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INTEGRATED PROJECT TEAMS GUIDE FOR USE WITH DOE O 413.3A

[This Guide describes suggested nonmandatory approaches for meeting requirements. Guides are not requirements documents and are not to be construed as requirements in any audit or appraisal for compliance with the parent Policy, Order, Notice, or Manual.]

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CONTENTS

1.0 INTRODUCTION

This Guide provides those responsible for program and project management with the information and perspective needed to successfully implement DOE O 413.3A requirements relating to the use of integrated project teams (IPTs) to achieve improved project outcomes and efficiency.

1.1 Applicability

The Guide should be useful to Department of Energy (DOE) and the National Nuclear Security Administration (NNSA) employees who are either assigned to or interface with capital asset acquisition projects having a total project cost of $20 million or greater. It should also be of value to external organizations under contract to the Department and internal organizations that manage smaller projects.

The Guide includes both requirement statements taken directly from DOE O 413.3A and recommended procedures for implementing these requirements. Those instructions taken from DOE O 413.3A are stated as “must” while recommended implementing procedures are stated as “should”s. Should statements are not mandatory and are not to be construed as requirements by those conducting compliance appraisals or reviews.

1.2 Sources of Information

The Guide draws upon: other DOE directives, best practices from different professional fields, Office of Management and Budget (OMB) Circulars, Governmental Accountability Office reports, research by the nation’s leading universities, Defense Nuclear Facilities Safety Board publications and presentations, National Research Council findings and recommendations pertaining to DOE, other government agencies policies and practices, and lessons that have been learned from past project successes and failures.

OMB recommendations should be given particular attention since their views are derived from government wide studies of project management problems and have been extensively field tested. All of the source material utilized has been cross checked to ensure its validity and its applicability to DOE projects and programs.

1.3 Structure

Recent changes in the use of IPTs will be discussed and the classic “Who? What? When? Where? Why? and How?” questions will be answered. Lessons learned are included when applicable.

2.0 GUIDELINES

2.1 What Are IPTs

DOE O 413.3A 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."[1] IPTs are the crossroads where the technical, management, budgetary, safety, and security interest meet.

2.2 The Underlying Rationale for IPTs

The IPT is the primary tool for breaking down the walls that can exist between different organizations, different professions, and different levels within the different organizations command structures. A successful IPT brings these diverse elements together to form a unit that willingly shares information, balances conflicting priorities and ideologies, and jointly plans and executes the project mission.

2.3 Key Variables

2.3.1 Variables That Impact the IPT

The membership and depth of an IPT is dependent on the following project variables:

- size, cost, and complexity;
- number of organizations involved and their geographical separation;
- presence or absence of a management and operating contractor;
- number of organization approvals needed;
- degree of organizational independence;
- type of the contractual relationships between organizations;
- whether the different organizations and functional disciplines share a similar objective;
- level of technical challenge;
- novelty of the design and construction;
- FPD range and depth of knowledge;
- FPD and IPT levels of the authority;
- political and market conditions;
- existence of a systems engineering office and/or a lead systems integrator;

[1] DOE O 413.3A, Attachment 3, paragraph 19.

- budgetary and schedule constraints;
- stakeholder involvement;
- number and variety of operations performed in the facility;
- types and quantities of material processed in the facility;
- security classification;
- whether the project is a “green field” undertaking or a modification;
- phase of development;
- degree of consensus on methodology and what is an acceptable end product;
- awareness and commitment of organization top management; and
- risk to the public, workers and the environment [See Title 10 Code of Federal Regulations (CFR) 830 for nuclear projects].

The relationship between these variables and the IPT’s membership ranges from obvious to complex. It is fairly apparent that a greater number of functional disciplines will be needed on large or technically challenging projects, as compared to smaller, less technically challenging projects. Nuclear projects with accompanying security concerns require more IPT members with higher skill and knowledge levels than would be needed for conventional projects.

It is similarly apparent that larger projects almost always involve more customers/users and more subcontractors and vendors that should be represented on the IPT.

The relationship between the variables such as the vertical command structure for the project and the various organizations involved is more complex and can be difficult to grasp. Complex, first-of-a-kind projects that involve unknowns, tradeoffs and input from the different participants as the design process evolves need some form of partnering arrangement among the organizations, command levels, and functional disciplines within each organization. The IPT, when properly structured and used with the appropriate types of contracts, is the means for fostering this partnership.

