IIT ROORKEE

NPTEL ONLINE CERTIFICATION COURSE

Project Management for Managers

Lec – 52

Introduction to Project Cost Management

Dr. M.K. Barua

Department of Management

Indian Institute of Technology Roorkee

Cost Estimating

.1 Inputs
- .1 Enterprise environmental factors
- .2 Organizational process assets
- .3 Project scope statement
- .4 Work breakdown structure
- .5 WBS dictionary
- .6 Project management plan
  - Schedule management plan
  - Staffing management plan
  - Risk register

.2 Tools and Techniques
- .1 Analogous estimating
- .2 Determine resource cost rates
- .3 Bottom-up estimating
- .4 Parametric estimating
- .5 Project management software
- .6 Vendor bid analysis
- .7 Reserve analysis
- .8 Cost of quality

.3 Outputs
- .1 Activity cost estimates
- .2 Activity cost estimate supporting detail
- .3 Requested changes
- .4 Cost management plan (updates)

Cost Budgeting

.1 Inputs
- .1 Project scope statement
- .2 Work breakdown structure
- .3 WBS dictionary
- .4 Activity cost estimates
- .5 Activity cost estimate supporting detail
- .6 Project schedule
- .7 Resource calendars
- .8 Contract
- .9 Cost management plan

.2 Tools and Techniques
- .1 Cost aggregation
- .2 Reserve analysis
- .3 Parametric estimating
- .4 Funding limit reconciliation

.3 Outputs
- .1 Cost baseline
- .2 Project funding requirements
- .3 Cost management plan (updates)
- .4 Requested changes

Cost Control

.1 Inputs
- .1 Cost baseline
- .2 Project funding requirements
- .3 Performance reports
- .4 Work performance information
- .5 Approved change requests
- .6 Project management plan

.2 Tools and Techniques
- .1 Cost change control system
- .2 Performance measurement analysis
- .3 Forecasting
- .4 Project performance reviews
- .5 Project management software
- .6 Variance management

.3 Outputs
- .1 Cost estimate (updates)
- .2 Cost baseline (updates)
- .3 Performance measurements
- .4 Forecasted completion
- .5 Requested changes
- .6 Recommended corrective actions
- .7 Organizational process assets (updates)
- .8 Project management plan (updates)

Project Cost Management is primarily concerned with the cost of the resources needed to complete schedule activities

Different stakeholders will measure project costs in different ways and at different times. (Purchase decision, placing order, arrived,)

Cost estimates are generally expressed in **units of currency** (dollars, euro, yen, etc.) to facilitate comparisons both within and across projects.

In some cases, the estimator can use units of measure to estimate cost, **such as staff hours (men hour) or staff days,** along with their cost estimates, to facilitate appropriate management control.

Cost estimates can benefit from **refinement during the course** of the project to reflect the additional detail available. Initially **Rough order of magnitude** (ROM) estimate may be -50% to 100% later -10 to 50%.

Cost included is not limited to, labor, materials, equipment, services, and facilities, as well as special categories such as an **inflation** allowance or a contingency cost.

Cost Estimating: Inputs

1 Enterprise Environmental Factors

Marketplace conditions. What products, services, and results are available in the marketplace, from whom, and under what terms and conditions .

Commercial databases. Info @ standard costs for material and equipment. **Published seller** price lists are another source.

3 Project Scope Statement: describes the business need, justification, requirements, and current boundaries for the project.

4 Work Breakdown Structure: the project's work breakdown structure (WBS) provides the **relationship among all the components of the project** and the project deliverables.

5 Project Management Plan: provides the **overall plan for executing, monitoring, and controlling the project, and includes subsidiary plans that provide guidance and direction for cost management planning and control**.

Cost Estimating: Tools and Techniques

1.Analogous Estimating: Analogous cost estimating means **using the actual cost of previous**, similar projects as the basis for estimating the cost of the current project. It uses **expert judgment**. It is **less costly** than other techniques, but it is also **generally less accurate.**

2. Determine Resource Cost Rates: The persons must know the unit cost rates, **such as staff cost per hour and bulk material cost per cubic yard**, for each resource to estimate schedule activity costs.

