

CHAPTER 6: PROJECT COST MANAGEMENT

Information Technology Project Management, Sixth Edition



LEARNING OBJECTIVES

- Understand the importance of project cost management
- Explain basic project cost management principles, concepts, and terms
- Discuss different types of cost estimates and methods for preparing them

LEARNING OBJECTIVES (CONTINUED)

- Understand the processes involved in cost budgeting and preparing a cost estimate and budget for an information technology project
- Understand the benefits of earned value management and project portfolio management to assist in cost control
- Describe how project management software can assist in project cost management

THE IMPORTANCE OF PROJECT COST MANAGEMENT

- IT projects have a poor track record for meeting budget goals
- The CHAOS studies found the average cost **overrun** ranged from 180% in 1994 to **56%** in 2004; other studies found overruns to be 33-34%

WHAT IS PROJECT COST MANAGEMENT?

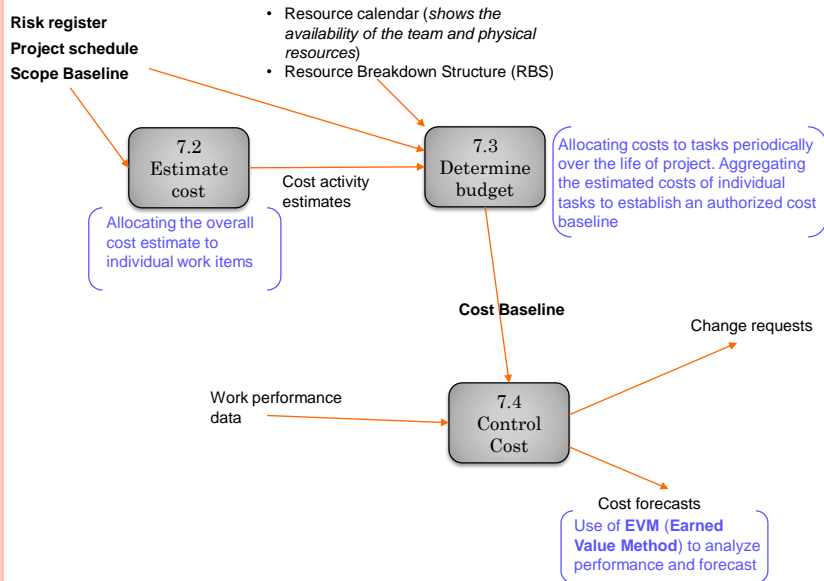
- **Project cost management** includes the processes involves in planning, estimating, budgeting, managing, and controlling costs so that the project can be completed within the approved budget.

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PROJECT COST MANAGEMENT PROCESSES

- **7.1 Plan cost management** : establishing the policies, procedures and documentation for estimating, managing, expending, and controlling project costs
- **7.2 Estimating costs**: allocating the overall cost estimate to individual work items to establish a baseline for measuring performance (in Planning)
- **7.3 Determining the budget**: developing an approximation or estimate of the costs of the resources needed to complete a project (in Planning)
- **7.4 Controlling costs**: monitoring the status of the project to update project cost and managing changes to the cost baseline.

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7.2 ESTIMATE COSTS

Estimate Costs involves developing an approximation of the monetary resources needed to complete project activity.

- 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

COST ESTIMATION TOOLS AND TECHNIQUES

- Basic tools and techniques for cost estimates:
 - **Analogous 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
 - **Three-point Estimate**
 - Most likely, Optimistic, Pessimistic

FIGURE 7-2. SURVEYOR PRO PROJECT COST ESTIMATE

WBS Items	# Units/Hrs.	Cost/Unit/Hr.	Subtotals	WBS Level 1 Totals	% of Total
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	

* See software development estimate

Contingency reserve

RESERVES

- **Reserves** are dollars included in a cost estimate to mitigate cost risk by allowing for future situations that are difficult to predict
 - **Contingency reserves** allow for future situations that may be partially planned for (sometimes called **known unknowns**) and are included in the project cost baseline
 - **Management reserves** allow for future situations that are unpredictable (sometimes called **unknown unknowns**)
- When do you use them?
 - Identified risks vs Unidentified risks
- The project manager has authority over the contingency reserve. For management reserve they need management's permission.

