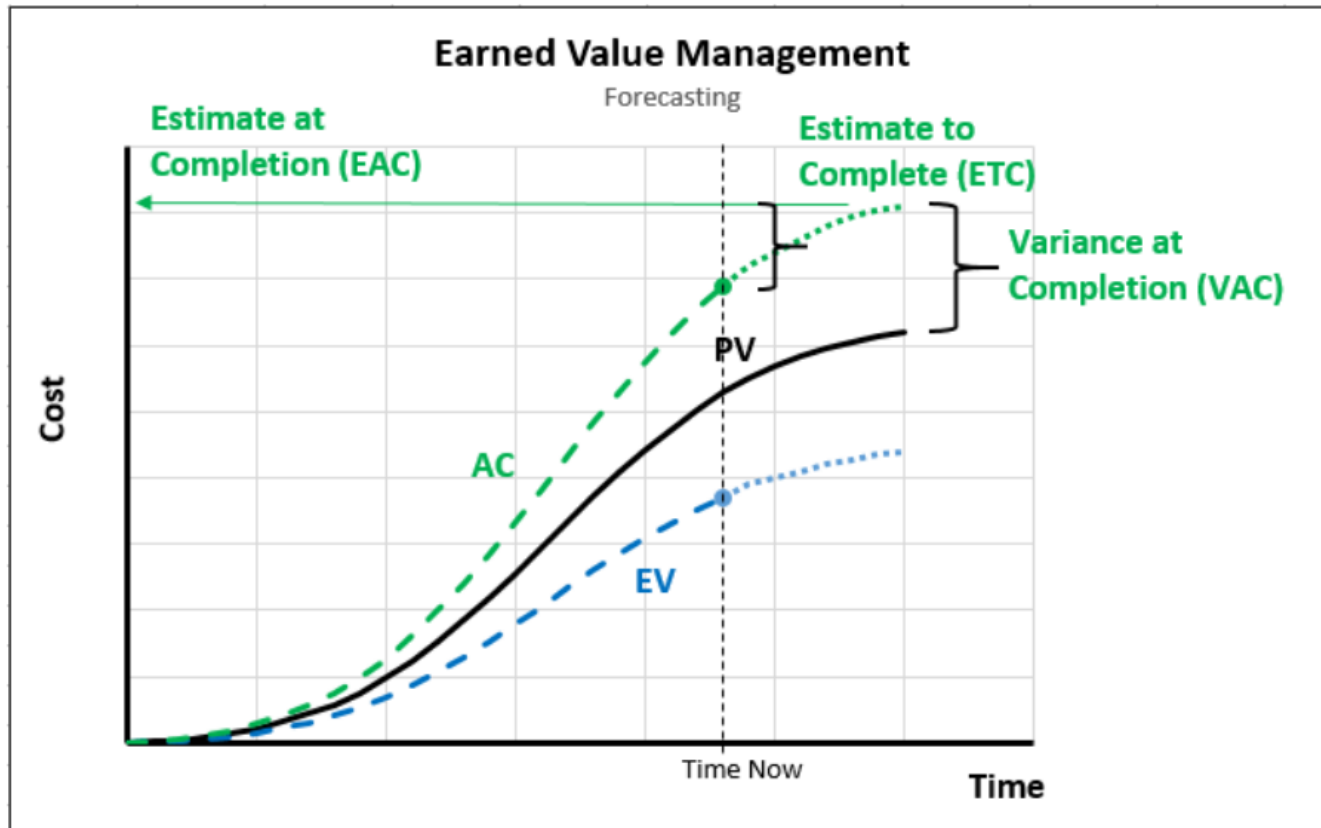
Controlling Cost

- **Cost Performance Index - CPI**

$$CPI = EV / AC$$

  ◦ *CPI < 1, the task is over budget.*

  ◦ *CPI =1, the task is on budget.*

  ◦ *CPI > 1, the task is under budget.*

- Cost Variance (CV)

$$CV = EV - AC$$

Forecasting

Earned Value Management

Forecasting

Forecasting

- **Estimate at Completion – EAC** is the full task or project cost expected **AT** completion (the new project budget).

$$EAC = BAC / CPI$$

- **Estimate to Complete** - ETC represents the expected cost required **TO** complete the project.

