

Project Management Lessons Learned in DOE Projects-11468

“The Past is Prologue – Study the Past”

Mark W. Frei and James G. Burritt, Longenecker & Associates, Las Vegas, NV 89135

ABSTRACT

As a result of review of DOE capital projects, lessons learned have been identified that should be examined for implementation in both ongoing and new capital projects. The overarching theme appears to be that these lessons are not new lessons, but duplication of issues from past projects because past experience is not being utilized effectively to guide future projects. As the paper's secondary theme indicates (from the front of the National Archives Building in Washington, D.C.) --“the past is prologue-study the past”-- there is much to be gained in project management improvements by studying past project management and performance.

INTRODUCTION

There is one statue on the National Archives Building in Washington D.C known as “The Past” which is inscribed with the statement “The Past is Prologue”. There is another statue known as “The Future” which is inscribed with “Study the Past”. In a Biblical context, Ecclesiastes 1-9 says “....there is nothing new under the sun”.

The authors have participated in numerous External Independent Reviews for the Office of Engineering and Construction Management across the DOE complex, as well as other project management reviews for other clients. We have found that many of the findings on the review of one project also occur later on the other projects. Truly, with regard to project management deficiencies, there is nothing new under the sun. However, many of these findings could be avoided if the projects understood that the past is prologue, study the past (review what has happened in other reviews).

For reviews performed for DOE Critical Decisions (CD), DOE Order 413.3B, Program and Project Management for the Acquisition of Capital Assets, delineates the required state of project readiness at each critical decision: CD-0 is Approve Mission Need; CD-1 is the Approve Alternative Selection and Cost Range; CD-2 is Approve Performance Baseline; CD-3 is Approve Start of Construction/Execution; and, CD-4 is Approve Start of Operations/Project Completion. DOE also has developed a series of guides which can assist the project staff in preparing documentation and procedures. Our experience has been that some projects are either not familiar with the requirements, or do not understand them. We have also found that project staffs do not always review the results of previous reviews and their associated corrective action programs. In some cases, instituted corrective actions have “become undone” over time.

DISCUSSION AND FINDINGS

Reviews are conducted project-wide. This includes the federal project organization as well as the performing contractor organization. Some of the recurring findings are obviously unique to the federal organization, while many of them apply to the integrated project organization, federal

and contractor. In the following discussion, we will present some of the recurring findings and if appropriate, provide insight as to how to avoid them.

In this section, we will discuss 13 common, recurring problems we have identified:

1. Key project management documents have not been updated or approved
2. The Federal Project Director is not certified to the proper level for the project
3. Project staff is not sufficient to properly manage the project
4. The risk management plan is inadequate
5. The concept of contingency and management reserve are not fully understood
6. The lessons learned program is inadequate or does not exist
7. A federal-level project quality assurance plan has not been prepared
8. The project is not adequately defined
9. Project staffs do not fully understand the requirements for each Critical Decision
10. Design has not reached a sufficient level of maturity to develop a baseline
11. The schedule lacks an adequate number of elements by which to measure progress
12. Cost is based upon level of effort instead of discrete, measurable work elements
13. Projects have not ensured that corrective action from previous reviews is complete;

1. Key project management documents have not been updated or have not been approved. It is not uncommon to find that the Project Execution Plan (PEP) and the Integrated Project Team (IPT) charter have not been updated or have not been approved. Both of these documents are key to managing the project.

The Project Execution Plan is the governing document that establishes the means to execute, monitor, and control, projects which are subject to DOE O 413.3B. The PEP should contain the following sections:

- Project Background and Project Description
- Justification of Mission Need
- Management Structure and Integrated Project Team
- Tailoring Strategy
- Scope, Schedule, and Cost Baseline
- Funding Profile
- Life-cycle Cost
- Project Management/Oversight Strategy
- Risk Management
- Engineering and Technology Readiness
- Environment, Safety, and Health
- Value Management
- Configuration Management
- Quality Assurance
- Communication Plan

- Test and Evaluation
- Project Reviews
- Transition to Operations

A key area in project management is effective communication. The proper use of IPTs provides that needed communication. Projects with IPTs with the proper mix of federal and contractor personnel, who work together as a team toward the common goal of completing the project on time, within the cost limits, and meeting the technical requirements, have a good chance of succeeding. Also, how and when the IPT brings the regulator “to the table” is critical to ensure that effective communication between the Federal project team, the contractor responsible for project delivery, and the federal/state/local regulator is occurring. The IPTs need to maintain focus on the proper set of issues/topics, such as emerging risk, metrics, earned value management system output, action items, regulatory compliance, etc. In some cases, the IPT’s roles, responsibilities, authorities, and accountabilities are either not established, or are not followed. In these cases, the projects do not perform as well. It is the responsibility of the IPT to prepare for reviews. The effectiveness of the IPT is often displayed by the results of the review. Establishing and maintaining effective liaison with all project players is a must for project success.

