EM-53 Lessons Learned Bulletin

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Estimates at Completion

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Statement:

The Department of Energy (DOE) Order 413.3B requires all contractors executing capital asset projects on cost reimbursable contracts to use Earned Value Management Systems (EVMS) to measure cost and schedule performance. In order to ensure that the information presented by the contractor's EVMS is accurate, the contractor's EVMS must be certified in compliance with the American National Standards Institute (ANSI) / Electronic Industries Alliance (EIA) EVMS Standard 748 guidelines, as outlined in the National Defense Industrial Association (NDIA) Integrated Program Management Division (IPMD) Intent Guide. A critical component of the EVMS is a forward-looking estimate at completion (EAC). The Deputy Secretary for Energy stated in the memorandum "Project Assessment and Reporting System (PARS II) Data Quality," dated June 19, 2012, "Federal Project Directors must assure project cost and schedule performance reflects reality. Monthly EACs are a must, including a separate EAC, or forecasted total project cost, provided by the Federal Project Director. EVMS gamesmanship will not be tolerated." The DOE Office of Acquisition and Project Management (OAPM) Glossary of Terms defines EAC as "actual cost of work completed to date plus the predicted costs and schedule for finishing the remaining work. The current estimated total cost for project authorized work. EAC equals the actual cost to a point in time plus the estimated costs to completion." Guideline 27 of the NDIA Intent Guide states: "Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements" (Reference 1). The intent guide further states "The control account managers are responsible for maintaining the control account level latest revised estimate to complete that is assessed on a monthly basis. Periodically, a comprehensive or bottom-up estimate at completion should be prepared using all available information to arrive at the best possible estimate at completion." However, during EVMS certification and surveillance reviews, EM-53 found violations of the EAC development process, monthly EAC updates focused on the current fiscal year only and not the contract period, and contractors not developing annual bottoms-up EACs. In order to provide an accurate and verifiable assessment of the project's cost and schedule performance, it is imperative that contractors provide accurate and timely EACs.

Discussion:

When properly implemented, EVMS provides project managers with accurate and reliable budget and schedule performance measures via Contractor Performance Reports (CPRs). These CPRs can be used to provide the current health of the project and also identify trends and forecasts through EACs. However, when not implemented properly, these forecasts can hide issues within a project which can leave project managers blindsided when the issues arise and the project exceeds its budgeted cost or schedule. In order to ensure these CPRs provide reliable data, OAPM and DOE Office of Environmental Management (EM) Office of Project Assessment (EM-53) conduct EVMS certification and surveillance reviews. Through the course of these reviews, EM-53 has identified recurring issues with EAC development. The three main recurring issues are that contractors are not providing best, worst, and most likely case EACs, updating EACs for the current fiscal year only, and not developing annual bottoms-up EACs. The best, worst, and most likely case EACs are described in the Data Item Description (DID) Integrated Program Management Report (IPMR) DI-MGMT-81861 (Reference 2), which is required by DOE Acquisition Letter AL-2013-11, "Contractor Business Systems," attachment B "Section H Contract Business Systems Clauses Section K Provision," which states "[t]he Contractor shall use Department of Defense's DID IPMR, DI-MGMT-81861, (current version at time of award) which contains data for measuring cost and schedule performance for this DOE contract" (Reference 3.) These EACs must present the contractor's range of EACs of all authorized contractual scope, not just the current fiscal year. Additionally, control account managers (CAMs) did not recognize that there is a difference between a routine monthly look at their EAC and a comprehensive, annual bottoms-up estimated EAC. The NDIA Intent Guide indicates an EAC more comprehensive than the monthly type of ETC should be conducted (Reference 1).

Analysis:

EACs are designed to be forward looking assessments of the project's expected future performance based upon actual performance, anticipation of risk realization, and estimates of future conditiosn. Best, worst, and most likely case EACs are designed to allow the contractor the flexibility to express multiple, justifiable final cost outcome positions. These EACs must account for assessments of contractor owned factors that may affect cost and schedule performance based on the scope of the contract, consideration of contractor owned risks and opportunities, and risk reduction and cost containment measures. By applying all of these factors, adjusted based on best, worst, and most likely cases, the contractor provides an more realistic cost and schedule forecast to the DOE.

