

# ROOT CAUSE ANALYSIS

## CONTRACT AND PROJECT MANAGEMENT

APRIL 2008



U.S. DEPARTMENT OF  
**ENERGY**

**Cover Photo:**  
Winner of the “DOE 2007 Excellence Award in Project Management,”  
Office of Science’s Lawrence Berkeley National Laboratory, “Molecular Foundry Project”;  
an \$85 million LEED “Gold” certified facility completed within cost and schedule.



**The Secretary of Energy**  
Washington, DC 20585

April 7, 2008

MEMORANDUM FOR HEADS OF DEPARTMENTAL ELEMENTS

FROM: SAMUEL W. BODMAN   
SUBJECT: Improving Contract and Project Management

Improving the Department of Energy's project and contract management continues to be one of my major management priorities. Excellence in this area helps ensure that DOE's programs and projects meet DOE's strategic objectives, provide value to the American taxpayer, and foster public confidence in DOE's ability to manage its responsibilities.

As part of our effort to build a strong project and contract management foundation, I established under the direction of the Deputy Secretary, a senior leadership team to conduct an in-depth root cause analysis of the underlying issues that have stymied DOE's past efforts to become a leader in this area. I am pleased to announce today that the senior leadership team has delivered to me the Department of Energy Root Cause Analysis Report (RCA). I have reviewed the RCA and accept and fully endorse the conclusions and recommendations embodied in it. A copy of the RCA is attached, and it can be viewed electronically at <http://management.energy.gov>.

The RCA was developed through extensive collaboration between DOE's Headquarters and field project, contract, and financial management professionals, and in coordination with the Office of Management and Budget and the Government Accountability Office. The Root Cause Analysis identified the key elements necessary to make the meaningful changes required to consistently deliver projects within cost and schedule performance parameters; disciplined upfront planning; realistic estimates of cost and schedule; and straight forward communication between the project director and senior management.

In addition, the team is to develop a Corrective Action Plan (CAP) to ensure that DOE's efforts to improve will be focused on addressing the root causes with meaningful and lasting solutions, ensure senior leadership ownership, and provide demonstrable results. That product is currently under development, and I look forward to receiving it in the very near future.

I remain strongly committed to real and tangible improvement in DOE's project and contract performance. My endorsement of the RCA today signifies that commitment to pursue those initiatives and actions which, when implemented, will help to resolve the contract and project management issues and root causes which have challenged DOE for years. My expectation is that you, as a senior leader of this Department, will fully embrace the RCA's conclusions and recommendations and commit your organization's resources in bringing about the needed changes as ultimately reflected in the CAP. Your personal commitment and the active participation of your headquarters and field organizations are critical to our success.

Attachment





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**ENERGY**





## Root Cause Analysis: Contract and Project Management

APRIL 2008

# Executive Summary

The U.S. Department of Energy (hereafter referred to as DOE or the Department and inclusive of the National Nuclear Security Administration) dedicates substantial resources to managing and operating its complex of sites and laboratories. DOE sites and laboratories perform critical missions that include maintaining the nuclear weapons stockpile, cleaning up radioactive and hazardous waste resulting from the legacy of the Manhattan project, and conducting some of the world's most sophisticated basic and applied energy and scientific research activities. To conduct these missions, the Department has established some of the largest, most complex projects in either the public or private sector.

Over the past three decades, the Department has successfully delivered many of its capital asset projects on time and within budget; however, far too many have breached their performance baselines. This has harmed the Department's credibility and eroded support on Capital Hill. These ongoing challenges have prompted the Government Accountability Office (GAO) to include "DOE Contract (Project) Management" on their High Risk List since 1990.

Substantial contract and project management enhancements and reforms have been implemented, resulting in improved project execution and performance. During FY05–07, 70 percent of DOE projects were completed in accordance with our performance goals of completing projects within the original performance baseline with no more than 10 percent cost growth. While not all of these recently completed projects were the most complex or presented the highest risk, they demonstrate dramatic improvement from early years, while acknowledging further challenges remain.

While the Department takes pride in its recent accomplishments, significant opportunities remain for further improvement in the areas of contract and project management. In order to assess the underlying causes for past challenges, a root cause analysis was conducted to identify significant contract and project management deficiencies and to subsequently develop a strategy to make the culture changes required to allow DOE to attack these deficiencies head-on. While the emphasis of this report is directed at capital line item projects, several of the issues identified are also applicable to other projects, such as major items of equipment projects and Office of Environmental Management cleanup projects.

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A root cause analysis workshop was conducted on October 16–17, 2007, to identify and review the systemic challenges of planning and managing DOE projects. In preparation for this workshop, a thorough document review was conducted to highlight the significant issues and themes identified in previous reviews, including past studies of DOE contract and project management conducted by the United States Government Accountability Office (GAO), the National Research Council (NRC), and the DOE Inspector General (DOE IG). Appendix A details the 43 documents included in this review.

After compiling a list of 143 issues, the workshop attendees consolidated and prioritized them into a shorter list of 60 issues. The top 10 issues are listed below. These are the issues that when properly addressed will have a positive impact on all of the identified contract and project management issues.

1. DOE often does not complete front-end planning (project requirements definition) to an appropriate level before establishing project baselines.
2. DOE does not have an adequate number of federal contracting and project personnel with the appropriate skills (e.g., cost estimating, scheduling, risk management, and technical expertise) to plan, direct, and oversee project execution.
3. Risks associated with projects are not objectively identified, assessed, communicated, and managed through all phases of planning and execution.
4. Failure to request and obtain full funding or planned incremental funding results in increased risk of project failure.
5. Contracts for projects are too often awarded prior to the development of an adequate independent government estimate.
6. DOE's acquisition strategies and plans are often ineffective and are not developed and driven by federal personnel. DOE does not begin acquisition planning early enough in the process or devote the time and resources to do it well.
7. DOE's organizational structure is not optimized for managing projects.
8. DOE has not ensured that its project management requirements are consistently followed. In some instances projects are initiated or carried out without fully complying with the processes and controls contained in DOE policy and guidance.
9. Ineffective DOE project oversight has sometimes resulted in failure to identify project performance issues in a timely manner.

