What is Project Cost Management

Project Cost Management includes the processes involved in estimating, budgeting, and controlling costs so that project can be completed within the approved budgets.

What is a cost management plan?

During the Develop Project Management Plan process the management team develops a cost management plan, included as part of the project management plan. It describes the form and criteria for planning, estimating, budgeting, and controlling project costs. It covers the "How" of cost management for project.

What does the Cost Management Plan address?

- Level of accuracy - what rounding is used in cost estimating
- Units of measure - days, weeks, dollars, Euros
- Organizational procedure links, particularly through the specification of control accounts in the WBS
- Control thresholds, to set an agreed-upon level of variance before triggering response.

What is Project Cost Management (cont)

- Rules of performance measurement, including choices affecting use of Earned Value Management
- Reporting formats for cost reports
- Process descriptions of the three cost management processes.

What types of costs should be identified?

- Variable vs. Fixed
- Direct vs. Indirect
- Recurring vs. Non-recurring
- "Allowed" costs for contract projects
- Price, if the project is done under contract for an external customer

What are the Project Selection Cost Measures?

- ROI : Return on Investment
- IRR : Internal Rate of Return
- NPV : Net Present Value
- BCR : Benefit Cost Ration

For the above, pick the highest value

- Payback Period, pick shortest duration
- Opportunity Cost: the cost of projects not selected for execution

What is Future Value?

What is Project Cost Management (cont)

Future Value is the value of something at a specific time in the future.

FV = PV * (1 + r)to the n power

PV = Present Value

r = Interest Rate

n = Number of Periods

FV = Future Value

What is Present Value?

Present Value is the value of something today to create a certain value in the future.

PV = FV / (1 + r) to the n power

PV = Present Value

r = Interest Rate

n = Number of Periods

FV = Future Value

What is depreciation?

Depreciation is devaluing an asset in the tax system. There are two kinds:

- Standard depreciation, where the difference between start value and scrap value is divided by the number of periods.
- Accelerated depreciation, which generally requires tables of data to calculate. Two types are Sum of the Years Digits, and Double Declining Balance (DDB). Depreciates faster than standard. (just recognize these terms)

Inputs, Tools and Techniques, Outputs

What is the Process - 7.1 Estimate Costs?

- Develop an approximation of the costs of resources required for project activities
- Estimates are based on the information known at a particular time, and can be expected to be reflined as the project proceeds, from a rough order of magnitude estimate during initiation in the +/- 50% range, to a later definitive or control estimate within a range of +/- 10%.
- Costs estimated include labor, materials, equipment, services, facilities, and special categories like inflation.

What are the INPUTS of the process - Estimate Costs?

1. Scope baseline, includes the project scope statement, the WBS, and WBS dictionary. These are the sources of information about components and products of the project, as well as assumptions and constraints.

Inputs, Tools and Techniques, Outputs (cont)

2. Project schedule, Which includes the quantity and amount of time resources will be required. This achieves the close linkage between Estimate Activity Resources and Estimate Costs.
3. Human resource plan, indicates staffing requirements, cost rates, related reward costs
4. Risk register, so that risk mitigation costs are included in cost estimates.
5. Enterprise environmental factors, including market conditions and published commercial databases or seller price lists.
6. Organizational process assets, including cost estimation policies and templates, along with historical information and lessons learned

What are the TOOLS and TECHNIQUES of the process - Estimate Costs?

1. Expert judgement, to guide the application of historical and other information in determining project estimates.

Inputs, Tools and Techniques, Outputs (cont)

2. Analogous estimating, which uses historical information from a previous project. Analogous estimating is useful when information and time are limited, but is not as accurate as detailed estimating.
3. Parametric estimating
4. Bottom-up estimating, which estimates at the lower levels then accumulates cost upward. It's more accurate than analogous estimate.
5. Three point estimates. Allows consideration of a range of possible estimates.
6. Reserve analysis, to set up contingency reserves to account for cost uncertainty. Contingency reserves are part of the project's funding requirements.
7. Cost of quality, to provide for quality assurance and control costs of the project.
8. Project management estimating software, including things like computerized spreadsheets, simulation and statistical tools

Inputs, Tools and Techniques, Outputs (cont)

9. Vendor bid analysis in which vendor cost bids are analyzed to determine reasonable "should costs" estimates.

What are the OUTPUTS of the process - Estimate Costs?

1. Activity costs estimates, in summary form or in detail
2. Basis of estimates includes detail necessary to support the estimate and how it was determined. Also indicates the range of possible results as an indicator of the expected accuracy of the estimate.
3. Project document updates including the risk register.

