

# Project Management Working Group

## Tailored Approach to Project Controls



### Problem Statement

How should Project Controls processes/tools be selected and applied to small projects (less than \$5M) as a management tool across the Complex to provide the appropriate level of benefit on work performed for DOE?

### Objective

Implement a tailored Project Controls process/tool selection methodology based on project risk and budget criteria.

#### A. Meeting the Objective

Develop a methodology for determining the appropriate level of application of Project Control, by tailoring Project Control process selection based on a defined project scoring system. All Project Control processes are not required to provide proper control and management on all projects.

#### B. Description of the tailored approach to Project Controls

A defined Project Controls process selection methodology, based on a project scoring system, provides consistency in process selection for similar projects types. The tailored approach scoring system determines an overall project score using both project risk and budget criteria. This approach focuses on projects smaller than \$5M.

### Methodology

#### I. Project Risk

The project scoring methodology uses the Tailored Approach Risk Scoring Questionnaire, Appendix A, to apply metrics to project risk categories. The questionnaire includes an evaluation of multiple risk categories based on a scale of 0-5, where 0 indicates NO risk and 5 indicates Extremely High risk. A “sub-score” would be computed for each risk category by computing an average score of the related criteria. Likewise, an overall project risk score would be determined either by computing a simple average of the risk categories, excluding the Cost category which will be a mutually exclusive scoring category, or by applying a weighted average calculation.

## II. Budget

Project budget will be scored on the following scale:

Budget (\$M)	Score
0 - 0.499	0
0.5 – 0.999	1
1 – 1.999	2
2 – 2.999	3
3 – 3.999	4
4 – 4.999	5

\*Budget scoring criteria may be modified for special cases, such as major equipment procurements with simple installation.

## III. Overall Project Score

Once the elemental Risk and Budget scores have been determined, an overall project score is computed. This computation will consist of a weighted average of the elemental scores,

Example            Risk    →    2.2 \* (0.7)  
                         Budget →    3.0 \* (0.3)  
                         Overall →    2.44

The overall project score would equal 2.44. Therefore, the project would be subject to the Project Controls processes/tools as defined in the Tailored Approach Decision Matrix, Appendix B.

The Tailored Approach Decision Matrix includes the following three primary project control Tool Groups:

**Tool Group 1** – This is the lowest level type of tools suggested for use on low risk, primarily procurement type projects.

- Scope of Work Statement
- Organize Project Team
- WBS – Work Breakdown Structure / Charge Codes
- Estimate – Formal estimate of all Project Costs
- Pricing – Calculation of Price for the estimated Quantity (SAP pricing)
- Plan Milestones / Major Dates – Most important project dates to meet project goals
- Project Execution Plan – Proposed work plan, technical, scope, estimate, schedule, baseline
- Baseline – Official fixed baseline for the project in the cost processor (SAP)
- Project Work Authorization – PM’s authorization to perform work

**Tool Group 2** – This is the middle level type of tools suggested for use on medium to high risk, medium dollar value projects.

- Periodic Review of Charges vs. Plan
- Schedule Logic / Layout – Typical P3 schedule with sufficient detail to monitor schedule progress including logic ties between activities
- Status Schedule – Determine and input schedule progress of activities on routine basis
- Report / Status Milestones and Major dates – Determine status of major project dates and include information either in schedule or other reporting vehicle
- Action Items Report – Plan, track and report near term actions required not included on schedule
- Trends – Forecast (estimate) of deviations from the estimate, scope, or schedule.
- Baseline Change Proposals – Formal Change Process for Configuration Control

**Tool Group 3** – This is the highest level type of tools suggested for use on higher risk, high dollar value projects.

- Cost Account Managers – Assigned for monitoring scope, cost and schedule
- Schedule Resource Loading – Schedule above, including quantities of hours, equipment, materials and subcontracts, using resource codes
- Objective work measurement – Method defined to measure work quantitatively
- Cost Performance Reports – Cost Processor reports format 1 etc.
- Variance Analysis – Formal analysis and reporting of project deviations from scope, cost and schedule
- Management Summary Report – Upper Management Reporting vehicle
- EV - Percent Complete in schedule – assigning percent complete to schedule activities for those activities with progress. Required for Earned value.
- EV - ETC / Forecasting in schedule – Review of remaining work to determine accuracy of remaining work. EV Percent complete required.
- EAC – Calculation in Cost Processor – Results of EV percent complete and EV –ETC Forecasting.

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## Appendix A

### Tailored Approach Risk Scoring Questionnaire

\* A 0-5 scale is used to measure each criteria within the risk categories. Each category will be assessed by computing an average of the respective criteria.