Cost Estimating: Tools and Techniques

3. Bottom-up Estimating??????????

4. Parametric Estimating: ??????????????

Cost Estimating: Tools and Techniques

3. Bottom-up Estimating: estimating the cost of individual work packages or individual schedule activities with the lowest level of detail. This detailed cost is then summarized or "**rolled up**" to higher levels for reporting and tracking purposes.

4. Parametric Estimating: Parametric estimating is a technique that uses a **statistical relationship between historical data and other variables** (e.g., square footage in construction, lines of code in software development, required labor hours) to calculate a **cost estimate** for a schedule activity resource.

5. **Project Management Software:** Project management software, **such as cost estimating software applications, computerized spreadsheets, and simulation and statistical tools**, are widely used to assist with cost estimating.
6. **Vendor Bid Analysis:** Other cost estimating methods include **vendor bid analysis** and an analysis of what the project should cost.
7. **Reserve Analysis:** Many cost estimators **include reserves**, also called **contingency allowances**, as costs in many schedule activity cost estimates.
8. **Cost of Quality:** Cost of quality can also be used to prepare the schedule activity cost estimate.

Cost Estimating: Outputs

1. Activity Cost Estimates: An activity cost estimate is a **quantitative assessment** of the likely **costs of the resources** required to complete schedule activities. This includes, but is not limited to, **labor, materials, equipment, services, facilities, information technology, and special categories such as an inflation allowance or cost contingency reserve.**

2. Activity Cost Estimate Supporting Detail: Regardless of the level of detail, the **supporting documentation should provide a clear, professional, and complete picture by which the cost estimate was derived**.

Supporting detail for the activity cost estimates should include:

- Description of the schedule activity's project scope of work
- Documentation of **the basis for the estimate** (i.e., how it was developed)
- Documentation of **any assumptions made**
- Documentation **of any constraints**
- Indication of the range **of possible estimates** (e.g., $10,000 (-10% / +15%) to indicate that the item is expected to cost between $9,000 and $11,500).

3. Requested Changes: The Cost Estimating process may **generate requested changes that may affect the cost management plan, activity resource requirements**, and **other components of the project management plan.**

4. Cost Management Plan (Updates): If approved change requests result from the Cost Estimating process, then the **cost management plan component of the project management plan is updated** if those approved changes impact the management of costs.

Cost Budgeting: Cost budgeting involves **aggregating the estimated costs of individual schedule activities** or work packages to establish a **total cost baseline for measuring project performance.**

Cost Budgeting: Inputs

1. Project Scope Statement

2. Work Breakdown Structure

3. WBS Dictionary: The WBS dictionary is a primary input to schedule activity definition.

4. Activity Cost Estimates: The **cost estimates for each schedule activity** within a work package are aggregated to obtain a cost estimate for each work package.

5. Activity Cost Estimate Supporting Detail

6. **Project Schedule:** The project schedule includes planned **start and finish dates for the project's schedule activities, schedule milestones, work packages, planning packages, and control accounts.** This information is used to aggregate costs to the calendar periods when the costs are planned to be incurred.
7. **Resource Calendars**
8. **Contract:** information related to what products, services, or results have been purchased — and their costs — are used in developing the budget.
9. **Cost Management Plan:** The cost management plan component of the project management plan and other subsidiary plans are considered during cost budgeting.

Cost Budgeting: Tools and Techniques

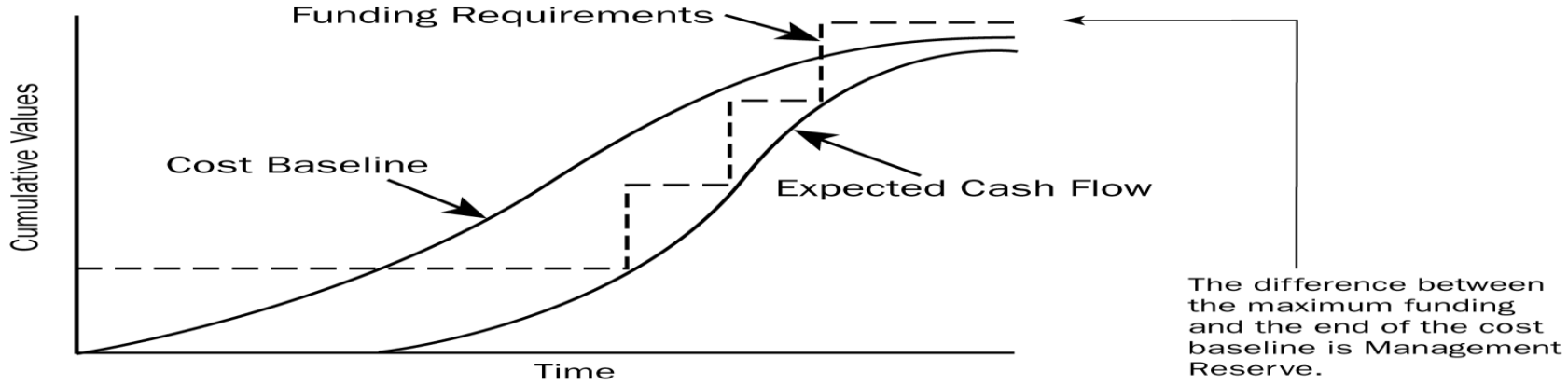
1. Cost Aggregation: Schedule activity cost estimates are aggregated by work packages in accordance with the WBS.

