Cost Estimating

GAO Cost Estimating Process

The GAO Cost Estimating Process consists of 12 steps. Each step builds upon each other to develop and comprehensive and complete cost estimate. Each of the 12 steps is important for ensuring that high-quality cost estimates are developed and delivered in time to support important decisions.

Step 1: Define estimate’s purpose

* Determine estimate’s purpose, required level of detail, and overall scope;
* Determine who will receive the estimate

Step 2: Develop Estimating Plan

* Determine the cost estimating team and develop its master schedule;
* Determine who will do the independent cost estimate;
* Outline the cost estimating approach;
* Develop the estimate timeline

Step 3: Define Program Characteristics

* In a technical baseline description document, identify the program’s purpose and its system and performance characteristics and all system configurations;
* Any technology implications;
* Its program acquisition schedule and acquisition strategy;
* Its relationship to other existing systems, including predecessor or similar legacy systems;
* Support (manpower, training, etc.) and security needs and risk items;
* System quantities for development, test, and production;
* Deployment and maintenance plans

Step 4 Determine Estimating Structure

* Define a work breakdown structure (WBS) and describe each element in a WBS dictionary (a major automated information system may have only a cost element structure);
* Choose the best estimating method for each WBS element;
* Identify potential cross-checks for likely cost and schedule drivers;
* Develop a cost estimating checklist

Step 5 Identify ground rules and assumptions

* Clearly define what the estimate includes and excludes;
* Identify global and program-specific assumptions, such as the estimate’s base year, including time-phasing and life cycle;
* Identify program schedule information by phase and program acquisition strategy;
* Identify any schedule or budget constraints, inflation assumptions, and travel costs;
* Specify equipment the government is to furnish as well as the use of existing facilities or new modification or development;
* Identify prime contractor and major subcontractors;
* Determine technology refresh cycles, technology assumptions, and new technology to be developed;
* Define commonality with legacy systems and assumed heritage savings;
* Describe effects of new ways of doing business

Step 6: Obtain Data

* Create a data collection plan with emphasis on collecting current and relevant technical, programmatic, cost, and risk data;
* Investigate possible data sources;
* Collect data and normalize them for cost accounting, inflation, learning, and quantity adjustments;
* Analyze the data for cost drivers, trends, and outliers and compare results against rules of thumb and standard factors derived from historical data;
* Interview data sources and document all pertinent information, including an assessment of data reliability and accuracy;
* Store data for future estimates

Step 7: Develop Point Estimate and Compare it to an Independent Cost Estimate

* Develop the cost model, estimating each WBS element, using the best methodology from the data collected, and including all estimating assumptions;
* Express costs in constant year dollars;
* Time-phase the results by spreading costs in the years they are expected to occur, based on the program schedule;
* Sum the WBS elements to develop the overall point estimate;
* Validate the estimate by looking for errors like double counting and omitted costs;
* Compare estimate against the independent cost estimate and examine where and why there are differences;
* Perform cross-checks on cost drivers to see if results are similar;
* Update the model as more data become available or as changes occur and compare results against previous estimates

Step 8: Conduct Sensitivity Analysis

* Test the sensitivity of cost elements to changes in estimating input values and key assumptions;
* Identify effects on the overall estimate of changing the program schedule or quantities;
* Determine which assumptions are key cost drivers and which cost elements are affected most by changes

Step 9: Conduct Risk and Uncertainty Analysis

* Determine and discuss with technical experts the level of cost, schedule, and technical risk associated with each WBS element;
* Analyze each risk for its severity and probability;
* Develop minimum, most likely, and maximum ranges for each risk element;
* Determine type of risk distributions and reason for their use;
* Ensure that risks are correlated;
* Use an acceptable statistical analysis method (e.g., Monte Carlo simulation) to develop a confidence interval around the point estimate;
* Identify the confidence level of the point estimate;
* Identify the amount of contingency funding and add this to the point estimate to determine the risk-adjusted cost estimate;
* Recommend that the project or program office develop a risk management plan to track and mitigate risks

Step 10: Document the Estimate

* Document all steps used to develop the estimate so that a cost analyst unfamiliar with the program can recreate it quickly and produce the same result;
* Document the purpose of the estimate, the team that prepared it, and who approved the estimate and on what date;
* Describe the program, its schedule, and the technical baseline used to create the estimate;
* Present the program’s time-phased life-cycle cost;
* Discuss all ground rules and assumptions;
* Include auditable and traceable data sources for each cost element and document for all data sources how the data were normalized;
* Describe in detail the estimating methodology and rationale used to derive each WBS element’s cost (prefer more detail over less);
* Describe the results of the risk, uncertainty, and sensitivity
* analyses and whether any contingency funds were identified;
* Document how the estimate compares to the funding profile;
* Track how this estimate compares to any previous estimates

Step 11: Present Estimate to Management for Approval

* Develop a briefing that presents the documented life-cycle cost estimate;
* Include an explanation of the technical and programmatic baseline and any uncertainties;
* Compare the estimate to an independent cost estimate (ICE) and explain any differences;
* Compare the estimate (life-cycle cost estimate (LCCE)) or independent cost estimate to the budget with enough detail to easily defend it by showing how it is accurate, complete, and high in quality;
* Focus in a logical manner on the largest cost elements and cost drivers;
* Make the content clear and complete so that those who are unfamiliar with it can easily comprehend the competence that underlies the estimate results;
* Make backup slides available for more probing questions;
* Act on and document feedback from management;
* Request acceptance of the estimate

Step 12: Update the Estimate to reflect Actual Costs and Changes

* Update the estimate to reflect changes in technical or program assumptions or keep it current as the program passes through new phases or milestones;
* Replace estimates with EVM EAC and independent estimate at completion (EAC) from the integrated EVM system;
* Report progress on meeting cost and schedule estimates;
* Perform a post mortem and document lessons learned for elements whose actual costs or schedules differ from the estimate;
* Document all changes to the program and how they affect the