PROJECT/TASK NAME	DATE	Score		
		0	1-2	3-5
<b>A. TECHNOLOGY</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. New technology?				
2. Unknown or unclear technology?				
3. New application of existing technology?				
4. Modernized/advanced technology in existing application?				
<b>B. INTERFACES</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Multiple system interfaces?				
2. Multiple technical interfaces?				
3. Interface with operating structures, systems, and components during installation?				
4. Significant transportation or infrastructure impacts?				
5. Interfaces with multiple projects?				
6. Interfaces with multiple contractors?				
7. Significant interface with operational facility?				
<b>C. SAFETY</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Criticality potential?				
2. Significant exposure/contamination potential?				
3. Any impact on the facility's safety basis?				
4. Hazardous material involved?				
5. Process hazard potential?				
6. Hazardous materials inventories will exceed the Occupational Safety and Health Administration total quantities or Radiation Management Plan total quantities?				
<b>D. SECURITY</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Classified process/information involved? (This response requires Safeguards and Security concurrence)				
<b>E. REGULATORY/ENVIRONMENTAL CONSIDERATIONS</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Environmental assessment/impact statement required?				
2. Additional releases?				
3. Undefined disposal methods?				
4. Political visibility (U.S. Department of Energy, local government, Congress)?				
<b>F. DESIGN</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Undefined, incomplete, or unclear functional requirements?				
2. Undefined, incomplete, or unclear design criteria?				
3. Complex design features?				
4. Difficult-to-perform functional test?				
5. Numerous or unclear assumptions?				
<b>G. RESOURCES/CONDITIONS</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Adequate and timely resources not available?				
2. Specialty resources required?				
<b>H. COST (Omit – Considered separately)</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Modification total project cost greater than \$10M?				
<b>I. SCHEDULE</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Project schedule uncertainties or restraints that may impact project completion or milestone dates?				
<b>J. PROCUREMENT</b>		<b>0</b>	<b>1-2</b>	<b>3-5</b>
1. Long lead items that may affect critical path?				
2. Qualified vendors or contractors potentially unavailable?				

## Appendix B

**Tailored Approach Decision Matrix**

Project Controls Tools and Processes	Project Score				
	0-0.999	1-1.999	2-2.999	3-3.999	4-5
Scope of Work	Required	Required	Required	Required	Required
Organize Project Team	Required	Required	Required	Required	Required
WBS / Charge Codes	Required	Required	Required	Required	Required
Estimate	Required	Required	Required	Required	Required
Pricing	Required	Required	Required	Required	Required
Plan Milestones / Major Dates	Required	Required	Required	Required	Required
Project Execution Plan	Required	Required	Required	Required	Required
Baseline	Required	Required	Required	Required	Required
Project Work Authorizations	Required	Required	Required	Required	Required
Periodic Review of Charges vs. Plan		Required	Required	Required	Required
Schedule Logic / Layout		Required	Required	Required	Required
Report / Status MS / Major Dates		Required	Required	Required	Required
Status Schedule		Required	Required	Required	Required
Action Item Reports / Tracking		Required	Required	Required	Required
Variance Analysis		Required	Required	Required	Required
Baseline Change Proposals (BCP's)			Required	Required	Required
EAC - Calculation		Required	Required	Required	Required
Trends			Required	Required	Required
Action Item Reports / Tracking				Required	Required
Schedule Resource Loading				Required	Required
Objective work measurement				Required	Required
Cost Performance Reports				Required	Required
EV - % Completes in Schedule				Required	Required
EV - ETC / Forecasting in Schedule				Required	Required
EAC - Calculation in Cost Processer					Required
Management Summary Report					Required
Cost Account Managers					Required

\* Note: This matrix represents the proposed minimum Project Controls requirements, additional rigor can be introduced as needed. The scoring process should be revisited periodically over the life of the project.

## **Appendix C**

### **Best Practices**

#### **1. Trend Procedure**

The primary objective of the Trend Program is to control potential or actual changes or trends to the baseline project scope, cost, and schedule. The Trend Program is an element of the overall Earned Value Management System (EVMS) used to understand the evolution of the project, prevent cost and schedule surprises, and identify the potential impacts of changes.

The success of the Trend Program requires the active involvement of the entire project team. The Trend Program allows the project team to

- Identify changes in design, quality, and services;
- Take corrective action before changes have irrevocable cost or schedule impacts; and
- Assist in the identification of required changes to the estimate at completion (EAC) and in the explanation of cost and schedule variances on the CPR Format 5, Variance Analysis Report.

To support the Trend Program, the project team must be aware of the technical and commercial basis of the project scope, schedule, and cost baseline. Executing the work under a technical or commercial basis different from that planned could result in significant commercial impacts. The root cause of a trend must be viewed separately from its commercial impact for the Trend Program to be proactive in mitigating commercial impacts. Otherwise the Program is misused as an accounting tool that only records the actual cost or schedule impacts of changes. For example, the identification of revised structural design criteria as a root cause of increased foundation construction costs leads to greater understanding of trend than an analysis limited to the change in cost.