10. DOE is not effectively executing its ownership role on some large projects with respect to the oversight and management of contracts and contractors.

Then a “Five-Whys” root cause analysis methodology was used to identify the project management and contract management deficiency root causes. The “Five-Whys” is a question-asking method used to explore the cause and effect relationships underlying a particular problem. Ultimately, the goal of applying the “Five-Whys” method is to determine the root cause(s) of a problem.

Outlined below are the primary causes that impact the Department’s ability to consistently deliver capital asset projects on time and within budget. It should be noted that not all of the root causes apply to all DOE projects all of the time. However, when they do occur, some of the root causes are found to be prevalent within several projects leading to recurring project management and contract management deficiencies. Taken with the resulting contract and project management issues and recurring shortcomings in planning, oversight, organization, and resources, these root causes emanate from an ingrained culture of weak federal ownership of projects, including associated contracts, from inception through execution to completion. These are the root causes that must be addressed to bring about significant and lasting solutions to the Department’s contract and project management challenges:

- ◆ Insufficient number of personnel assigned to contract and project management functions
- ◆ Some personnel lack the appropriate skills to carry out all required contract and project management functions
- ◆ Lack of alignment between contract and project management authority, accountability, and responsibility
- ◆ Lack of effective contract and project management integration between line and staff organizations at headquarters, between the field and headquarters, and between contract and project management personnel
- ◆ Insufficient budget resources allocated to contract and project management
- ◆ Ineffective project and program prioritization and resource allocation negatively impacting portfolio, program, and project management
- ◆ Inadequate training for some specific areas of need in contract and project management
- ◆ Lack of defined benchmarks in specific contract and project management areas

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This root cause analysis provides a foundation for identifying and implementing corrective measures that will result in significant, measurable, and sustainable improvements in the Department's contract and project management performance and culture. A separate Corrective Action Plan (CAP) will follow this root cause analysis and be implemented to effect the required culture change.

Achieving excellence in contract and project management remains a top Departmental priority. A strong Department-wide focus, sustained leadership, and progress to make DOE the model for Federal contract and project management will anchor the Department in this endeavor. Ultimately, the consistent completion of projects on time and within budget is the benchmark and the metric to demonstrate success.

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# Chapter 1

## Introduction

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### 1.1 BACKGROUND

The Department of Energy's portfolio of contracts and projects demands a sophisticated and flexible structure that can manage contract and project risks systematically; control cost, schedule, and scope baselines; acquire, develop, and retain contract and project management personnel; optimize use of available resources; and transfer new technologies and management practices efficiently between projects.

This portfolio of projects is large, complex, and technically challenging. Many are unique, one-of-a-kind initiatives that involve cutting-edge technology. The project portfolio represents the diverse nature of DOE missions, encompassing energy systems and research, nuclear weapons development and stewardship, environmental restoration, contaminated and complex facility deactivation and decommissioning, waste management, and basic and applied energy and scientific research activities. Few other government or private sector organizations are challenged by projects of a similar magnitude, diversity, and complexity. To complete these complex projects on schedule, within budget, and in scope, the Department must employ highly developed project management capabilities, processes, and procedures.

The Department has had many project successes over the years, but also some significant cost and schedule overruns. Due to the nature of the projects and past problems, GAO has included "DOE Contract (Project) Management" on their High Risk List since 1990. The deficiencies noted within their reports include both inadequate management and oversight of contractors and failure to hold contractors accountable. Numerous other reports, some of which are included in Appendix A, have further delineated the Department's project challenges.

The Department has taken significant steps to improve contract and project management. Over the years, a number of key actions have been implemented to improve contract and project management including the following:

- ◆ Established the Office of Engineering and Construction Management and the project management support offices in the National Nuclear Security Administration (NNSA), the Office of Environmental Management (EM), and the Office of Science (SC) to ensure consistent policy, procedures, and oversight;

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- ◆ Established rigorous project management procedures by issuing DOE Order 413.3, Program and Project Management for the Acquisition of Capital Assets, along with subsequent revision and development of 18 associated Guides;
  - ◆ Implemented a Project Assessment and Reporting System (PARS) to keep leadership aware of project status and to effect appropriate corrective actions in a timely manner;
  - ◆ Established requirements for, and certification of, contractor's Earned Value Management Systems (EVMS) and EVMS training of all Federal Project Directors and Contracting Officers to ensure the accuracy of critical project management data and better enable its use;
  - ◆ Established a comprehensive External Independent Review (EIR) process to validate and recommend approval of proposed project performance baselines prior to construction capital asset budget requests;
  - ◆ Established the Project Management Career Development Program (PMCDP), the Federal Project Director Certification Program, the Acquisition Career Development (ACD) Program, and the Acquisition Professional Certification requirements to enhance the training and qualifications of contract and project management personnel;
  - ◆ Implemented enhanced Internal Project Reviews (IPRs) and Technical IPRs to better monitor project development and execution;
  - ◆ Enhanced use of project management tools and techniques, including the Project Definition Rating Index (or DOE versions with comparable content) for improved management decision-making;
  - ◆ Established the Contract Administration Division to identify and resolve systemic issues in the management of our contracts;
  - ◆ Established guidance, training, and performance measures to increase the quality and level of performance-based contracting;
  - ◆ Implemented the requirement for integrated contract management strategies in the form of Contract Management Plans;
  - ◆ Performed a reengineering assessment of our contract preparation and award processes, including recommendations for improvement;
  - ◆ Initiated EM best-in-class program for contracting and project management to identify and implement improvements;

There is recognition that there are additional opportunities for improvement. The Department has established a minimum benchmark for success and that

benchmark has not yet been achieved. This root cause analysis (RCA) is intended to identify the current reasons for continued shortcomings and to develop corrective measures aimed at improving performance.

