**Project Cost Management, PMBOK 6th Edition**

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*“Project cost management involves defining and controlling the cost to ensure the project is completed within the approved budget.”*

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|  | **Project Cost Management** | **Process Groups** | | | | |
|  | **Major Processes** | Initiating | Planning | Executing | Monitoring &  Controlling | Closing |
|  | Plan Cost Management |  | 1 |  |  |  |
| 🡪 | Estimate Costs |  | 2 |  |  |  |
| 🡪 | Determine Budget |  | 3 |  |  |  |
| 🡪 | Control Costs |  |  |  | 4 |  |

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| --- | --- |
| **Estimate Costs** | Cost Estimates. 🡪 Primary Cost, Secondary Costs |

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| --- | --- |
| **Determine Budget** | WBS 🡪 Cost Estimates 🡪 Cost Baselines |

|  |  |
| --- | --- |
| **Control Costs** | Cost Baseline 🡪 Performance reports 🡪 Evaluation and action  [ Earned Value Analysis ] |

**Estimate Costs.** .

Cost Estimates: Types, Methods, Accuracy, Time, Approach

🡪 Primary Cost, Secondary Costs

**Design Breakdown of Primary Cost Sources.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Scope  Statement | | 🡪  🡨 | WBS | |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | Work  Packages | | 🡪 | Code of  Accounts | |  |  |  |  |  |  |
|  |  |  |  |  |  | 🡨 |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | Activities | | 🡪 | Tasks | |
|  |  |  |  |  |  |  |  |  |  |  |  | 🡨 |

**Breakdown of Secondary Cost Sources.**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Risk | |  | 🡪  🡨 | Reserves | |  | 🡪  🡨 | Quality | | 🡪  🡨 |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  | Time &  Cost |  |  |  | Management  Reserves  (Out of Scope) |  |  |  | Improvement of  Specifications |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
|  |  | Risk  Register |  |  |  | Contingency  Reserves  (Unplanned) |  |  |  | Changes Needed to  meet Specifications |
|  |  |  |  |  |  |  |  |
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| **Types of**  **Estimates** | **Methods of**  **Estimating** | **Accuracy of**  **Estimates** | **Preparation of**  **Estimates** | **Approach** |
| ROM\*  Budgetary  Definitive | Parametric  Analogous  Analysis | Low  Medium  High | Days  Weeks  Months | Judgment  History  Data; Quotes |

\*ROM=Rough Order of Magnitude

|  |
| --- |
| **Methods of Estimating**  Parametric 🡪 Relying on parametric curves, scale factors, or capacity reports.  Analogous 🡪 Comparing similar projects, activities, or tasks  Analysis 🡪 Applying computerized tools, bottom-up estimation analysis, engineeringdata, vendor quotes, learning curves, estimating manual, or three-point estimate.  [ Cost = (Optimistic Cost + 4\*(Most Likely Cost) + Pessimistic Cost)/6 ] |
| **Cost estimation by task of an activity.**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **A** | **Cost** |  | **Task 1** | **Task 2** | **Task 3** | **Task 4** | **Task 5** | | 1 | 2000 |  | 300 | 700 | 400 | 600 |  | | 2 | 5000 |  | 1500 | 500 | 1000 | 1300 | 700 | | 3 | 5000 |  | 1000 | 500 | 1500 | 2000 |  | | 4 | 6000 |  | 2800 | 1200 | 1400 | 600 |  | | 5 | 3000 |  | 1200 | 200 | 500 | 1000 | 100 | | 6 | 2000 |  | 500 | 500 | 1000 |  |  | | 7 | 2000 |  | 500 | 1500 |  |  |  | |

Conventionally, on Low-Tech, Routine Projects, use cost estimating manuals.