DOE O 413.3B requires that all projects establish IPTs led by a federal project director (FPD). The Order defines IPTs as “cross-functional groups of individuals organized for the specific purpose of delivering a project to an external or internal customer. IPTs are the crossroads where the technical, management, budgetary, safety, and security interest meet.” The IPT charter is the document which describes the organization and operation of the IPT.

If these two documents (the PEP and the IPT charter) are not accurate, current, and approved, the project is not ready to proceed.

2. Frequently, the Federal Project Director is not certified to the proper level for the project. DOE has four levels of certification, and the Total Project Cost determines the proper level of certification for the FPD. In the cases where this occurs, there have been no mitigation plans provided (such as providing a more highly certified mentor), no acknowledgement that the requirement has not been met from the acquisition authority, and there has been no plan that describes how and in what time frame either the FPD will achieve the proper level of certification, or when a properly certified FPD will be provided.

3. Typically, federal project staffing is insufficient to properly manage the project, and the OEMC staffing model has not been run at the time of the review. The staffing model provides the number and type of personnel appropriate to manage a specific type and size of project. It is unlikely, given budget restraints and federal personnel number limitations, that all these positions can be filled with federal staff. However, there are other alternatives. There are some project management functions which prima facie must be filled by federal employees. Those include the Federal Project Director, the Contracting Officer (and contracting staff members), and others which fill a position from which they can commit the government. There are other positions which can be filled by contractors, consultants, or subject matter experts who are not federal employees. The federal project management staff must be adequate in range and depth to

properly manage the project. DOE G 413.3-19, Federal Staffing Guide for Project Management, provides guidance for staffing a project.

4. The risk management program is inadequate. This includes:

- The risk management plan is out of date;
- Risk assessment forms contain errors and inconsistencies;
- Residual risk is improperly quantified;
- Avoidance and mitigation strategies do not appear as items in the baseline;
- Positive impact risks (opportunities) are not contained in the plan;
- The basis for probability of occurrence and consequence is not identified;
- The risk management program is not kept current; and
- Cost and schedule impacts are not realistic, or the basis for their impacts are not documented.

An active and adequate risk management program is essential to project success. Risk management is a project management specialty area, and is one where a well-chosen subject matter expert can be used to establish and maintain the program. While some projects do this, there is a tendency to let the subject matter expert run the program with minimum oversight by the FPD and the federal IPT. The FPD needs to appreciate that he is responsible for risk management, and must take an active role in it.

Of all the project management documents that need to be kept current, Risk Management Plans and the risk assessments are the most important. Risks and their consequences change with time. An effective IPT will revisit the risks with the highest probability of occurrence and highest consequence often to monitor the status of the risk, and to see if anything has changed. All the risks need to be reviewed periodically to ensure that the lower risks have not increased in likelihood or impact.

5. The concept of contingency and management reserve are not fully understood. Also, it is not understood who determines the amounts and who manages them. The federal government is responsible for determining and managing contingency. The contractor determines and manages management reserve. Contingency and management reserve are not calculated using a rigorous probabilistic risk assessment. Often, contingency is based upon a “guesstimate”. Some Project Execution Plans fail to identify the needed contingency and management reserve. The consequences of having too low a management reserve are that actual costs may exceed the contractor’s performance measurement baseline (PMB). The consequence of having too low a contingency is that the federal Performance Baseline (PB) may be exceeded and DOE may have to go back to Congress and request more funding. Neither of these situations is desirable.

6. The lessons learned program is either non-existent or inadequate. There is no indication that the project staffs consult either site or DOE-wide lessons learned programs.

Most of the lessons learned programs, if they exist at all, focus on safety or quality assurance incidents. There is little evidence that lessons learned programs include project and contract management lessons learned. The theme of this paper is that DOE projects should learn from previous reviews. There is little evidence that this is being done.

7. A federal-level project Quality Assurance (QA) Plan has not always been prepared. DOE Order 413.3B specifically requires that the project's application of QA is documented in either the organizational or project-specific QA Program that addresses 10 basic criteria: program, personnel training and qualification, quality improvement, documents and records, work processes, design, procurement, inspection and acceptance, management access, and independent assessment. The key requirements/elements of a QA Program are provided in DOE O 414.1C and 10 CFR 830 Subpart A.

The reviews have also found that where the plans exist, they at times do not reflect the current planned or existing project activities and organization. There must be a federal QA plan. A contractor level QA plan alone without a federal QA plan is insufficient.

8. The project is not adequately defined. Key Performance Parameters (KPPs) are either missing, incorrect, or incomplete. Regulatory requirements are not adequately defined. Key assumptions are not adequately defined. If the project doesn't define how what is built is supposed to perform, what the regulatory requirements and constraints are, and the assumptions which bound the project, then when the project is completed, one cannot tell whether what was built is adequate to meet the requirements. KPPs must be measurable, and are critical to defining success at the end of the project.