## 1.2 CURRENT DOE SITUATION

The Department continues to rely predominantly on contractors to operate the laboratories and sites and to carry out diverse missions, including developing, maintaining, and securing the nation's nuclear weapons capability; cleaning up the radioactive and hazardous wastes resulting from more than 50 years of weapons production; and conducting basic and applied energy and scientific research activities. This mission work is carried out primarily under the direction of NNSA and the Offices of Environmental Management and Science.

In FY 2007, approximately 11,000 Federal personnel (excluding 4,000 employees working for the four Power Marketing Administrations) were employed by the Department. The estimated contractor population numbered approximately 93,500 personnel. A small subset of the civil servants provided direct oversight for capital asset project work and environmental clean up performed under contract. The M&O (Management and Operating) contractors generally carried out the Department's missions by managing projects and operating facilities. This has been the business model used by the agency for decades.

Today's projects include efforts such as construction of multi-billion dollar facilities to treat radioactive and hazardous wastes, construction of accelerators and nuclear material chemical processing plants, decontamination, and demolition of excess facilities, as well as nearly 50 on-going capital asset projects with established performance baselines estimated at approximately \$30 billion and EM clean-up projects valued in the tens of billions.

Multiple offices are responsible for various aspects of contract and project management. The DOE Office of Engineering and Construction Management (OECM) is responsible for establishing policies and guidance for planning and managing projects. The DOE Office of Procurement and Assistance Management and NNSA Office of Acquisition and Supply Management establish policies and guidance for awarding and administering contracts. Each of the eight Departmental Programs, such as NNSA and the Offices of Environmental Management and Science, have representatives responsible for providing oversight to ensure that contractors are appropriately managing projects to support the DOE missions.

In addition to OECM providing oversight of project management policies and procedures, the Department's three largest program elements—NNSA and the Offices of Environmental Management and Science—have established project management support offices within their respective organizations. These project management support offices coordinate efforts within the program, provide additional oversight of projects, and conduct internal reviews of individual projects.

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The very nature of this business requires excellence in the execution of relatively straightforward office building projects to large, complex projects as a core competency. Improvements in contract and project management have been made and these have resulted in improved project execution performance. Within the past several years, various reports noted that less than 50 percent of our projects were being executed within the original cost estimates. In the last 3 years (FY05–07), a total of 33 capital asset projects have been completed and of these, 23 were completed within the original approved CD-2 scope and at a total cost within 10 percent of the approved cost baseline. This represents a 70 percent success rate; the trending line is moving in the right direction.

Despite the most recent project performance improvement trends, the Department's performance goals have not yet been achieved. Challenges continue predominately in the areas of inadequate up-front planning, human capital, organizational alignment, and inadequate oversight of our projects. Too often original project performance baselines are breached, and, at times, they are breached by significant amounts.

This RCA will serve as a foundational document for contract and project management performance improvement. It is a reassessment of what issues and underlying root causes remain that negatively impact project performance. The issues and underlying root causes must be addressed to make significant strides for achieving and maintaining the Department's project and portfolio performance goals.

## 1.3 PERFORMANCE GOALS

The Department has established performance goals for capital line item and EM cleanup projects. Our capital asset goals are consistent with OMB Circular A-11 and the Capital Planning Guide. These performance goals constitute our definition of success for capital asset construction and cleanup projects.

- ◆ Capital Asset Line Item Projects: Capital asset line item projects will be completed within the original approved scope baseline (Critical Decision 2) and within 10 percent of the original approved cost baseline at Critical Decision 4 (project completion), unless otherwise impacted by a directed change.<sup>1</sup> On a project portfolio basis, 90 percent of DOE line item projects will meet the project success definition benchmark.
- ◆ EM Cleanup (Soil and Groundwater Remediation, D&D, and Waste Treatment and Disposal) Projects: EM cleanup projects will be completed by achieving at least 80 percent of the defined (near-term baseline) end-state scope and with less than a 25 percent cost variance from the original approved baseline, unless impacted by a directed change. On a project

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<sup>1</sup> Directed Change: Changes caused by DOE Policy Directive, Regulatory, or Statutory action.

portfolio basis, 90 percent of DOE operating projects will meet the project success definition benchmark.

These are the benchmarks that will be used to define, track, and measure project success over time. The difference in performance benchmarks reflects the inherent differences in the planning and execution of different types of projects, in this case, the differences between capital asset construction projects versus EM Cleanup. In many instances, it is harder to clearly define up-front requirements for EM Cleanup projects (as is the case for Soil and Groundwater Remediation, for example) and, in most cases, they operate in different regulatory and funding environments with different stakeholder pressures.

In addition, there is recognition that despite the best planning efforts, world events and shifting Presidential and/or Congressional budget priorities could negatively impact project funding profiles over time, resulting in project schedule delays and cost growth. Actions such as these could result in performance baseline changes. In those instances, the original performance baselines will be readjusted and project success measured against those revised baselines.

By addressing the root causes of past contract and project management deficiencies and effecting the appropriate solutions, the probability of project and portfolio success will be increased.

## 1.4 ROOT CAUSE ANALYSIS OBJECTIVES

The overall objective of this analysis was to identify and define the root causes impeding improved contract and project management performance. The specific objectives were:

- ◆ To identify a comprehensive list of departmental issues and the root causes that negatively impact contract and project management.
- ◆ To provide a basis for developing recommended solutions that address the identified root causes and issues and mitigate or eliminate any negative impacts to contract and project management performance.

## 1.5 APPROACH AND METHODOLOGY

The approach for conducting the contract and project management RCA involved collecting data through document reviews and personnel interviews and then analyzing the issues and identifying root causes during a 2-day workshop. Workshop attendees included nearly 70 DOE contract and project management personnel from the headquarters, sites, and laboratories, including federal project directors.

The methodology used to perform the contract and project management RCA included the following steps.