2.3.2 IPT Evolution over the Course of the Project

The composition of an IPT should, of necessity, evolve in parallel with the project, which is a severe challenge at the concept definition stage. Each of the variables needs to be tied down during this phase in order to determine the composition of the IPT, but it is the IPT that would normally generate the information that is needed to tie down each of the variables. This catch 22 dilemma can be resolved by forming an interim or initiating team that can explore each of the variables and simultaneously define the size and composition of the IPT that is required to be established and chartered prior to Critical Decision 1[2]. The interim or initiating team should be made up of senior employees with prior experience on similar project types and missions.

2.4 IPT Roles and Responsibilities

DOE O 413.3A, OMB's Capital Programming Guide, and the O 413.3 series Guides assign nearly a hundred roles and responsibilities to the IPTs. The more significant of these are discussed below with accompanying insight regarding the extent to which each focuses on an integration related objective and when each must be performed.

2.4.1 Supporting the Federal Project Director

The initial requirement imposed upon the IPT by DOE O 413.3A is to support the FPD[3] by providing individual expertise to fill the voids in his or her knowledge base in the areas of planning and implementing the project using a systems engineering approach[4]; "meeting cost, schedule and performance targets,"[5] and, "demonstrating initiative in incorporating and managing an appropriate level of risk to ensure best value for the government"[6]. Each of these tasks can be fully achieved only when undertaken from a holistic frame of reference which considers and unites the views of all of the IPT members.

2.4.2 Managing Environment, Health and Safety and Safeguards and Security

The extent of the IPT's roles and responsibilities for environmental, health, and safety depends upon the project's Hazard Category and overall safety risks. The IPT must identify, define and manage environmental, safety, health, security, and QA on all projects[7]. It must also "ensure that safety is fully integrated into design and construction for high-risk, high-hazard, and Hazard Category 1, 2, and 3 nuclear facilities." [8]Specific products and activities for Hazard Category 1, 2, and 3 facilities and timetables for delivery are defined in DOE Technical Standard (DOE-STD) 1189.

While these roles extend over the length of the project, the identification and definition of requirements should include heavy IPT involvement in the period between CD-0 and CD-1. Failure to define the requirements at this point in the project can result in costly downstream rework and schedule delays.

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[2] DOE O 413.3A, Table 2.
[3] DOE O 413.3A, paragraph 6m(1).
[4] DOE O 413.3A, paragraph 6g(2).
[5] DOE O 413.3A, paragraph 6g.
[6] DOE O 413.3A, paragraph 6g.
[7] DOE O 413.3A, paragraph 6m(4).
[8] DOE O 413.3A, paragraph 6m(13).

A highly integrated team effort should be employed to execute environmental, health, and safety responsibilities. Many of these matters should be addressed simultaneously to avoid having a solution in one area conflict with another. An example might be finding satisfactory solutions to inherent conflicts between security and safety objectives.

Quality assurance decisions can also involve tradeoffs that can become contentious if not considered from all frames of reference. OMB recommends that "if a commercial or non-developmental item is procured, the IPT should consider using commercial quality standards or the contractor's quality system to ensure acceptability," [9]a recommendation that is not tenable for nuclear facility projects governed by 10 CFR 830 Subpart A.

2.4.3 Acquisition Planning

Input from all members of the IPT is important for development of an integrated project plan. DOE O 413.3A states that the IPT "develops a project contracting strategy"[10] that "conveys the IPT's approach for the successful acquisition of the project, its intended outcomes, and (the) rationale for the approach."[11] Development of the acquisition strategy is ultimately a Federal responsibility that is supported by the IPT.

The OMB suggests market studies as part of developing the acquisition strategy as follows.

- With the decision to evaluate the feasibility of acquiring a capital asset, management should provide the IPT with an estimate of the range of budget resources that may be available for an asset. The IPT should conduct market research to determine the feasibility of various capital asset alternatives that are available in the market to satisfy the requirements. Emphasis should be placed on generating innovation and competition from private industry and on the use of commercial items and non-developmental items to meet the mission needs. The IPT should determine: 1) availability; 2) affordability; 3) cost and benefits; 4) sustainable design principles; and, 5) risk.[12]

- "Once a clear agency need has been identified, the IPT should begin with a plan to conduct both market surveillance and market research to ensure that as many alternative solutions as possible are identified for consideration."[13]

- In market research, the IPT seeks information through research of published information, talking to other agencies that have conducted similar market research, and/or going directly to the market for information.[14]

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[9] OMB Capital Programming Guide, paragraph II.10 pages 51 and 52.
[10] DOE O 413.3A, paragraph 6m(2).
[11] DOE O 413.3A, paragraph 5k(1).
[12] OMB Capital Programming Guide, paragraph I.5, page 14
[13] OMB Capital Programming Guide, paragraph I.5.1.2, page 16.
[14] OMB Capital Programming Guide, paragraph I.5.1.1, page 15.

