



Project Cost Management



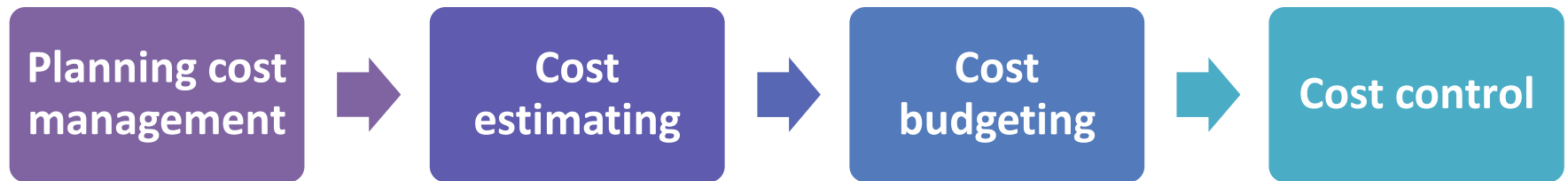
COST

a resource sacrificed or foregone to achieve a specific objective or something given up in exchange

Project cost management

the processes required to ensure that the project is completed within an approved budget

Project Cost Management Processes



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



Profits are revenues minus expenditures



Profit margin is the ratio of revenues to profits

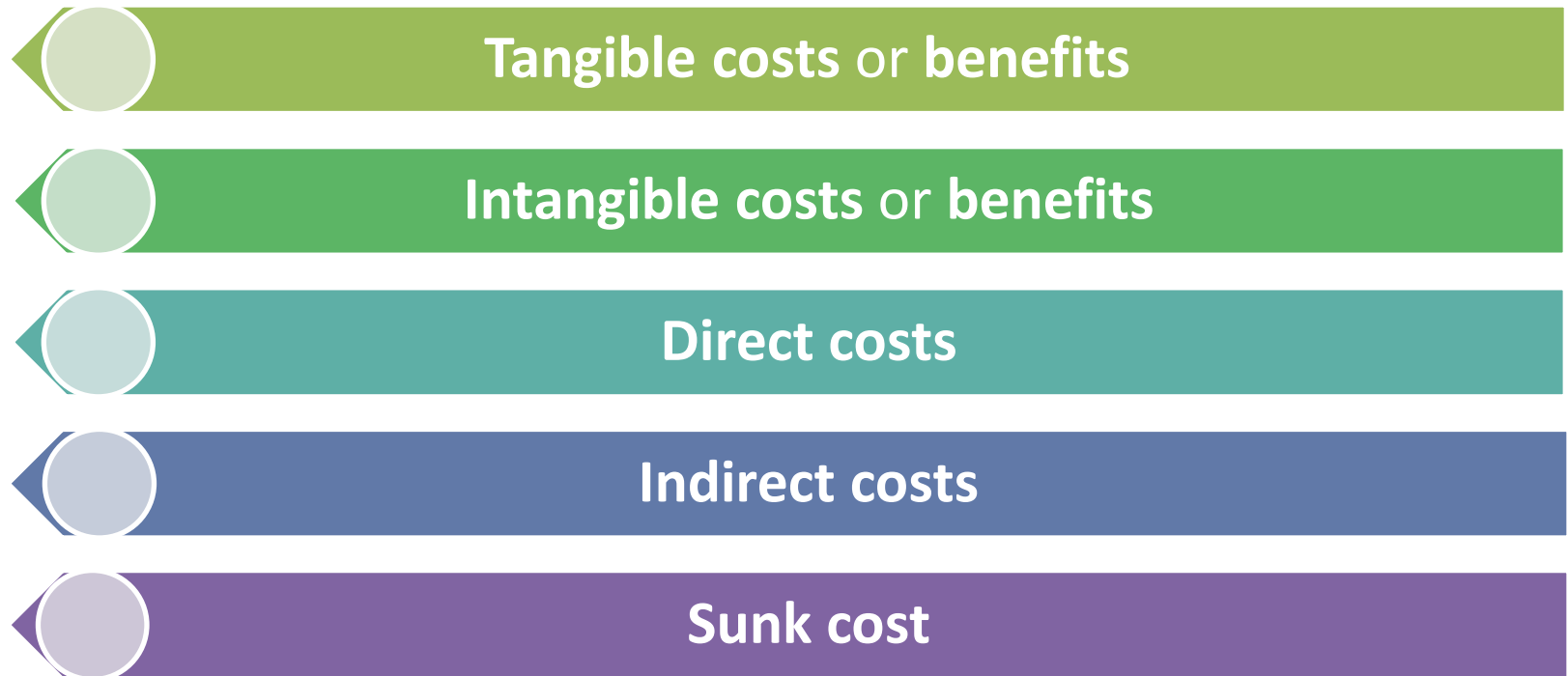


Life cycle costing considers the total cost of ownership, or development plus support costs, for a project



Cash flow analysis determines the estimated annual costs and benefits for a project and the resulting annual cash flow


Basic Principles of Cost Management



Basic Principles of Cost Management



Learning curve theory




Reserves are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predic

Planning Cost Management

- ◀ *Level of accuracy*
- ◀ *Units of measure*
- ◀ *Organizational procedures links*
- ◀ *Control thresholds*
- ◀ *Rules of performance measurement*
- ◀ *Reporting formats*
- ◀ *Process descriptions*

Cost Estimating

- 
- A **Rough order of magnitude (ROM)** estimate provides an estimate of what a project will cost


- 
- A **budgetary estimate** is used to allocate money into an organization's budget

- 
- A **definitive estimate** provides an accurate estimate of project costs

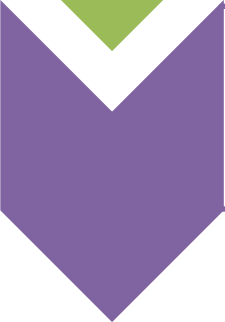
Types of Cost Estimates

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

- 
- **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

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

- 
- **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

Lack of estimating experience

Human beings are biased toward underestimation

Management desires accuracy

Sample Cost Estimate

The project has the following WBS:

1. Project management
2. Hardware
 - 2.1 Handheld devices
 - 2.2 Servers
3. Software
 - 3.1 Licensed software