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- ◆ **Step 1—Define the Problem.** Despite improvements in contract and project management, the Department’s performance in completing projects within cost and schedule baselines continues to be inconsistent. Most recent project performance continues to fall short of project performance goals as a result of impediments and challenges to managing contracts and projects.
  - ◆ **Step 2—Gather Data and Evidence.** Data were gathered to document past shortcomings in performance. These data were predominantly gathered from reviewing documented GAO, NRC, and DOE IG reports that specifically addressed the Department’s contract and project management. The significance and value of the findings in many of these reports were still germane. They were reviewed for continued applicability. The findings from these reports were validated and supplemented with interviews of people directly responsible for, and closely familiar with, DOE contract and project management.
  - ◆ **Step 3—Identify Issues that Contribute to the Problem.** On the basis of the data gathered and reviewed through document reviews and interviews, workshop participants identified the most significant contract and project management issues that continue to plague project performance. While no empirical evidence was able to delineate how each issue impacted each project, there was broad acknowledgement that addressing the identified issues would improve project performance. There was also general agreement that while the issues identified were present in some contracts and projects, they were not necessarily representative of all Departmental contract and project management activities.
  - ◆ **Step 4—Find the Root Causes.** Once the common issues negatively affecting our contract and project management performance were established, a more thorough review of the top issues was undertaken to determine the reasons why they continue. The RCA methodology commonly referred to as the “Five-Whys” procedure was used.<sup>2</sup> During the workshop, individuals knowledgeable of, and directly responsible for, managing DOE contracts and projects identified probable root causes through this challenging series of questions as to “why” the situation, event, or condition associated with each of the identified issues existed. The responses were structured to establish root causes.
  - ◆ **Step 5—Develop Recommended Solutions.** Upon determining the underlying root causes for contract and project management shortcomings, a se-

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<sup>2</sup> Masaaki Imai first used the Five Whys procedure for trouble shooting problems relative to the Toyota Production System in the 1970s. It is a common RCA methodology used today and most useful in conference environments. It involves taking any issue and asking “Why”, what caused the problem? When the cause is understood, the question is asked again. Generally, it has been acknowledged that it takes asking the question fives times before the root causes begin to appear.

ries of recommended solutions will be developed in the form of corrective measures aimed at resolving the contract and project management issues and root causes. The focus will be on properly addressing the critical few having the biggest impact, which will have a positive impact on all of the identified contract and project management issues. To establish ownership and ensure successful implementation, future corrective measures will be developed with broad input and support from people across the Department.

- ◆ **Step 6—Establish Milestones and Performance Measures.** Each of the corrective measures will include discrete milestones and performance measures. These milestones and performance measures will be used to evaluate implementation of the corrective action plan as well as the overall contract and project management performance in accordance with our established project performance goals.
- ◆ **Step 7—Implement Recommended Solutions.** Each corrective measure will be included in a comprehensive and integrated corrective action plan. The implementation of specific corrective measures will be evaluated and reported on a periodic basis.
- ◆ **Step 8—Observe and Measure Performance for Desired Outcome.** Ensure the commitment and allocation of the necessary resources to continually measure performance against our performance goals.

The contents of this report represent completed activity through the first four steps. Subsequent efforts will include the development and implementation of corrective actions and the measurement of their effectiveness.



## Chapter 2

# Data Collection and Findings

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### 2.1 DOCUMENT REVIEWS AND INTERVIEWS

Over the years, there have been many external reports and studies focused on DOE contract and project management challenges. Some of these reports and studies highlighted the root causes of these challenges. The value and importance of past findings and recommendations addressed in previous studies on DOE contract and project management remain germane. Accordingly, relevant reports authored by GAO, NRC, and others, as well as internal reports issued by the DOE Inspector General were reviewed. A total of 43 documents were reviewed and are included in Appendix A. Key issues that impact our contract and project management performance were identified. Thereafter, a comprehensive list of potential current issues that continue to impede Departmental contract and project management performance was compiled.

In addition, a series of interviews were conducted with more than 40 people to validate past findings and to identify any additional contract and project management performance issues that may not have been identified through our document reviews. In addition to interviewing DOE headquarters and field personnel directly responsible for managing contracts and projects, OMB representatives, knowledgeable about DOE and NNSA projects, were also interviewed. In most cases, these interviews did not identify any new issues; however, they did confirm the continued presence of previously identified and documented issues.

### 2.2 ROOT CAUSE ANALYSIS WORKSHOP

A root cause analysis workshop was conducted on October 16–17, 2007, to discuss the challenges of planning and managing DOE projects, including the major issues and associated root causes impacting cost and schedule performance. Approximately 70 DOE federal employees were in attendance.

Numerous teams were assembled during the workshop to review, revise, merge, delete, and/or validate the previously defined 143 issues as well as identify additional new issues impacting contract and project management. Team composition included headquarters and the field personnel, including representative federal project directors (FPDs), from NNSA, the Offices of Environmental Management and Science, other DOE staff functions, and OMB. The teams ultimately briefed their results to all the attendees to solicit input, discuss the issues, and finalize issue consolidation. The result included a total of 60 issues, which were then prioritized.

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Workshop attendees independently ranked their top 10 issues according to what they believed to be the relative significance impacting contract and project management performance. Each participant was provided 10 numerical votes numbered 1 through 10, with 10 being the most important. The rankings from each participant were then consolidated to establish a relative prioritization of all 60 issues.