## **Guidelines for Identification of Trends**

A Trend is an item that represents a potential or actual change to the project or program scope, pricing, unit rates, schedule, or intended plant quality that causes an addition or reduction to the trend base estimate and/or schedule including corrections for scope/estimate omissions. Trends can arise from changes in

- Labor productivity, wage or burden rates,
- Material and subcontract prices, pricing levels, or claims
- Availability of resources
- Schedule due to delayed design, construction, or vendor design, fabrication, or delivery of material or equipment
- Quantities (if undefined in scoping statements) .Design criteria or system requirements
- Subcontractor scope, schedule, requirements, or costs
- Scope of professional services
- Anticipated requirements related to environmental, safety and health (ES&H), training, security, DOE Orders or other regulatory drivers
- Expected levels of hazardous or radiological contamination
- anticipated resource needs to complete the defined scope of work (e.g., Engineering, ES&H, Industrial Hygiene, Radiological Control, or Operations)
- Construction methods or craft jurisdictions
- Location or existence of underground or other interference
- Serviceability of existing systems or structures
- Use of overtime or shift work
- Prioritization of projects
- Funding limits or timing

ATTACHMENT C

Trend Notice			
<b>INITIATOR</b>	<b>Trend Title:</b>		Trend No: _____
			Initiator: _____
	<b>Description of Change:</b>		Date: _____
			Trend Type: Scope <input type="checkbox"/> Schedule <input type="checkbox"/> Cost <input type="checkbox"/>
<b>Reference, Source, Reason For Change:</b>		PCE:  ROM Estimate (\$1000)  ROM Estimate (Weeks)	
<b>Project WBS No.</b>	<b>Project Name:</b>	<b>Project Manager:</b>	
Potential Areas of Impact (Check all that apply and provide a brief description) <input type="checkbox"/> Safety: <input type="checkbox"/> Nuclear Safety/Nuclear Criticality Safety: <input type="checkbox"/> Regulatory Compliance/Milestones: <input type="checkbox"/> Operational Performance: <input type="checkbox"/> Site Interfaces: <input type="checkbox"/> Baseline Major Milestones: <input type="checkbox"/> Management Commitments or Corrective Action Plans: <input type="checkbox"/> Customer Requested: <input type="checkbox"/> Performance Based Incentive (PBI)/ AF: <input type="checkbox"/> Other			
<b>PCE</b>	<b>Scope, Schedule, Cost Impact:</b>		
<b>Trend Resolution</b>	<b>Disposition Of Trend:</b>		
	Resolved: <input type="checkbox"/> Scope Change - Provide BCP and obtain approval prior to commencing <input type="checkbox"/> Performance - Proceed with work, process change for contingency <input type="checkbox"/> Performance - Note in variance analysis <input type="checkbox"/> Cancelled - Note in change log		
	Unresolved: <input type="checkbox"/> Scope Change - Pending further evaluation <input type="checkbox"/> Performance - Pending further evaluation		
Comments:			
If BCP Required: _____		Project Controls Engineer	Date
BCP No. _____		_____	_____
BCP Approval Date: _____		Project Manager	Date: _____
		_____	_____

## 2. Estimate at Completion (EAC)

The current approach to forecasting project cost is calculating the Estimate at Completion, (EAC). EAC is defined as,

$$\mathbf{EAC = ACWP + ETC}$$

where ACWP is the Actual Cost of Work Performed and ETC is the Estimate to Completion. The ETC should be a forecast of all remaining work or effort on a project, including resolved trends and/or approved changes. The ETC is normally developed within the schedule through the routine schedule update and status process. This process determines work completed, based on percent complete of activities in progress, as well as work remaining. Trends or changes are included in the forecast schedule with increased quantities where required, either in existing activities or new activities. Through this process, and appropriate analysis, the resulting forecast provides an accurate EAC. See **Appendix C** for further information on trends.

Alternative EAC calculation methods are also used to forecasting project completion statistics. An example of an alternate EAC calculation method is using project performance history to forecast future project performance. These alternative methods are primarily project type dependant and are available in industry literature.

## 3. Training

In order to effectively implement and manage projects, the project control tools and processes have to be understood by all parties. Improving the understanding of the tools and processes by both DOE and contractors through the appropriate level of training is a must. The following provides the typical training content that can be used for EVMS training:

### Introduction to EVMS

What is EVMS?

Why does it apply to us?

How does one do it?