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7.3 DETERMINE THE BUDGET

Determine Budget is the process of aggregating the estimated costs of individual tasks to establish an authorized cost baseline

- 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

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SURVEYOR PRO PROJECT COST BASELINE

(The project spans 12 months.)

Surveyor Pro Project Cost Baseline Created October 10*

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													
Totals	20,000	86,027	92,027	172,027	223,027	198,027	185,027	173,027	148,427	90,027	80,027	53,967	1,521,240

Contingency reserve

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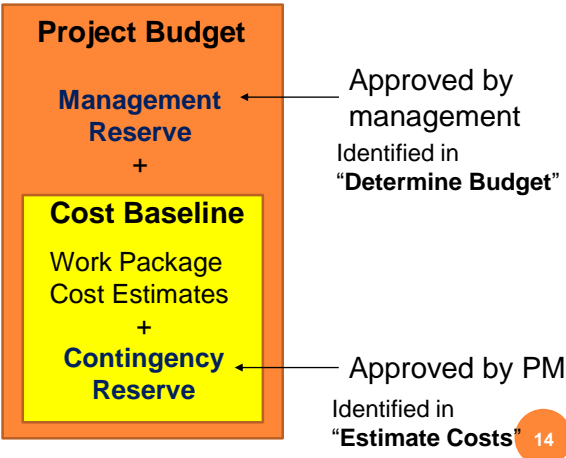
COMPOSITION OF PROJECT BUDGET

Unidentified risks (M.R.)

- Financial crisis
- Chief engineers get sick and are not able to complete the project
- Natural disaster
- Hackers attack and lock up files

Identified risks (C.R.)

- Cost overrun
- Catching up schedule by exercising Crashing
- Computer breakdown and need repair
- Inflation rate is a bit higher than expected



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7.4 CONTROL COSTS

Control costs is the process of monitoring the status of the project to update project cost and managing changes to the cost baseline.

- Project cost control includes:
 - Monitoring cost performance (*by adopting EVM*)
 - 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

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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
- More and more organizations around the world are using EVM to help control project costs

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FUNCTIONS OF EVM

○ Performance Measurement

- EVM is a commonly used method of performance measurement
- Integrates project scope, cost and schedule measures to help the project management team assess and measure project performance and progress

○ Variance Analysis

- The variance between planned and actual performance

○ Forecasting

- Making estimate or predictions of conditions and events in the project's future based on information and knowledge available at the time of the forecast.

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EARNED VALUE MANAGEMENT TERMS

○ 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)

- the total of direct and indirect costs incurred in accomplishing work on an activity during a given period.

○ Earned Value (EV)

- an estimate of the value of the physical work actually completed, based on the original planned costs for the project.

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EARNED VALUE MANAGEMENT TERMS (CONT.)

○ Rate of Performance (RP)

- 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)

- the difference between the actual cost and the budgeted cost, so it is an indicator of whether a project cost is below or under budget.

○ Schedule Variance (SV)

- the difference between the actual value of work done and the budgeted cost, so it is an indicator of whether a project schedule is ahead or behind schedule.

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EARNED VALUE MANAGEMENT TERMS (CONT.)

○ Cost Performance Index (CPI)

- a ratio that measures the financial effectiveness of a project by dividing the budgeted cost of work performed by the actual cost of work performed.

○ Schedule Performance Index (SPI)

- a measure of how close the project is to being completed compared to the schedule.

○ Estimate At Completion (EAC)

- the estimated total amount of money needed to finish a project.

○ Budget At Completion (BAC)

- total planned budgeted cost

○ Estimated Time to Complete (ETC)

- Number of time unit required to complete a project

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EARNED VALUE FORMULAS

TERM	FORMULA
Earned Value	$EV = PV \text{ to date} \times RP$
Cost Variance	$CV = EV - AC$
Schedule Variance	$SV = EV - PV$
Cost Performance Index	$CPI = EV/AC$
Schedule Performance Index	$SPI = EV/PV$
Estimate at Completion (EAC)	$EAC = BAC/CPI$
Estimated Time to Complete	Original Time Estimate/SPI

Table 7-5.