 - 3.2 Software development
4. Testing
5. Training and support
6. Reserves

	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	WBS Level 2 Totals	% of Total
WBS Items					
1. Project Management				\$306,300	20%
Project manager	960	\$100	\$96,000		
Project team members	1920	\$75	\$144,000		
Contractors (10% of software development and testing)			\$66,300		
2. Hardware				\$76,000	5%
2.1 Handheld devices	100	\$600	\$60,000		
2.2 Servers	4	\$4,000	\$16,000		
3. Software				\$614,000	40%
3.1 Licensed software	100	\$200	\$20,000		
3.2 Software development*			\$594,000		
4. Testing (10% of total hardware and software costs)			\$69,000	\$69,000	5%
5. Training and Support				\$202,400	13%
Trainee cost	100	\$500	\$50,000		
Travel cost	12	\$700	\$8,400		
Project team members	1920	\$75	\$144,000		
6. Reserves (20% of total estimate)			\$253,540	\$253,540	17%
Total project cost estimate				\$1,521,240	

1. Labor Estimate	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	Calculations
Contractor labor estimate	3000	\$150	\$450,000	$3000 * 150$
Project team member estimate	1920	\$75	\$144,000	$1920 * 75$
Total labor estimate			\$594,000	Sum above two values
2. Function point estimate**	Quantity	Conversion Factor	Function Points	Calculations
External inputs	10	4	40	$10 * 4$
External interface files	3	7	21	$3 * 7$
External outputs	4	5	20	$4 * 5$
External queries	6	4	24	$6 * 4$
Logical internal tables	7	10	70	$7 * 10$
Total function points			175	Sum above function point values
Java 2 language equivalency value			46	Assumed value from reference
Source lines of code (SLOC) estimate			8,050	$175 * 46$
Productivity×KSLOC ^{Penalty} (in months)			29.28	$3.13 * 8.05^{1.072}$ (see reference)
Total labor hours (160 hours/month)			4,684.65	$29.28 * 160$
Cost/labor hour (\$120/hour)			\$120	Assumed value from budget expert
Total function point estimate			\$562,158	$4684.65 * 120$

Determining The Budget

Determining the budget involves allocating the project cost estimate to individual material resources or work items over time.