2. Reserve Analysis: Reserve analysis establishes contingency reserves, such as the management **contingency** reserve, that are allowances for **unplanned**, but potentially required, changes.

3. Parametric Estimating: The parametric estimating technique involves using project characteristics (parameters) in a **mathematical model** to predict total project costs. Both the cost and accuracy of parametric models vary widely.

Cost Budgeting: Outputs

1. **Cost Baseline:** The cost baseline is a time-phased **budget** that is used as a basis against which to measure, monitor, and control **overall cost performance** on the project. It is developed by **summing estimated costs by period and is usually displayed in the form of an S-curve,** as illustrated in Figure .
2. **Project Funding Requirements:** Funding requirements, total and periodic (e.g., annual or quarterly), are **derived from the cost baseline** and can be established to exceed, usually by a margin, to allow for either early progress or cost overruns. Funding usually occurs in incremental amounts that are not continuous, and, therefore, appears as a step function in Figure



3 . Cost Management Plan (Updates): If approved change requests result from the Cost Budgeting process, then the cost management plan component of the project management plan is updated if those approved changes impact the management of costs.

4 . Requested Changes: The Cost Budgeting process can generate requested changes that affect the cost management plan or other components of the project management plan. Requested changes are processed for review and disposition through the Integrated Change Control process.

Cost Control??????????????

Cost Control

Project cost control includes:

- Influencing **the factors that create changes** to the cost **baseline**
- Ensuring **requested changes are agreed** upon
- Managing the actual changes when and as they occur
- Assuring that potential **cost overruns do not exceed the authorized funding** periodically and in total for the project

- Monitoring cost performance **to detect and understand variances from the cost baseline**

- Recording all appropriate changes accurately **against the cost baseline**

- **Preventing incorrect, inappropriate, or unapproved changes from being included in the reported cost** or resource usage

- **Informing appropriate stakeholders of approved changes**

- **Acting to bring expected cost overruns within acceptable limits.**

Cost Control: Inputs

1 . Cost Baseline

2 . Project Funding Requirements

3. Performance Reports: Performance reports **provide information on cost and resource performance** as a **result of actual work progress.**

4. Work Performance Information: Work performance information pertaining to the **status and cost of project activities being performed is collected**. This information Includes, but is not limited to:

- **Deliverables that have been completed** and those not yet completed
- **Costs authorized and incurred**
- Estimates to complete the schedule activities
- **Percent physically complete** of the schedule activities.

5. Approved Change Requests

6. Project Management Plan

Cost Control: Tools and Techniques

1. **Cost Change Control System:** A cost change control system, documented in the cost management plan, defines the **procedures by which the cost baseline can be changed**. It includes the **forms, documentation, tracking systems, and approval levels** necessary for authorizing changes.

Cost Control: Tools and Techniques

2. **Performance Measurement Analysis:** Performance measurement techniques help to assess the **magnitude of any variances** that will invariably occur.

   The earned value technique (EVT) compares the value of the **budgeted cost of work performed** (earned) at the original allocated budget amount to both the **budgeted cost of work scheduled** (planned) and to the **actual cost of work performed** (actual). This technique is especially useful for cost control, resource management, and production.

An **important part of cost control is to determine** the **cause of a variance**, the **magnitude** of the variance, and to decide if the variance **requires corrective action.**