9. DOE projects do not fully understand the requirements for each CD, and do not understand what each review will cover. DOE provides extensive guidance in these areas. DOE Order 413.3B discusses the requirements for each CD. It also specifies what reviews, if any, are required for each CD. The reviews include Independent Project Reviews (IPRs) and External Independent Reviews (EIRs) as well as Independent Cost Estimates/Independent Cost Reviews for projects greater than \$100 million. DOE orders and guides provide information on what should be included in project documents, and what their state needs to be for each CD. In addition, the OECM EIR Standard Operating Procedure (SOP) provides detailed lists of documents required for EIRs as well as detailed lists of review topics and areas for each type of EIR. In addition, other DOE and NNSA elements which have projects may provide similar guidance for IPRs.

The requirements for Alternative Financing for DOE construction project is contained in DOE Order 413.3B, OMB Circulars A-11 and A-94, DOE Order 430.1B, and the DOE Real Property Desk Guide. There are several discrete steps that must be completed, and there must be an interface established with OMB early on in the process. These steps, although critical, to the success of the approval of an alternative financing proposal, are sometimes not followed.

Program and project staffs should consult these documents when preparing for a CD or an EIR or IPR, and should use these documents as a checklist to prepare for the reviews. For Alternative Financing, projects should closely consult with an OECM Realty Specialist to ensure that proper procedures are followed and that additional insights into the process are gained.

10. The project design has not reached the level of maturity required by DOE Order 413.3B to develop and approve the project baseline, or design review comments are unresolved and no path for resolution exists. This issue was identified by the DOE root cause analysis performed to

identify the root causes of project management problems endemic within the department. The resulting corrective action program instituted some new requirements to address the problem, including technology readiness assessments (TRAs) to determine technology readiness levels (TRLs), and product definition rating indices (PRDIs) to determine the overall readiness at each Critical Decision.

There are several implications of this: If the project has progressed to the point that the baseline is to be approved, lack of sufficient design, or unresolved design review comments can lead to an incorrect baseline estimate, or can cast doubts upon the validity of the estimate. It is recognized that in the case of design-build projects, design maturity will be less than for projects where the design is essentially complete at the time of the estimate.

The design review of a completed design package may contain comments that have not been resolved or for which proposed actions have not been identified. Also, if the project is ready to begin construction, the design must be at such a state where sufficient working drawings are complete and available to support the start of construction.

11. The schedule does not provide an adequate number of elements by which to measure progress. Frequently, the numbers of milestones are inadequate. At times, the milestones are inappropriately placed. Schedule milestones are a valuable tool for measuring progress, and if they are lacking, the project staff will have difficulty doing so. There are also cases where the milestones differ among project documents. Consistency is very important if the schedule is to be used to conduct work and evaluate progress.

12. In some cases, too much of the cost is based upon “level of effort” instead of discrete, measurable work packages. This is most commonly found in support activities, such as engineering, safety, quality assurance, and the like. One of the difficulties with this is that the level of effort activity becomes an upper limit on cost as opposed to a manageable target. It is also difficult to evaluate progress, since the only metric for this type of activity is the level of expenditure instead of a more appropriate measure.

Also, reviews have found that in some cases the procedure for reporting cost trends to the earned value management system only allows for negative (increasing) cost trends, unless there are offsetting positive (decreasing) cost adjustments. This type of procedure effectively prohibits the accurate reporting of the cost estimate-at-completion, and can lead to unexpected large project cost increases too far along in the project for recovery.

13. Project staffs have not reviewed the reports of previous reviews on the project, and have not verified that all corrective action is complete, and that completed actions have not “been undone”.

Each review team will look to see if previously reported findings and observations have been addressed and corrected, and that the corrections are still in force. Instances where previously reported findings remain unaddressed gives the impression of lack of attention to detail on the part of the project team, and since this is usually one of the first things reviewed, can provide a negative or positive impression at the start of the review.

The lesson learned from these reviews is that if project staffs consulted the governing documents for requirements, and then prepared for a review or a CD using the requirements as a reference, the number of findings should be reduced, and the nature of the findings should be less severe. Project staffs should also learn from the reviews of other similar projects. If this is done, then the past may not repeat itself, and the projects will progress with much better likelihood of success within cost and schedule baselines.

RECOMMENDATIONS

The authors recommend that projects should be proactive in learning and applying, where appropriate, the findings and observations of project reviews from other (similar) projects, and from on-going exchanges of project management issues between project staffs. We note that the Department of Energy has expanded the program of project peer reviews, which should facilitate this exchange of information. In addition, we note that the Department of Energy is investigating several methods of disseminating project management lessons learned. We also recommend that when preparing for a project review, that project staffs revisit the findings and observations of previous reviews of their own project.

REFERENCES

1. U.S. Department of Energy Order 413.3B “Program and Project Management for the Acquisition of Capital Assets, (2010)
2. U.S. Department of Energy Guides G 413.3-1 through -19 which provide guidance to support DOE O 413.3B (2008-2010)
3. U.S. Department of Energy Report “Root Cause Analysis, Contract and Project Management (2008)
4. U.S. Department of Energy Report “Root Cause Analysis, Contract and Project Management, Corrective Action Plan (2008)