The resulting top 10 contract and project management issues identified by the workshop participants are outlined below. The total numerical score and number of personnel that actually used one of their votes for the issue are included in parentheses. For example, for “Issue 1” below, the parenthetical representation of “430 and 68”, means that “Issue 1” received a “430” score (derived by adding each person’s vote (either a “10”, a “1”, or any number within that range)), and that “68” people actually used one of their ten votes for “Issue 1”. Each attendee could only assign one of their numerical votes to one issue. The results follow:

1. DOE often does not complete front-end planning (to include project requirements definition) to an appropriate level before establishing project baselines. (430 and 68)
2. DOE does not have an adequate number of federal contracting and project personnel with the appropriate skills (e.g., cost estimating, scheduling, risk management, and technical expertise) to plan, direct, and oversee project execution. (270 and 42)
3. Risks associated with projects are not objectively identified, assessed, communicated, and managed through all phases of planning and execution. (230 and 40)
4. Failure to request and obtain full funding or planned incremental funding results in increased risk of project failure. (130 and 24)
5. Contracts for projects are too often awarded prior to the development of an adequate independent government estimate. (105 and 22)
6. DOE’s acquisition strategies and plans are often ineffective and are not developed and driven by federal personnel. DOE does not begin acquisition planning early enough in the process or devote the time and resources to do it well. (99 and 14)
7. DOE’s organizational structure is not optimized for managing projects. (77 and 12)
8. DOE has not ensured that its project management requirements are consistently followed. In some instances projects are initiated or carried out without fully complying with the processes and controls contained in DOE policy and guidance. (77 and 12)

9. Ineffective DOE project oversight has sometimes resulted in failure to identify project performance issues in a timely manner. (75 and 14)
10. DOE is not effectively executing its ownership role on some large projects with respect to the oversight and management of contracts and contractors. (72 and 11).

Appendix B includes the prioritized list of the top 10 issues with further details. A quick comparison between “Issue 1” and “Issue 10” is revealing; 68 workshop attendees voted for Issue 1 and only 11 voted for Issue 10. The drop off is more dramatic beyond Issue 10. From the results of the voting, these top 10 issues clearly floated to the top and garnered maximum attention in the development of the root causes. These are the issues that when properly addressed will have a positive impact on all of the identified contract and project management issues.

## 2.3 CONTRACT AND PROJECT MANAGEMENT ROOT CAUSES

After consolidating and prioritizing the issues, the most significant issues impeding performance were further evaluated to identify root causes. The purpose of the RCA was to identify the underlying causes that, when corrected, will preclude or minimize the recurrence of contract and project management deficiencies in the future. As discussed earlier, the RCA utilized the “Five-Whys” methodology.

Figure 2-1 below summarizes and presents the top ten 10 issues along with the results of the root cause analysis. Taken in context with the resulting contract and project management issues and recurring shortcomings related to planning, oversight, organization, and resources, these root causes emanate from an ingrained culture of weak federal ownership of projects, including associated contract mechanisms, from inception through execution to completion.

*Figure 2-1 Summary of Top 10 Contract and Project Management Issues and Associated Root Causes*

Top 10 DOE Contract and Project Management Issues	Root Causes
1. DOE often does not complete front-end planning to an appropriate level before establishing project performance baselines.	<ul style="list-style-type: none"> <li>▪ Insufficient number of people</li> <li>▪ Inadequate skilled personnel</li> <li>▪ Inadequate time</li> <li>▪ Reliance on the M&amp;O contractor</li> <li>▪ Lack of a benchmark</li> <li>▪ Ineffective interdepartmental integration</li> <li>▪ Limited planning budget resources</li> </ul>
2. DOE does not have an adequate number of federal contracting and project management personnel with the appropriate skills (e.g., cost estimating, scheduling, risk management, and technical) to plan, direct, and oversee project execution.	<ul style="list-style-type: none"> <li>▪ Insufficient budget resources</li> <li>▪ Conflicting and competing priorities</li> <li>▪ Inferior Federal government compensation compared to the private sector</li> <li>▪ Inadequate roles and responsibilities definition</li> <li>▪ Inadequate training</li> </ul>

Top 10 DOE Contract and Project Management Issues	Root Causes
3. Risks associated with projects are not objectively identified, assessed, communicated, and managed through all phases of planning and execution.	<ul style="list-style-type: none"> <li>▪ Insufficient number of staff</li> <li>▪ Inadequate training</li> <li>▪ Lack of management emphasis and direction</li> <li>▪ Lack of recognition of the required number of personnel and the necessary skills needed</li> </ul>
4. Failure to request and obtain full funding or planned incremental funding results in increased risk of project failure.	<ul style="list-style-type: none"> <li>▪ Suboptimum portfolio management</li> <li>▪ Ineffective project and program prioritization and resource allocation</li> </ul>
5. Contracts for projects are too often awarded prior to the development of an adequate independent government cost estimate.	<ul style="list-style-type: none"> <li>▪ Lack of policy or standards</li> <li>▪ Lack of qualified personnel</li> <li>▪ Lack of databases with current or historical information</li> </ul>
6. DOE's acquisition strategies and plans are often ineffective and are not developed and driven by federal personnel. DOE does not begin acquisition planning early enough in the process or devote the time and resources to do it well.	<ul style="list-style-type: none"> <li>▪ Insufficient qualified staff</li> <li>▪ Competing priorities</li> <li>▪ Personnel resource conflicts and budget limitations</li> <li>▪ Lack of effective field and headquarters integration</li> <li>▪ Lack of lessons learned</li> <li>▪ Inadequate roles and responsibilities definition</li> </ul>
7. DOE's organizational structure is not optimized for managing projects.	<ul style="list-style-type: none"> <li>▪ Competing priorities</li> <li>▪ Lack of prioritization on project management</li> <li>▪ Lack of alignment in authority, accountability, and responsibility</li> <li>▪ Attributes of optimized organizational structure are not identified and universally understood</li> </ul>
8. DOE has not ensured that its project management requirements are consistently followed. In some instances projects are initiated or carried out without fully complying with the processes and controls contained in DOE policy and guidance.	<ul style="list-style-type: none"> <li>▪ Conflicting guidance and priorities</li> <li>▪ Lack of adequate personnel resources</li> <li>▪ Inadequate training</li> <li>▪ Lack of failed project reviews</li> </ul>
9. Ineffective DOE project oversight has sometimes resulted in failure to identify project performance issues in a timely manner.	<ul style="list-style-type: none"> <li>▪ Inadequate budget and personnel resources</li> <li>▪ Competing and conflicting resource priorities</li> <li>▪ Lack of effective portfolio management</li> <li>▪ Inadequate field oversight</li> </ul>
10. DOE is not effectively executing its ownership role on some large projects with respect to the oversight and management of contracts and contractors.	<ul style="list-style-type: none"> <li>▪ Inconsistent expectations and definition of federal ownership role</li> <li>▪ Lack of experienced and qualified personnel</li> <li>▪ Limited authority of FPDs</li> <li>▪ Lack of accountability</li> </ul>

## 2.4 ANALYSIS OF ROOT CAUSES

The root causes and themes identified from the top 10 issues are identified below. The sub-bullets provide more specificity to better define the context of the root cause.