- "The IPT should engage potential suppliers in an advisory process in which the government provides a general description of the scope or purpose of the acquisition … and invites potential offerers to submit information…"[15]

OMB goes on to say:

- Market surveillance is an on-going process. The IPT technical staff should keep abreast of the latest capabilities and performance through trade journals, advertisements, sales brochures, etc.[16]

- At the beginning of the Acquisition Phase (which they define as the availability of project funding) the IPT should re-assess the market capabilities to verify earlier decisions as to whether a commercially available asset can be acquired or limited (or full-scale) development work is needed.[17]

- The IPT should also re-examine how it can make the most effective use of competition and financial incentives.[18]

Post failure analyses of DOE projects have shown the importance of all OMB recommended actions.

2.4.4 Other Project Planning Tasks

DOE O 413.3A does not specify the IPT's roles and responsibilities for developing the project execution and risk management plans. It is recommended that the IPT be heavily involved in both in support of the FPD. To be of real value, both documents should integrate varied knowledge bases and frames-of-reference and should be developed in unison with the acquisition strategy, for which the IPT is responsible.

2.4.5 Defining Technical, Schedule, and Cost Parameters

According to DOE O 413.3A, the IPT must "identify and define appropriate and adequate project technical scope, schedule, and cost parameters"[19] as one of its roles and responsibilities. This requirement dovetails with the following OMB recommendations:

- "If current assets cannot bridge the gap between planned and actual performance the IPT should define the gap in terms of performance requirements to be achieved. Depending on the depth of the analysis of program requirements during the first round of strategic planning, the IPT may wish to define more detailed

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[15] OMB Capital Programming Guide, paragraph I.5.1.2, page 16.
[16] OMB Capital Programming Guide, paragraph I.5.1.1, page 15.
[17] OMB Capital Programming Guide, paragraph II.1, page 32.
[18] OMB Capital Programming Guide, paragraph II.1, page 32.
[19] DOE O 413.3A, paragraph 6m(5).

requirements against which they can evaluate options for reducing the performance gap."[20]

- "It is incumbent upon the agency IPT to clearly define the performance requirements and estimated costs for major acquisitions before RFPs are issued."[21]

- "The IPT must also develop sound cost estimates. . . ."[22]

- "The IPT must ensure that the proposals and in-house estimates clearly recognize the amount and impact of risk on cost, schedule and technical effort."[23]

Thus, the IPT is responsible for identifying the functional and operational requirements, alternative approaches, the level of resources needed to undertake them, and the optimal path forward.

2.4.6 Managing Interfaces

DOE O 413.3A assigns the IPT the responsibility to "ensure project interfaces are identified, defined, and managed to completion."[24] DOE G 413.3-1, *Managing Design and Construction Using Systems Engineering*, provides detailed information relating to this responsibility.

2.4.7 Overseeing Project Performance

DOE O 413.3A requires that the IPT:

- "Perform periodic reviews and assessments of project performance and status against established performance parameters, baselines, milestones, and deliverables."[25]

- "Plan and participating in project reviews, audits, and appraisals as necessary."[26]

- "Participate, as required, in operational readiness reviews or readiness assessments."[27]

- "Review change requests (as appropriate) and support change control boards as requested."[28]

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[20] OMB Capital Programming Guide, paragraph I.3, page 10.
[21] OMB Capital Programming Guide, paragraph II.4, page 44.
[22] OMB Capital Programming Guide, paragraph I.2.1 page 9.
[23] OMB Capital Programming Guide, paragraph II, page 31.
[24] DOE O 413.3A, paragraph 6m(3).
[25] DOE O 413.3A, paragraph 6m(6).
[26] DOE O 413.3A, paragraph 6m(7).
[27] DOE O 413.3A, paragraph 6m(11).

The IPT, therefore, should have a lead role in change control.

OMB expands upon the DOE O 413.3A requirement that the IPT review change requests, adding that the IPT prepares an analysis of the estimated changes in cost, schedule, and performance goals if the existing goals will not be achieved and determines the reasons for cost, schedule or performance deviations and evaluates whether the corrective actions are likely to be effective.[29]

When all four of the IPT's performance oversight responsibilities are viewed in total, it becomes obvious that the IPT serves as DOE's primary tool for tracking and controlling project progress and that the members of the IPT should be skilled in recognizing the early warning signs of an emerging performance problem. The need for the IPT to have this, and other, project management skills is addressed in section 2.6.2.