On High-Tech, Creative Projects, use cost change management

**Determine Budget.**

WBS 🡪 Cost Estimates 🡪 Cost Baselines

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Cost Baseline.** | | | | | | | |
| **A** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Cost** |
| 1 | 1000 | 1000 |  |  |  |  | 2000 |
| 2 |  | 2000 | 1000 | 2000 |  |  | 5000 |
| 3 |  |  | 3000 | 2000 |  |  | 5000 |
| 4 |  |  |  | 4000 | 2000 |  | 6000 |
| 5 |  |  |  |  | 3000 |  | 3000 |
| 6 |  |  |  |  | 1000 | 1000 | 2000 |
| 7 |  |  |  |  |  | 2000 | 2000 |

**Control Costs.**

Cost Baseline 🡪 Performance reports 🡪 Evaluation and action

Earned Value Management.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| .  Consider a 6-month project with the following budget or cost baseline:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **Activity** | **Cost** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | | 1 | 2000 | 1000 | 1000 |  |  |  |  | | 2 | 5000 |  | 2000 | 1000 | 2000 |  |  | | 3 | 5000 |  |  | 3000 | 2000 |  |  | | 4 | 6000 |  |  |  | 4000 | 2000 |  | | 5 | 3000 |  |  |  |  | 3000 |  | | 6 | 2000 |  |  |  |  | 1000 | 1000 | | 7 | 2000 |  |  |  |  |  | 2000 |   . |
| .  Assume the project reports at the end of March a total cost of $12,500 and the progress:   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Activity | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | % Completed | 100 | 100 | 60 | 0 | 0 | 0 | 0 |   . |
| .  **Perform an “Earned Value Analysis” (EVA) with the following definitions:**   |  | | --- | | Planned Value (PV). The budgeted cost of work scheduled (BCWS).  The amount of cost allocated to an activity in the budget. | | Actual Cost (AC). The actual cost of work performed (ACWP).  The total direct and indirect cost of the project to date. | | Earned Value (EV). The budgeted cost of work performed (BCWP).  The percent of the activity completed multiplied by the planned value. |   . |

**Earned Value Analysis**

Consider the 6-month, $25,000 project:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **A** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **PV** | **%** | **EV** |
| 1 | 1000 | 1000 |  |  |  |  | 2000 | 100 | 2000 |
| 2 |  | 2000 | 1000 | 2000 |  |  | 5000 | 100 | 5000 |
| 3 |  |  | 3000 | 2000 |  |  | 5000 | 60 | 3000 |
| 4 |  |  |  | 4000 | 2000 |  | 6000 |  |  |
| 5 |  |  |  |  | 3000 |  | 3000 |  |  |
| 6 |  |  |  |  | 1000 | 1000 | 2000 |  |  |
| 7 |  |  |  |  |  | 2000 | 2000 |  |  |
| PV | 1000 | 3000 | 4000 | 8000 | 6000 | 3000 | 25000 |  | 10000 |
| EV | 10000 |  |  |  |  |  |  |  |  |
| AC | 12500 |  | 🡨 Three values from the EVA at the end of March | | | | | | |
| PV | 8000 |  |  |  |  |  |  |  |  |
| CV | –2500 | 🡨 Cost Variance, CV=EV–AC=10000–12500= –2500 | | | | | | | |
| SV | +2000 | 🡨 Schedule Variance, SV=EV–PV=10000–8000= +2000 | | | | | | | |
| CPI | 0.8 | 🡨 Cost Performance Index, CPI=EV/AC=10000/12500=0.8 | | | | | | | |
| SPI | 1.25 | 🡨 Schedule Performance Index, SPI=EV/PV=10000/8000=1.25 | | | | | | | |
| EAC | 31250 | 🡨 Estimated Cost at Completion, E[C]=TC/CPI=25000/0.8=31250 | | | | | | | |
| EAC | 4.8 | 🡨 Estimated Time at Completion, E[T]=TOC/SPI=6/1.25=4.8 | | | | | | | |

**Additional Terms from PMI**

BAC = Budget At Completion = Total Budget = Project PV = 25000.

ETC = Estimate To Completion = Amount of work remaining.

1. ETC can be estimated by judgment.

2. If the character of the variance of the project is atypical and is not expected to continue, then ETC = BAC – EV = 25000 – 10000 = 15000.

3. If the character of the variance of the project is typical and is expected to continue, then use CPI, ETC = (BAC – EV) / CPI = (25000 – 10000) / 0.8 = 18750.

EAC = Estimate At Completion = Amount of total work.

1. EAC can be estimated by judgment.

2. If the character of the variance of the project is atypical and is expected to not continue, then EAC = AC + ETC = AC + BAC – EV = 12500 + 25000 – 10000 = 27500.

3. If the character of the variance of the project is typical and is expected to continue, then use CPI, EAC = AC + (BAC – EV) / CPI = 12500 + (25000 – 10000) / 0.8 = 31250.