The main goal of the cost budgeting process is to produce a cost baseline for measuring project performance and to determine project funding requirement

WBS Items	1	2	3	4	5	6	7	8	9	10	11	12	Totals
1. Project Management													
1.1 Project manager	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	96,000
1.2 Project team members	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	144,000
1.3 Contractors		6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	6,027	66,300
2. Hardware													
2.1 Handheld devices				30,000	30,000								60,000
2.2 Servers				8,000	8,000								16,000
3. Software													
3.1 Licensed software				10,000	10,000								20,000
3.2 Software development		60,000	60,000	80,000	127,000	127,000	90,000	50,000					594,000
4. Testing			6,000	8,000	12,000	15,000	15,000	13,000					69,000
5. Training and Support													
5.1 Trainee cost									50,000				50,000
5.2 Travel cost									8,400				8,400
5.3 Project team members							24,000	24,000	24,000	24,000	24,000	24,000	144,000
6. Reserves				10,000	10,000	30,000	30,000	60,000	40,000	40,000	30,000	3,540	253,540
Totals	20,000	86,027	92,027	172,027	223,027	198,027	185,027	173,027	148,427	90,027	80,027	53,567	1,521,240

Cost Control

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



Earned Value Management (EVM)

EVM is a project performance measurement technique that integrates scope, time, and cost data

Earned Value Management (EVM)

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

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

The **earned value (EV)**, is an estimate of the value of the physical work actually completed

Earned Value Formulas

Term	Formula
Earned value (EV)	$EV = PV \text{ to date} * RP$
Cost variance (CV)	$CV = EV - AC$
Schedule variance (SV)	$SV = EV - PV$
Cost performance index (CPI)	$CPI = EV/AC$
Schedule performance index (SPI)	$SPI = EV/PV$
Estimate at completion (EAC)	$EAC = BAC/CPI$
Estimated time to complete	Original time estimate/SPI

Rate of Performance

Rate of performance (RP) is the ratio of actual work completed to the percentage of work planned to have been completed at any given time during the life of the project or activity

For example, suppose the server installation was halfway completed by the end of week 1; the rate of performance would be 50% because by the end of week 1, the planned schedule reflects that the task should be 100% complete and only 50% of that work has been completed

Cost variance (CV) is the earned value minus the actual cost. If cost variance is a negative number, it means that performing the work cost more than planned. If cost variance is a positive number, performing the work cost less than planned.

Schedule variance (SV) is the earned value minus the planned value. A negative schedule variance means that it took longer than planned to perform the work, and a positive schedule variance means that the work took less time than planned to perform.

The cost performance index (CPI) is the ratio of earned value to actual cost; it can be used to estimate the projected cost of completing the project. If the CPI is equal to one, or 100 percent, then the planned and actual costs are equal—the costs are exactly as budgeted. If the CPI is less than one or less than 100 percent, the project is over budget. If the CPI is greater than one or more than 100 percent, the project is under budget.

The schedule performance index (SPI) is the ratio of earned value to planned value; it can be used to estimate the projected time to complete the project. Similar to the cost performance index, an SPI of one, or 100 percent, means the project is on schedule. If the SPI is greater than one or 100 percent, then the project is ahead of schedule. If the SPI is less than one or 100 percent, the project is behind schedule

The estimate at completion (EAC)—an estimated cost of completing a project based on performance to date. Similarly, the schedule performance index can be used to calculate an estimated time to complete the project.