- ◆ Insufficient number of personnel assigned to contract and project management functions
  - There are not adequate numbers of federal personnel assigned to contract and project management functions based on the number, size, and

complexity of Departmental projects, the historical and cultural reliance on M&O contractors, and the discrepancy between Federal government compensation as compared to the private sector.

- This is particularly a problem in the areas of front-end planning, risk management, project management requirements compliance, and project oversight.
- ◆ Some personnel lack appropriate skills to carry out all required contract and project management functions
  - There are not enough federal personnel with the requisite skills to plan and manage contracts and projects.
  - This is highlighted in the areas of front-end planning, risk management, independent government cost estimating, acquisition strategy development and planning, and oversight and management of large projects.
- ◆ Lack of alignment between contract and project management authority, accountability, and responsibility
  - There are inconsistencies between the defined and documented roles and responsibilities for federal contracting, project management, and program management personnel, and what their respective contract and project authority and accountability actually entails, which results in competing and conflicting project direction, ineffective use of resources, a lack of accountability, and limited authority of FPDs.
  - This is reflected in acquisition strategy development and planning, the way in which the Department is organized (which may not exhibit the attributes of an optimized, organizational structure), and the inconsistent expectations and definition of the federal ownership role.
- ◆ Lack of effective contract and project management integration between line and staff organizations at headquarters, between the field and headquarters, and between contract and project management personnel
  - Departmental organizations and personnel responsible for specific contract and project management functions are not effectively communicating and working together to integrate their activities, which results in inadequate contract and project management plans, performance, oversight, and results.
  - The lack of effective integration is particularly evident in front-end planning and acquisition strategy development and planning, where inadequate time is invested.

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- ◆ Insufficient budget resources allocated to contract and project management
    - The Department lacks the required budget resources to carry out the necessary contract and project management functions in accordance with established performance baselines.
    - Insufficient budget resources are a cause for contract and project management underperformance in the areas of front-end planning, contract administration and project oversight and adequate numbers of personnel with the appropriate skills.
  - ◆ Ineffective project and program prioritization and resource allocation negatively impacting portfolio, program, and project management
    - Often times there are competing, and in some cases, conflicting guidance between programs, as well as ineffective prioritization of budget requests and resource allocations.
    - Suboptimal portfolio management, prioritization and resource allocation in the areas of project oversight, program and project management, organizational structure, adequate numbers of federal personnel with the required skills, funding requests, acquisition strategy development and planning, adherence to project management requirements, the number of on-going active projects, and project oversight, or lack thereof, result in decisions that negatively affect contract and project management performance.
  - ◆ Inadequate training for some specific areas of need in contract and project management
    - Training has not always been developed and delivered to the specific areas of need in contract and project management; there needs to be better instruction of the integration between contract management and project management.
    - Areas identified in need of additional training include front-end planning and the use of project definition rating indices, risk management, change order control boards and configuration control, and more contract administration instruction for FPDs and “IPT Training” for IPT (integrated project team) members.

- ◆ Lack of defined benchmarks in specific contract and project management areas
  - While it is recognized that certain contract and project management activities are not optimized, there is a lack of management emphasis and direction and no defined benchmarks to serve as a guide for improved performance or to assess whether projects have failed reviews. In addition, there are no centralized databases of current and historical project information or lessons learned.
  - The lack of defined benchmarks, including policies and standards, is particularly relevant in workforce development, front-end planning, risk management, and independent government cost estimates.

To improve contract and project management performance, corrective measures identified in the Department's follow-on corrective action plan will focus on addressing, mitigating, and where possible, eliminating the root causes. These root causes are not insurmountable; with the proper management attention, including the required budget and personnel resources, improved contract and project management performance can be achieved.



# Chapter 3

## Summary and Next Steps

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### 3.1 CHARACTERISTICS OF SUCCESSFUL PROJECTS

There are a number of characteristics that can contribute to successful project management within the DOE environment. A comprehensive list of characteristics of successful projects was identified by the National Academy of Sciences in their 1999 Report, *Improving Project Management in the Department of Energy*. This list was used as a key reference and benchmark in the context of our RCA and is still as germane today as it was when written in 1999. Select highlights from that report as items that are listed as essential or important for project success include:

- ◆ Sponsors know what they need and can afford.
- ◆ There is a senior project champion within the owner's organization.
- ◆ Project managers are experienced professionals dedicated to success.
- ◆ Contracts are clear and unambiguous.
- ◆ Accountability of project is understood.
- ◆ Owner's requirements and expectations are clearly understood.
- ◆ Project organization and mission are clearly understood.
- ◆ Depth, stability, and time commitments by key personnel are appropriate.

There is nothing new or unique about these characteristics. The Department endorses these characteristics as keys to project success, and in many cases, they were the reasons for past agency successes. Simply stated, when these conditions, qualities, and characteristics exist, projects have a higher probability of successful performance than when they are absent. Of course, the conditions, qualities, and characteristics require tailoring for the wide range of projects, which have very different scopes or purposes. These characteristics will be used as guidelines during the development of the corrective action plan (CAP).

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## 3.2 IMPACT OF TOP 10 ISSUES ON 9 SELECTED PROJECTS

To further validate the currency and relevance of the RCA results, 9 on-going projects were selected to compare the top 10 contract and project management issues. The 9 projects were selected because of current or past contract and project management challenges, and also because of the significant lessons to be learned, shared, and communicated from their respective experiences. The Federal Project Director (FPD) and Contracting Officer (CO) for each project provided responses regarding which issues were encountered by their project. Appendix C provides the results of that survey.