$$ETC = EAC - AC$$

Forecasting

▸ **To Complete Performance Index-TCPI**

$$TPCI = \frac{(BAC - EV)}{(BAC - AC)}$$

▸ ***Variance at Complete-VAC***

$$VAC = BAC - EAC$$

VAC > 0 : the project will be under budget

VAC = 0 : the project will be on budget

VAC < 0 : the project will be over budget

Name	Formula	
BAC—Budget at Completion	No formula – it's the project budget	
PV—Planned Value	$PV = BAC \times \text{Planned \% Complete}$	
EV—Earned Value	$EV = BAC \times \text{Actual \% Complete}$	
AC—Actual Cost	What you've actually spent on the project	
SPI—Schedule Performance Index	$SPI = \dfrac{EV}{PV}$	
SV—Schedule Variance	$SV = EV - PV$	
CPI—Cost Performance Index	$CPI = \dfrac{EV}{AC}$	
TCPI—To-Complete Performance Index	$TCPI = \dfrac{BAC-EV}{BAC-AC}$	
CV—Cost Variance	$CV = EV - AC$	

Chapter Summary

▸ Project cost management is a traditionally weak area of IT projects, and project managers must work to improve their ability to deliver projects within approved budgets

▸ Main processes include

- Plan cost management
- Estimate costs
- Determine the budget
- Control costs

Bài tập 1:

▸ Bạn là người quản lý dự án tại một công ty thiết kế công nghiệp. DA được cấp vốn tổng cộng 55.000$. Kế hoạch của bạn kêu gọi sáu người làm việc trong dự án 8 tiếng một ngày, 5 ngày một tuần trong 4 tuần. Theo lịch trình, nhóm của bạn phải hoàn thành khối lượng công việc vào **tuần thứ ba của dự án.** Khi bạn xem lại những gì nhóm đã làm cho đến nay, bạn thấy rằng nhóm đã hoàn thành **50% công việc, với chi phí 25.000 đô la**.

▸ **BAC, AC, PV, EV ?**

▸ **CPI, SPI → Kết luận ?**

- BAC=55.000
- Time = 4
- Kế hoạch hoàn thành tuần thứ 3 (planned): ¾= 75%
- $\rightarrow$ Planned Value (PV) = 75% *55.000= 41.250
- Thực tế hoàn thành 50% : 50%
- $\rightarrow$ Earned Value: EV= 50% *55.000=27500
- Thực tế chi phí sử dụng: AC= 25.000
- SPI = EV/PV= 27500/41250 <1
- CPI= EV/AC= 27500/25000>1

Bài tập 2:

- Dự án hiện tại của bạn là một nỗ lực phát triển phần mềm trị giá 800.000 đô la, với hai nhóm lập trình viên sẽ làm việc được sáu tháng, tổng cộng là 10.000 giờ. Theo kế hoạch dự án, nhóm của bạn thực hiện với 38% công việc. Bạn thấy rằng dự án hiện đã hoàn tất 40%. Bạn đã dành 50% ngân sách cho đến thời điểm này.

- Tính BAC, AC, SV, SPI, PV, EV, CV, CPI

- Kết luận về thời gian thực hiện và ngân sách cho DA

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Bài tập 3:

▸ Bạn đang quản lý dự án xây dựng triển khai hệ thống CNTT cho các trường TH trong một tỉnh. Tổng ngân sách của bạn là 650 triệu, và có tổng cộng 7.500 giờ làm việc dự kiến. Tại thời điểm hiện tại bạn đã chi 400 triệu và 5% giá trị phát sinh giá thiết bị tăng so với chi phí thực tế. Theo kế hoạch, đội DA của bạn cần làm việc 4.500 giờ, nhưng cả đội làm việc thêm giờ (OT) lên tới 5.100 giờ làm việc.

▸ Tính các giá trị BAC, PV, AC, EV, SPI, CV, CPI?

▸ Kết luận về thời gian thực hiện và ngân sách cho DA

Bài tập 4

- Bạn là người quản lý dự án làm việc trong một dự án lớn dự kiến kéo dài trong **hai năm** với tổng ngân sách cho dự án của bạn là **$ 4,200,000**.

- Trường hợp 1:

  Trong **9 tháng** đầu dự án đã chi **1.650.000** đô la, và bạn đã có một **CPI là 0.875**.

- Trường hợp 2:

  Trong sáu tháng tiếp theo, bạn đã chi tổng số là 2.625.000 đô la, dự án hoàn thành 70%.

- Bạn có thể đưa ra một dự báo cho dự án của mỗi trường hợp.

- Trường hợp 1:
- VAC = -600.000
- → Vượt Ngân Sách $600.000
- Trường hợp 2:

AC= 2.625.000

Hoàn thành : 70% → EV=70%* **4,200,000= 2.940.000**

- CPI = EV/AC= 2.940/2.625= 1.12
- EAC=BAC/CPI= 4.200.000/1.12= 3.750.000
- VAC = BAC – EAC =4.200.000- 3.750.000= 450.000
- → Chi phí đạt được khi hoàn thành dự còn lại : $450.000