INDICATIONS FOR PROJECT PERFORMANCE

- Negative numbers for **Cost** and **Schedule variance** indicate over budget and behind schedule.
 - $CV > 0$ (Under budget); $CV < 0$ (Over budget)
 - $SV > 0$ (Ahead of schedule); $SV < 0$ (Behind schedule)
- CPI and $SPI < 100\%$ indicate the project is costing more than planned (over budget) or taking longer than planned (behind schedule)

EXAMPLE:

- Based on the Cost Baseline developed earlier.

- At the end of 6th month, we have:

- Budget At Completion (BAC) = 1,521,102
- Planned Value (PV) = 791,108
- Actual Cost (AC) = 1,200,000
- Earned Value (EV) = 700,000

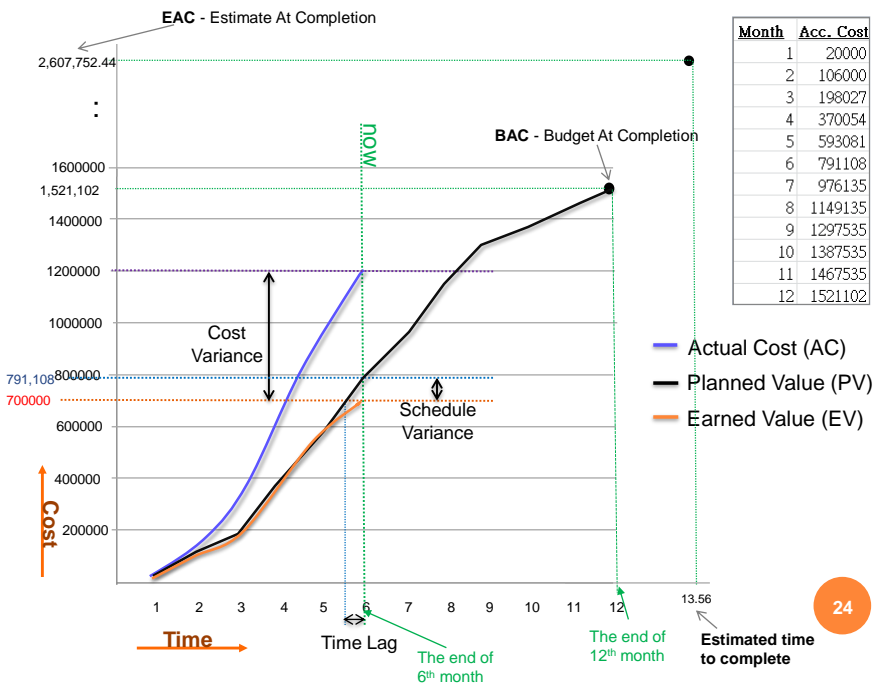
- Find out:

- CV, SV, CPI, SPI, EAC, RP ?
- When will be the estimated time to complete?
- How much will be the estimated cost to complete?

Accumulative Cost
↓

Month	Acc. Cost
1	20000
2	106000
3	198027
4	370054
5	593081
6	791108
7	976135
8	1149135
9	1297535
10	1387535
11	1467535
12	1521102

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ANSWERS

- Cost Variance (**CV**) = $EV - AC$
 $= 700,000 - 1,200,000$
 $= -500,000$ ----- *negative* ----- *over budget*
- Schedule Variance (**SV**) = $EV - PV$
 $= 700,000 - 791,108$
 $= -91,108$ ----- *negative* ----- *behind schedule*
- Cost Performance Index (**CPI**) = EV/AC
 $= 700,000 / 1,200,000$
 $= 58.33\%$

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ANSWERS (CONT.)

- Schedule Performance Index (**SPI**) = EV/PV
 $= 700,000 / 791,108 = 88.48\%$
- Estimate At Completion (**EAC**) = BAC/CPI
 $= 1,521,102 / 58.33\% = 2,607,752.44$
- **Estimated time to complete** = time estimate / SPI
 $= 12 / 88.48\% = 13.56$ (month)
- Rate of Performance (**RP**) = EV/PV
 $= 700,000 / 791,108 = 88.48\%$ ----- *same as SPI*

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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:
 - Estimate costs
 - Determine the budget
 - Control costs