The survey did in fact validate the results. The three most common issues impacting the 9 projects were included in the top contract and project management issues previously identified. Inadequate front-end planning prior to establishing project baselines was the most common issue identified by 8 of the 9 projects. Insufficient risk identification, assessment, communication, and management through project planning and execution were identified by 7 of the 9 projects. Lastly, 6 of the 9 projects responded that failure to request and obtain planned funding increased the risk of project failure.

The purpose of comparing the top issues against specific projects was to verify that the most significant issues identified during the workshop have direct applicability to current and past projects. While not all the issues were deemed directly relevant by the select few FPDs and COs, the expectation is that corrective measures directed at eliminating, or at least mitigating, the root causes would positively influence the performance of future projects.

## 3.3 PRELIMINARY CORRECTIVE MEASURE CONSIDERATIONS

As this RCA indicates, there are opportunities for continuous improvement in contract and project management activities. The following is a list of potential preliminary corrective measure captured during the two-day workshop. These, along with other future proposals, will be fully vetted in follow-on efforts to finalize a CAP.

- ◆ Acquire, develop, and retain a contract and project management federal workforce through comprehensive resource management.
  - Conduct a thorough assessment of existing capability and a needs analysis of current and future requirements;
  - Close skill and competency gaps;

- Implement a workforce staffing plan; and
- Provide training at the point of need to support mission-driven human capital management needs.
- ◆ Improve the efficiency and effectiveness of hiring practices.
- ◆ Improve the discipline and structure for certifying FPDs at predetermined skill levels to ensure competent management oversight of resources for appropriate projects at specific geographical locations; the right people, at the right place, at the right time.
- ◆ Improve and communicate the definition of roles and responsibilities for contract, project, and contractor management.
- ◆ Improve accountability at the individual and organizational level for both federal and contractor personnel.
- ◆ Enforce strict federal ownership and contractor adherence to the identification, definition, and justification of project needs.
- ◆ Improve the alignment, coordination, and integration of contract and project management functions, including integrated and timely change control management.
- ◆ Ensure compliance with DOE Order 413.3A, *Project Management for the Acquisition of Capital Assets*.
- ◆ Establish and implement a procedure to ensure that ongoing projects are re-evaluated frequently in light of changing missions.
- ◆ Establish and enforce a policy on the development and appropriate use of funded management reserve and contingency.
- ◆ Develop a disciplined project cost estimating capability to develop independent government cost estimates, conduct comprehensive cost analyses, and support more accurate budget development efforts.
- ◆ Ensure the financial and project management systems provide accurate, reliable, and timely information on contract spending and project costs.
- ◆ Provide better policy and guidance on the use of full funding and develop guidance to assist in the establishment of realistic incremental funding profiles based on the historical realities of the federal budgeting process.

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- ◆ Improve the specific requirements in DOE Order 413.3A for front-end planning.
    - Consider use of a Project Definition Rating Index (PDRI), or a DOE version with comparable content, as a front-end planning tool.
  - ◆ Establish performance baselines based on more complete project designs.
  - ◆ Minimize the practice of “exceptions”, allowing project budget requests in advance of requisite up-front planning and establishment of the project’s performance baseline.
  - ◆ Break up large “projects” (programs) into smaller projects to enable greater focus and requirements definition on smaller facility subsets and to enhance management span of control and oversight.
  - ◆ Enhance the existing internal and external independent review processes to improve the front-end planning of projects before authorization to assure that the appropriate level and detail of planning has been completed.
  - ◆ Establish a process and specific criteria for assessing the status of critical project technologies (e.g., a Technology Readiness Assessment process analogous to the one used by DoD and NASA)
    - Establish a rigorous independent review of project technology at CD-1 and CD-2 to review its readiness status and assure that appropriate technology development has been planned, estimated, and scheduled.
  - ◆ Improve the identification and appropriate use of new contracts and contract types.
  - ◆ Increase acquisition and contract management training for program managers and federal project directors.
  - ◆ Improve the federal ownership and development of acquisition strategies.
  - ◆ Increase federal oversight of acquisition plan implementation, including the writing of statements of work, evaluation criteria, and contractor performance incentives.
  - ◆ Improve the planning and active management of project risks using defined systems and processes.
  - ◆ Develop and use internal and external contract and project benchmarking data for continuous performance improvement.
  - ◆ Develop and communicate a contract and project management lessons learned program for continuous performance improvement.

- ◆ Improve the federal oversight of contractors managing and operating the Department's facilities.
- ◆ Improve the discipline and structure for approving and controlling program and baseline changes to projects.

The above list is not all encompassing but documents some potential future corrective measures. There are certainly other measures requiring consideration, and these will be identified and further defined through the corrective action planning process. Once all of the potential corrective measures have been vetted, a comprehensive and integrated CAP will be established. The CAP will include a series of corrective measures directed at mitigating or eliminating the root causes to improve contract and project management performance. The focus will be on properly addressing the critical few having the biggest impact, which will have a positive impact on all of the identified contract and project management issues.

## 3.4 CORRECTIVE ACTION PLAN DEVELOPMENT AND IMPLEMENTATION

This report contains information on past DOE contract and project management challenges and their issues and underlying root causes. Improvements in contract and project management are the imperative. Future enhancements must be measurable and sustainable to achieve performance goals.

Many relevant areas for improvement have been highlighted as a result of this report, to include the composition of a federal workforce, their capabilities, organizational alignment and interaction, and management processes and systems. These represent some keys for future project success. Increased management and oversight and accountability in contract and project management will be an overarching theme.

To improve project performance, the identified root causes from this report will be addressed with appropriate and effective corrective actions and then actively tracked and managed over time. Contract and project management activities and responsibilities are interrelated. Effective performance in both areas is essential to achieving the Department's mission and goals.

Real, sustainable, and measurable contract and project management performance requires a DOE organizational and managerial commitment to continuous improvement from top to bottom. By focusing on project definition and front-end planning, resource allocation and acquisition strategy decisions, and risk management and project oversight, project performance will improve. This will require renewed investment in human capital to acquire, develop, and retain qualified personnel commensurate with the value and complexity of the projects.