What are Reserves?

- Contingency reserves are allowances for unplanned but potentially required changes resulting from the risks identified in the risk register. Included in the cost baseline.
- Management reserves are budgets reserved for unplanned changes to project scope and costs, and will usually require the project manager to obtain approval before spending management reserves.

Inputs, Tools and Techniques, Outputs (cont)

- Management reserves are not included in cost baseline, but may be included in the project budget, and are not included in project earned value calculations.

Describe the Process - Determine Budget.

Aggregating the estimated cost of individual schedule activities or work packages to establish a total cost baseline for measuring project performance. It includes all authorized budgets but excludes management reserves.

What are the INPUTS of the process - Determine Budget?

1. activity cost estimates, from Estimate Costs process
2. Basis of estimates, from Estimate Costs
3. Scope baseline, containing the scope statement, which may contain limitations by period for project expenditures from the organization, contract, or government agency. It also includes the WBS and WBS dictionary.
4. Project schedule, from Develop Schedule, which provides the "when" for costs.

Inputs, Tools and Techniques, Outputs (cont)

5. Resource calendars, which may indicate resource costs over the length of the project (e.g. rate increases)
6. Contracts for products, services or results that are purchased.
7. Organizational process assets, including policies, procedures, and guidelines related to budgeting, as well as budgeting tools and reporting methods.
What are the TOOLS AND TECHNIQUES of the process - Determine Budget?
1. Cost aggregation, which aggregates by work package, then to higher levels such as control accounts, and ultimately the entire project cost
2. Reserve analysis, to establish contingency and management reserve requirements.
3. Expect judgement, particularly related to the application area of the project.
4. Historical relationships for parametric or analogous estimates

Inputs, Tools and Techniques, Outputs (cont)

5. Funding limit reconciliation, to relate timing of expenditures to any limitations on the commitment of funds during the project.
What are the OUTPUTS of the process - Determine Budget?
1. Cost performance baseline, an authorized time-phased budget used to measure and monitor project cost performance. Sumss the approved budget expenditures by time period, and is displayed as an S-curve showing accumulated expenditures over time.
2. Project funding requirements, which are set in a step function to stay ahead of the cost baseline considering cash flow delays.
3. Project document updates, including cost estimates, project schedule, and the risk register.
How is the Cost Baseline usually graphed?
The Cost Baseline is usually displayed as an S curve.
Describe the process - 7.3 Control Costs.

Inputs, Tools and Techniques, Outputs (cont)

The process of monitoring project status to updates project budget and managing changes to the cost baseline.
This effort includes updating actual costs spent.
Any increase to the budget must be approved through Perform Integrated Change Control
As we monitor costs we also must ensure that we are receiving value for the cost expended. We will find the earned value management technique useful in this context.
What does Controlling Costs include?
Controlling costs includes:
- influencing factors that create changes to the cost baseline
- Ensuring requested changes are acted on timely
- Managing the actual changes when and as they occur
- Assuring that expenditures do not exceed the authorized funding by period and in total for the project.
- Monitoring cost performance to detect and understand variances from the cost baseline.

Inputs, Tools and Techniques, Outputs (cont)

- Monitoring work performance against funds expended
- Preventing incorrect, inappropriate, or unapproved changes from being included in the reported cost or resource use.
- Informing appropriate stakeholders of approved changes
- Acting to bring expected cost overruns within approved limits.
What are the INPUTS of the process - Control Costs?
1. Project management plan, which contains the cost management plan and the cost performance baseline
2. Project funding requirements from Determine Budget
3. Work performance information which comes from Direct and Manage Project Execution, and provides deliverable status, actual costs and estimates for cmpleted work
4. Organizational process assets, including cost control policies, procedures, and guidelines, as well as tools and monitoring and reporting methods.

Inputs, Tools and Techniques, Outputs (cont)

What are the TOOLS AND TECHNIQUES of the process - Control Costs?
1. Earned value management
2. Forecasting
3. To-complete performance index
4. Performance reviews
5. Variance analysis
6. Project management software
What are the OUTPUTS of the process - Control Costs?
1. Work performance measurements (CV, SV, CPI, and SPI) for WBS components and control accounts.
2. Budget forcasts
3. Organizational process assets updates with historical information and lessons learned
4. Change requests when the baseline must be changed. These are processed through Perform Integrated Change Control process.
5. Project management plan updates, including the cost performance baseline and the cost management plan
6. Project document updates, including cost estimates and basis of cost estimates

What is Earned Value Management (EVM)?