- Define the Scope
- WBS Hierarchy
- Control Accounts
- Plan and Schedule the Work
- Establish Budgets
- Set the Baseline
- Cost Collection
- Earned Value
- ETC/EAC
- Change Control

### Earned Value and Variance Analysis Determination

- Quantitative Methods
- Variance Analysis
- Calculations
- Schedule Variances
- Cost Variances
- CPR Report
- Impacts
- Corrective Actions

### Trends and Estimate-At-Completion

#### Trend Definition

#### Trend Program

- Objectives
- Key Attributes
- Process
- Trend Identification
- Evaluation
- Resolution

## **4. Accountability**

To enhance the oversight and Performance Management on projects, especially larger projects, the Cost Account Manager (CAM's) concept should be utilized, where selected parts of the WBS are assigned to appropriate managers for monitoring and controlling, scope, cost and schedule. They are part of the Project Team and are held accountable for their area of the WBS and provide important feedback to the Project Manager and the rest of the Project Team. CAM's would have the lead responsibility to determine and provide the Variance Analysis on a project with the assistance of the Project Controls personnel.

## **5. Certification**

Formal EVMS Certification is not recommended as a requirement for projects, but should be used as a guide to direct the project resources to the right level of control. Project resources that would otherwise be focused on the certification process, could be used to improve analysis and develop good corrective actions. Points of certification should be addressed and applied to the project as appropriate. See **Appendix D** for points of certification.

## **6. Fee Determination**

Caution should be used in selection of the criteria that will be used to monitor the contractors for use in Fee determination. The many tools and processes must all be used in conjunction, to properly manage a large, complex, high risk project. Most of the tools, such as EVMS (including CPI and SPI), are only one piece of the puzzle and may only be snapshots in time and not a true indicator of the overall project performance. True performance can only be confirmed at the end of a project.

## 7. Other Suggested Best Practices

- a. Estimates should be aligned with the schedule activities in an easy to understand manner.
- b. Use Project Performance Indicators as intended to take early corrective action
- c. Use Summarized Performance Indicators as derived from discreet schedule status
- d. Be consistent with level of review and methods when developing variance analysis
- e. The 5 basic guidelines of EVM include:
  - Organize the project team & the scope of work
  - Schedule tasks in a logical fashion
  - Allocate the total budget resources
  - Establish objective means for measuring work
  - Control the Project
- f. Schedule Activities and their Relationship to Cost and Schedule Performance Curves:

Schedules are prepared with discreet activities of identified work that make up the Project Plan (attached). The duration of these activities varies in days, weeks or months. Each activity is assigned with estimated resource requirements or estimated dollars necessary to complete the work. Each of these activities is progressed on a regular basis, at least monthly, with the percent of work that has been accomplished for that activity. The results of this process yield project performance indicators that can be used to measure work scheduled vs. work performed. This data as summarized is used to prepare the total Cost and Schedule Performance Curves (attached). These curves provide trends (CPI & SPI) to help monitor the project's performance and take appropriate actions in time.

## **Appendix D**

### **EARNED VALUE MANAGEMENT SYSTEM CRITERIA (32 points for Certification of EVMS or CSCS)**

#### **Organization**

1. Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.
2. Identify the program organizational structure including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.
3. Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.
4. Identify the company organization or function responsible for controlling overhead (indirect costs).
5. Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

#### **Planning and Budgeting**

6. Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.
7. Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.
8. Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher-level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost including estimates for authorized but undefined work. On government contracts, if an over target baseline is used for performance measurement reporting purposes; prior notification must be provided to the customer.
9. Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.
10. To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.

11. Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.
12. Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is not measurable or for which measurement is impractical may be classified as level of effort.
13. Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.
14. Identify management reserves and undistributed budget.
15. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.

#### Accounting Considerations

16. Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.
17. When a work breakdown structure is used, summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.
18. Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.
19. Record all indirect costs which will be allocated to the contract.
20. Identify unit costs, equivalent units costs, or lot costs when needed. 21. For EVMS, the material accounting system will provide for:
  - (1) Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques.
  - (2) Cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material.
  - (3) Full accountability of all material purchased for the program including the residual inventory.

#### Analysis and Management Reports

22. At least on a monthly basis, generate the following information at the control account and other levels' as necessary for management control using actual cost data from, or reconcilable with, the accounting system:
  - (1) Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.
  - (2) Comparison of the amount of the budget earned the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.

23. Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.
24. Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.
25. Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.
26. Implement managerial actions taken as the result of earned value information.
27. 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.

#### **Revisions and Data Maintenance**

28. Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.
29. Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.
30. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer or management directed changes, or to improve the baseline integrity and accuracy of performance measurement data.
31. Prevent revisions to the program budget except for authorized changes. 32. Document changes to the performance measurement baseline.
32. Document changes to the performance measurement baseline.