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These and other corrective measures will be merged into a comprehensive contract and project management CAP. This CAP will be developed by a DOE cross-departmental team and vetted across the agency and with appropriate stakeholders to garner maximum support. Some of these corrective measures can and will be implemented immediately; others will be addressed later, if necessary, if earlier (and future) corrective actions have not already mitigated their impact.

The information contained in this report is one more step towards contract and project management performance improvement. This report reflects a mandate to continuously improve contract and project management; to take requisite actions to exceed the Department's performance goals by incorporating the findings from this RCA into a comprehensive and integrated contract and project management CAP and to effect positive cultural change.

# Appendix A

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## Appendix B

# Prioritized List of Issues (With Further Detail)

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- Priority #1** **DOE often does not complete front end planning to an appropriate level before establishing project baselines.**
- a. There is a lack of early and effective integration between and among the functional management organizations (procurement, OECM, nuclear safety, EMS, security), and with the program offices.
  - b. Projects are initiated and planned initially embracing optimistic assumptions.
  - c. Project cost estimates are unrealistic and based on overly optimistic assumptions that result in project failure.
  - d. Initial project requirements are not clear and/or complete.
  - e. DOE has developed comprehensive practice guidelines for the design and construction phases of projects but has not developed comparable guidelines for the early conceptual and pre-conceptual phases, when the potential for substantial savings is high. (DOE O 413.3A has policy and implementation being addressed by associated guidance documents in process).
  - f. Project teams are making tradeoffs and cutting corners in front end planning in order to meet the December 1 baseline date requirement to get the project into the budget for the current year.
- Priority #2** **DOE does not have an adequate number of federal contracting and project personnel with the appropriate skills (e.g., cost estimating, scheduling, risk management skills, and technical skills) to plan, direct and oversee project execution.**
- a. DOE has a significant number of competing priorities for skilled personnel that result in inadequate assignment of personnel resources to projects.
  - b. DOE acquisition personnel are not sufficiently experienced to provide the business advice necessary for its major systems acquisitions.
  - c. DOE has difficulty in its ability to recruit and retain contract and project management personnel for successful project execution.

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- Priority #3 Risks associated with projects are not objectively identified, assessed, communicated, and managed through all phases of planning and execution.**
- a. Project teams tend to be overly optimistic and are reluctant to use external assistance to identify and evaluate risk.
  - b. When assessing risk, there is pressure from program managers and other senior management to minimize risk. Managers want to keep the project afloat. Project Managers may know the risks but prefer “compression” of risk to preclude the project’s being cancelled.
  - c. Risk management is not routinely used as a key project planning tool.
  - d. Risk mitigation activities are not fully captured in cost and schedule baselines.
  - e. Risk management plans and assessments are often put on the shelf and forgotten. Project teams think of risk assessment as a document and not a process.
  - f. The resolution of risk is not tied to schedule and cost baselines.
  - g. Projects often do not take advantage of the full suite of risk-handling strategies available.
- Priority #4 Failure to request and obtain full funding or planned incremental funding results in increased risk of project failure.**
- a. Funding instability drives contract structure and changes, protracts schedules, and increases costs.
- Priority #5 Contracts for projects are too often awarded prior to the development of an adequate independent government estimate.**
- a. DOE does not have a consistent and effective way of developing independent government cost and schedule estimates.
- Priority #6 DOE’s acquisition strategies and plans are often ineffective and are not developed and driven by federal personnel. DOE does not begin acquisition planning early enough in the process or devote the time and resources to do it well.**
- Priority #7 DOE’s organizational structure is not optimized for managing projects.**
- Priority #8 DOE has not ensured that its project management requirements are consistently followed. In some instances projects are initiated or carried out without fully complying with the processes and controls contained in DOE policy and guidance.**

**Priority #9 Ineffective DOE project oversight has sometimes resulted in failure to identify project performance issues in a timely manner.**

- a. Inadequate systems for measuring contractor performance
- b. Approval of construction activities before final designs were sufficiently complete
- c. Ineffective project reviews, inadequate use of project management controls
- d. DOE lacks an effective management feedback loop that allows for identification and correction in real time

**Priority #10 DOE is not effectively executing its ownership role on some large projects with respect to the oversight and management of contracts and contractors.**



# Appendix C

## Matrix of Top 10 Contract and Project Management Issues and DOE Projects

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Appendix C summarizes the responses from each Federal Project Director and Contracting Officer for the 9 selected projects and identifies which of the top 10 issues have impacted each of the respective projects.



Table C-1. Matrix of Top 10 Contract and Project Management Issues—9 Selected DOE Projects

Contract and Project Management Issues	DOE Projects								
	Waste Treatment and Immobilization Plant (Hanford)	Depleted Uranium Hexafluoride Conversion (Portsmouth/ Paducah)	Radioactive Liquid Tank Waste Stabilization and Disposition (Hanford)	SNM Component Requalification Facility (Pantex)	Highly Enriched Uranium Materials Facility (Y-12)	Building 12-44 Production Cells Upgrade (Pantex)	National Ignition Facility (LLNL)	Linac Coherent Light Source (SLAC/ Stanford)	National Concept Stellarator Experiment (PPPL/ Princeton)
Inadequate number of federal contracting and project personnel with appropriate skills		▲	▲		▲				
Organizational structure					▲		▲		
Failure to request and obtain full or planned incremental funding	▲		▲		▲		▲	▲	▲
Inadequate front end planning	▲	▲	▲	▲	▲	▲	▲		▲
Ineffective acquisition strategies and plans		▲			▲		▲		
Poor/no independent government cost estimates	▲		▲		▲		▲		
Identification, assessment, communication, and management of risk during project planning and execution	▲	▲	▲		▲		▲	▲	▲
Adherence to project management requirements			▲			▲			
Ineffective project oversight					▲	▲			
Role of owner in oversight and management of contracts and contractors					▲				