-Earned value is a commonly used method of measuring project performance. It integrates scope, cost, and schedule measures.
- The focus is the accurate measurement of physical performance against a detailed plan
- It also allows for accurate prediction of the final costs and schedule
- Earned value management requires an integrated baseline against which to measure performance
Earned Value Management Overview
- EVM measures true cost performance "what we got for what we spent."
- It has three dimensions of data:
1. The Planned Value (PV) of the work
2. The Earned Value (EV) of the physical work accomplished
3. The Actual Costs (AC) incurred to accomplish the earned Value
- Two critical Variances may be determined: Scheduled Variance and Cost Variance
- Variances may be converted into indices:
-- Schedule performance index

What is Earned Value Management (EVM)? (cont)

-- Cost performance index
What is Earned Value (EV)?
Earned Value (EV) is the budgeted value of work completed during the selected time period.
What is Planned Value (PV)?
Planned Value is the budgeted cost for the work scheduled during the selected time period.
What is Actual Cost (AC)?
Actual Cost is the actual cost of work performed during the selected time period.
What is Schedule Variance (SV)?
Schedule variance is the earned value minus the planned value (EV - PV)
What is Cost Variance (CV)?
Cost Variance (CV) is the earned value minus the actual cost (EV - AC)
What is Schedule performance index (SPI)?
Schedule Performance Index (SPI) is the earned value divided by the planned value (EV/PV).
What is Cost Performance Index (CPI)?

What is Earned Value Management (EVM)? (cont)

Cost Performance Index (CPI) is the earned value divided by the actual cost (EV/AC).
What is the difference between Variances VS. Performances Indexes?
- Variances are measured in absolute values, like dollars.
- Performance indices are ratios
- A variance indicates where you are. A performance index measures how well you are performing against planned efficiency
- Both are useful measures
- Variance: plus good, minus bad
- Index: more than 1 good, less than 1 bad
How do you establish EV for in-process work packages?
The Measurement method should be specified in the cost management plan
- Keep the EV calculation method as simple as possible
- The first EV analysis should be performed at the 15-20% period of the project life cycle.
Measurement methods:
- 0/100 : No credit until its done - You understate/conservative

What is Earned Value Management (EVM)? (cont)

- 50/50 : Take 50% when you start and 100 when done
- % Complete : Base on estimating and prone to subjective opinion
- Milestone
- Apportioned Effect : Divy % of hours to various tasks
- Level of Effort

Forecasting

What is Forecasting?
- Making estimates or predictions of conditions in the project's future based on information and knowledge available at the time of the forecast.
- As the project progresses, the project team may develop a forecast of the estimated cost at completion that is significantly different from the original budget at completion.
- At all times, the estimate at completion is equal to the actual costs so far, plus an estimate to complete the remaining project work.

Forecasting Terms
ETC - Estimate to complete
EAC - Estimate at completion
BAC - Budget at completion

Forecasting (cont)

How do you determine Variance at completion?
Variance at Completion = Budget at Completion - Estimate at Completion
VAC = BAC-EAC
How do you determine % Complete (performance)?
Earned Value / Budget at Completion
EV/BAC
How do you determine % Completion (schedule)?
Project Value / Budget at Completion
PV/BAC
What are the three approaches of Forecasting?
1. EAC forecast for ETC at the budgeted rate: EAC = AC + BAC - EV
2. EAC forecast for ETC at the cumulative CPI: EAC = BAC / CPI
3. EAC forecast for ETC considering both the CPI and SPI factors. This is used when we have a negative cost performance to date, and must meet a firm schedule date commitment. EAC = AC + (BAC - EV) / (CPI X SPI)
When is To Complete Performance Index (TCPI) used?

Forecasting (cont)

To Complete Performance Index (TCPI) is used to determine cost performance efficiency required to complete project within the original budget (BAC) or revised budget (EAC).
1. Revised Budget: TCPI (EAC) = (BAC-EV)/(EAC-AC)
2. If budget can NOT be revised: TCPI (BAC) = (BAC/EV)/(BAC-AC)
How are Performance Reviews used?
Performance Reviews are used to compare cost performance over time, schedule activities or work packages over-running and under-running budget (Planned Value), milestones due, and milestones met.
1. Variance analysis
2. Trend analysis
3. Earned value performance
How is Variance Analysis used?
The cost management plan, created in Develop Project Management Plan, describes how cost variances will be managed.
- Example: response might be different for major versus minor variance. Plan would define what constitutes minor, and what to do

Forecasting (cont)

- Variances should decrease as project progresses; therefore the definition of minor variance may change during the project
How is Project Management Software used?
Software may be used to process actual costs and the EVM values, and to display graphical trends.