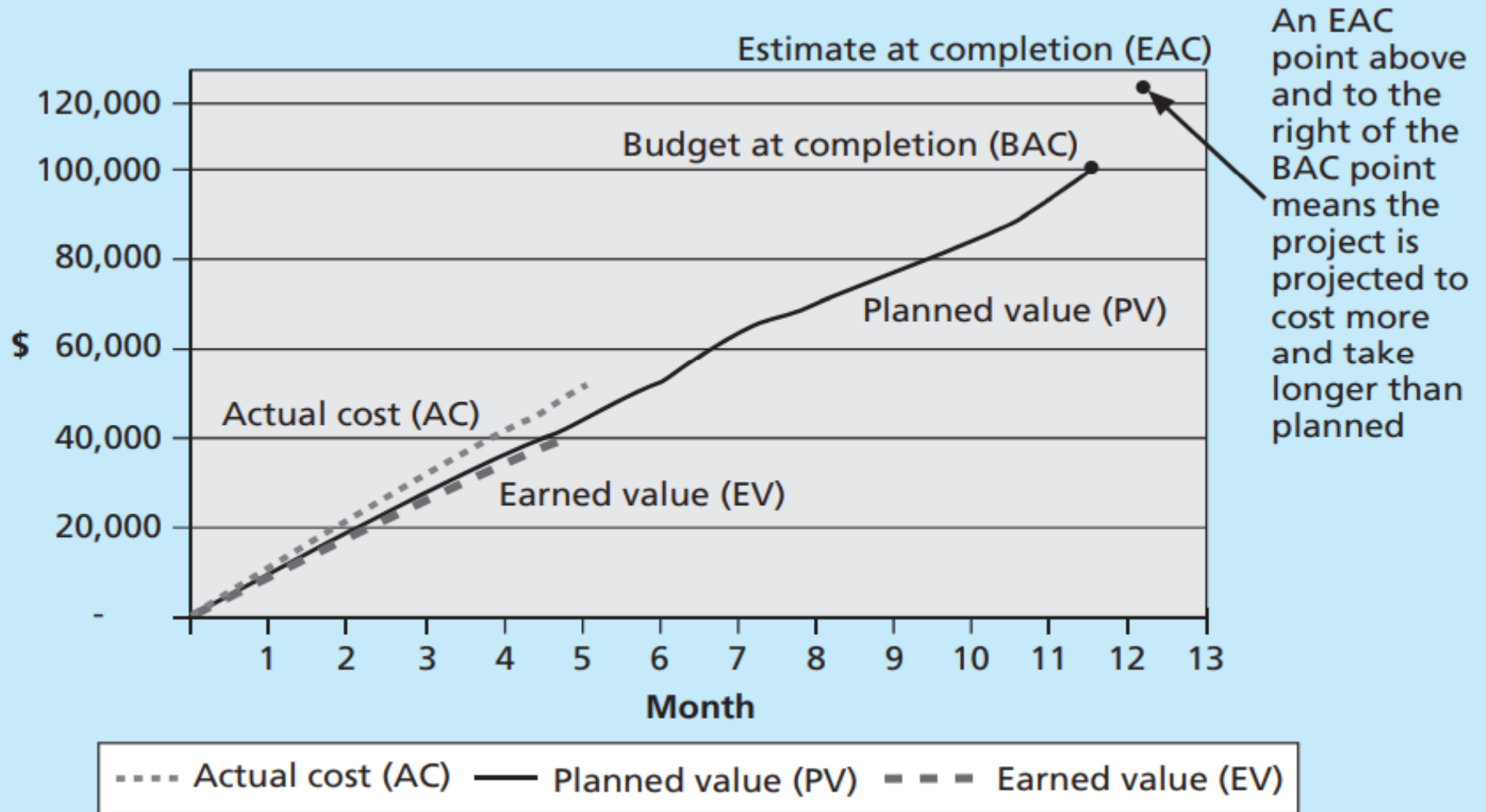
Earned Value Calculations for One Activity After Week One

Activity	Week 1
Earned value (EV)	5,000
Planned value (PV)	10,000
Actual cost (AC)	15,000
Cost variance (CV)	−10,000
Schedule variance (SV)	−5,000
Cost performance index (CPI)	33%
Schedule performance index (SPI)	50%

Rules Earned Value Numbers

- Negative numbers for cost and schedule variance indicate problems in those areas
- CPI and SPI less than 100% indicate problems
- Problems mean the project is costing more than planned (over budget) or taking longer than planned (behind schedule)
- The CPI can be used to calculate the **estimate at completion** (EAC)—an estimate of what it will cost to complete the project based on performance to date; the **budget at completion** (BAC) is the original total budget for the project

Earned Value Chart for Project after Five Months



End of File