

The Estimate at Completion - A Project Management Best Practice

Project managers are continually asked by company management and the customer to verify that the project's cost and schedule goals can be met within the authorized budget, the Budget at Completion (BAC), and the Planned Completion Date (PCD). The Estimated at Completion (EAC) and the Estimated Completion Date (ECD) are the measures used to provide the answers to this question.

The Earned Value Guidelines define the EAC as the sum of the contract's cumulative to date Actual Cost of Work Performed (ACWP) plus the company project manager's best estimate of the time-phased resources (funds) required to complete the remaining authorized work, the Estimate to Complete (ETC). This relationship is often expressed by the formula $EAC = ACWP + ETC$. Thus, the EAC is a forecast of the project's final cost. The project manager may revise work priorities, replan remaining tasks on the project schedule and/or adjust the technical approach to complete the project's goals within the estimated remaining resources. The goal is to complete all of the contract work scope within the Contract Target Cost (budget) and Contract Completion Date (schedule).

As with all estimates, the level of uncertainty of an EAC will vary with the type of remaining work, the available information, and the perceived remaining risks. Prudent management needs to know how valid an EAC is, especially when the EAC varies significantly from the project's authorized budget (BAC). Thus, the objectives of project management include the identification of the level of uncertainty associated with the remaining schedule, establishing the cost estimate for the remaining work, and managing the impact of the uncertainty upon the project cost goals.

For these reasons, the Contract Performance Report (CPR) and the Integrated Program Management Report (IPMR) require three separate EACs in an attempt to capture information regarding the level of cost uncertainty or the magnitude of the known project risks. These reports require EACs which represent the Best Case (or lowest potential

cost), the Worst Case (or highest potential cost) and the Most Likely EAC (the project manager's best estimate) with their respective forecasted completion dates---generally referred to as Estimated Completion Dates (ECDs).

Another important factor to consider regarding realistic EACs and customer reporting is the Sarbanes/Oxley Act. Unrealistic EACs reported in publicly owned companies are subject to the consequences of this Act. The Sarbanes-Oxley Act came into force in July 2002 and introduced major changes to the regulation of corporate governance and financial practices. With regard to periodic statutory financial reports (i.e., Company Annual Reports) the Act requires that a company include certifications that: The financial statements and related information fairly present the financial condition and the results in all material respects. Financial statements published by issuers are required to be accurate and presented in a manner that does not contain incorrect statements. Note that the financial information on CPRs and IPMRs directly feed corporate annual reports and that serious overrun or underrun conditions will effect the profit statements in these reports. The Act also imposes penalties and fines and/or imprisonment for altering, destroying, mutilating, concealing, falsifying records, documents or tangible objects with the intent to obstruct, impede, or influence a legal investigation.

Since the actual cost to date is a known value, EAC uncertainty is a function of the Estimate to Complete. The ETC is prepared by re-estimating the resources required to complete the remaining authorized work using the cost experience to date and then applying a number of other factors; such as current direct and overhead rates, Schedule Risk Assessment (SRA), Monte Carlo simulations, root cause analysis, etc.

A well conceived ETC also considers purchase order commitments, anticipated labor efficiency and rate, material price and usage, Other Direct Cost (ODC) price and usage performance, risk and opportunities, resources by type, and other factors identified by higher management. Additionally, as the ETC is being developed it should be mapped to the current schedule consistent with the Estimated Completion Date (ECD).

As a means to cross-check the EAC, a mathematical or independent estimate of the EAC is typically prepared using performance indices based upon the cost and schedule experience to date. For example, the Cost Performance Index (CPI) (cumulative Budgeted Cost for Work Performed / ACWP) can be used to complete the EAC by dividing the project BAC by the CPI. The resulting EAC is often referred to as the

Independent EAC (IEAC) to distinguish it from a formal or grass roots EAC. The IEAC can be quickly prepared and then used to test the reasonableness of the current cost estimate and to indicate when a comprehensive EAC should be undertaken. It is important to note that these calculations do not consider any “thinking” about the considerations mentioned above with respect to anticipated labor efficiency and rate, risk and opportunities, SRA, etc. It is often said that they are independent of sanity, logic and judgment but are calculated for comparative analysis---an important purpose.

The capability to regularly prepare an EAC along with the calculation of the Best Case, Worst Case, and Most Likely EACs is becoming an industry best practice. At least annually, a complete “bottoms-up” EAC, called the Comprehensive EAC, is required on those projects subject to the DFAR 252.234-7002 Earned Value Management System requirements. A comprehensive EAC is also often prepared at the start of a major project phase; such as the start of production or construction. Consequently, it can reflect the reduced uncertainty resulting from a design release and/or a released bill of material, which enables the project manager to answer these questions:

- Are the remaining authorized funds sufficient to complete the project?
- Is prior cost experience a predictor of future cost performance?
- Should the remaining project be modified based upon the performance to date?
- Will the project cost performance impact the corporate financial condition?

Thus, a timely and realistic EAC and ECD should be an integral part of both project management and corporate financial management practices. Both should require routine comparison of the EAC and ECD with the contract targets to forecast realistic financial performance for customers and stockholders.