The NDIA IPMD Intent Guide states that "[p]eriodically, a comprehensive EAC should be prepared using all available information to arrive at the best possible EAC. This is done by considering many of the same factors included in the monthly EAC evaluation at the control account level as well as:

- Evaluating both direct and indirect performance to date efficiency achieved by performing organizations for completed work and comparing it to remaining budgets and the scope of
- Assessing commitment values for material to complete the remaining work.
- Evaluation of subcontractor assessments of cost of complete their efforts.
- Estimating future conditions to derive the most accurate EAC, e.g. projected rate changes, process improvements that may result in reduced costs, or other economic factors that may impact future costs."

The ANSI/EIA 748 standard states that an organization may elect to conduct periodic (at least annual) EAC reassessments (Reference 3).

Actions:

The best measures to prevent inaccurate EACs is for the DOE project management team to conduct detailed reviews of the contractor's CPRs on a monthly basis. This allows project management teams to remain aware of cost and schedule performance trends. Additionally, the following actions help ensure accurate EACs presented by the contractor:

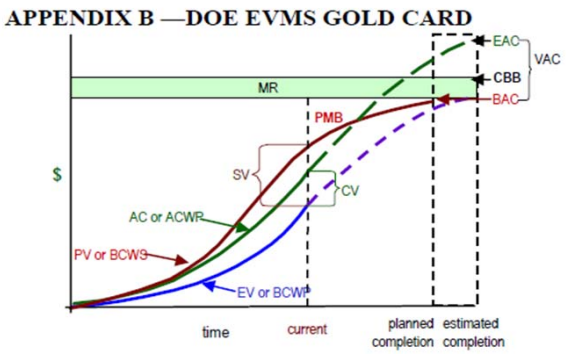
1. Provide more detailed EAC development training for CAMs and project control engineers.
2. Review EACs in the context of cost and schedule trends to ensure they account for recent performance. One method is to use the independent EACs provided by the Project Assessment and Reporting System (PARS II). The five separate iEACs calculate the EAC based on CPI, SPI, CPIxSPI, CPIxSPI (3 month average), and 0.8CPIx0.2SPI in order to provide a variety of EACs. These can be compared to the contractor's best, worst, and most likely cases to ensure they are realistic and reflect current performance.
3. Ensure bottoms-up EACs are prepared annually, using all comprehensive factors included in the monthly evaluation at the control account level are considered as well as direct and indirect performance to date, assesses commitment values for material to complete the remaining work, evaluates subcontractor assessments of costs to complete their efforts, and estimates future conditions including projected rate changes, process improvements, or other economic factors.
4. Ensure EACs are not based on performance trends which over value level of effort (LOE) scope. If necessary, consider calculating SPI and CPI after removing LOE scope in order to achieve a more accurate EAC.
5. Improve EACs through more accurate cost estimating practices using the Government Accountability Office Cost Estimating guide.

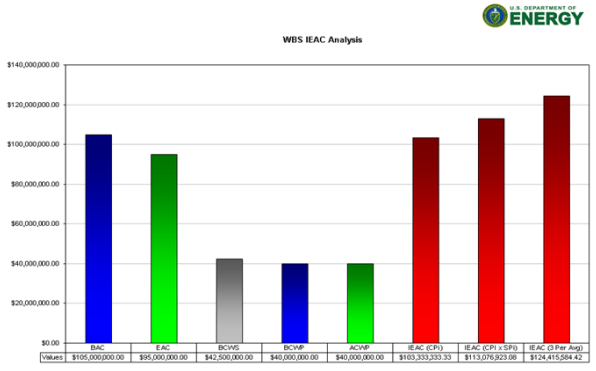
Critical Decision(s): CD-2, CD-3

Facility Type(s): All

Work Function(s): Project Management

Technical Discipline(s): Earned Value Management





Left: DOE EVMS Gold Card. EAC is represented by the green dashed line.
Right: Sample IEAC Analysis report from PARS II. Three different IEACs are calculated based on CPI, CPIxSPI, and a 3 period average of CPI and SPI.

REFERENCES:

1. "Earned Value Management Systems ANSI/EIA-748-C Intent Guide," National Defense Industrial Association Integrated Program Management Division, Washington, D.C.. April 29, 2014.
2. "Data Item Description - Integrated Program Management Report, DI-MGMG-81861," U.S. Department of Defense Defense Standardization Program, Washington, D.C.. June 20, 2012.
3. "DOE Acquisition Letter AL-2013-11, Contractor Business Systems," U.S. Department of Energy Office of Management, Washington, D.C., August 5, 2013.
4. "ANSI/EIA-748-C Earned Value Management Systems," American National Standards Institute, Washington, D.C.