2.4.8 Reviewing and Approving Project Deliverables

The IPT has responsibility for reviewing, and in some instances, approving key deliverables. They are to:

- "Review all Critical Decision packages and recommend approval/disapproval." [30]
- "Review and comment on project deliverables (e.g., drawings, specifications, procurement, and construction packages)."[31]
- "Support preparation, review, and approval of project completion and closeout documentation."[32]

It is important not to underestimate the time and personnel needed to perform each review. The best approach from a manpower leveling, rework avoidance, and a schedule standpoint is for the IPT to utilize a "rolling wave" concept wherein prior to allowing design to begin, they ensure that:

- all system and component level functional and operating requirements have been identified, checked and approved;
- the full design criteria for the structures, systems, and components (including all applicable codes and standards) have similarly been identified, checked and approved; and
- the methods that will be used to demonstrate at each review point that deliverables will achieve the above are specified and agreed upon by all parties.

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[28] DOE O 413.3A, paragraph 6m(10).
[29] OMB Capital Programming Guide, paragraph II.9.1, page 50.
[30] DOE O 413.3A, paragraph 6m(8).
[31] DOE O 413.3A, paragraph 6m(9).
[32] DOE O 413.3A, paragraph 6m(12).

Reviews and compliance demonstrations can also be approached from a "rolling wave" concept wherein non-interdependent components or elements are reviewed in advance of the systems. These "rolling wave" approaches can cut significant time off of the review process and shorten the total cost and duration of the project by reducing rework.

The FPD should ensure that IPT members do not review their own work. It is acceptable for an IPT member to review products that others in their company have produced as long as the IPT member is not in the same chain of command as the group that developed the product being reviewed.

2.5 Formation of the IPT

DOE O 413.3A requires that the IPT t be established and chartered no later than CD-1.[33] Many of the IPT's roles and responsibilities should, however, either be performed concurrently with or precede CD-1 approval. For example, conceptual designs should not precede development of the Acquisition Strategy, Project Execution Plan, or Risk Management Plan. Similarly; the IPT should be fully functional in advance of CD-1 to fulfill its obligations for managing environmental, health, and safety; defining technical, schedule, and cost parameters; managing interfaces; and overseeing and reviewing project activities prior to CD-1.

Paragraph 5k(5) of DOE O 413.3A seems to support the importance of having the IPT in place prior to CD-1 as an essential element in DOE's acquisition process and is used *during all phases* of a project's life cycle and then goes on to state that "the Federal Project Director *and the team* will prepare and maintain a Team Charter…"

The OMB also endorses the establishment of the IPT at the initiation of major acquisitions and indicates that the IPT should define the performance requirements to be achieved and the Work Breakdown Structure during the earliest stage of the planning phase.[34]

2.6 Membership and Structure

2.6.1 Composition of the IPT

OMB recommends that an IPT include:[35]

- a qualified program manager and contracting officer;
- personnel with expertise in architecture, budget, capital planning, contract oversight, cost estimating, financial, earned-value management, project management, procurement, risk management, sustainability, scheduling, security, technical, information resource, and value management skills; and

[33] DOE O 413.3A, Table 2, page 12.
[34] OMB Capital Programming Guide, paragraph I.2.1, page 10 and paragraph I.3, page 10.
[35] OMB Capital Programming Guide, paragraph I.2.1, page 9.

- those that will use the project after it is completed.

The list of those that should be considered for membership on complex or nuclear projects goes beyond OMB's. It includes:

- design disciplines (civil, structural, electrical, instrumentation, etc.)
- health physics and radiological protection
- safety, accident, or risk analysts
- criticality safety
- process and equipment research and development specialist
- process chemistry
- industrial safety
- fire protection
- emergency preparedness
- environmental protection and waste management
- human factors
- interfacing system representatives
- seismic/geotechnical

Other lists add the following functional disciples that may need to be included:

- safeguards and security
- high performance sustainable building experience
- configuration management
- human resources
- document control
- legal
- communications
- permitting

- transportation safety
- emergency protection
- startup testing
- system design descriptions
- conduct of operations
- maintenance
- operational readiness
- equipment lay-up
- commissioning
- quality assurance
- Counterintelligence and Intelligence
- NQA-1 auditors and inspectors

Functional disciplines represented on the IPT should be determined based on the project and should include the manufacturing, construction, and support expertise needed.

2.6.2 IPT Member Qualifications

Studies have shown the importance of ensuring that IPT members have the education, experience, and training necessary to meet the specific project demands, which DOE O 413.3A refers to as "competence commensurate with responsibility."

The following DOE 450-series directives on Integrated Safety Management are good resources for understanding the concept:

- DOE P 450.4, *Safety Management System Policy*, dated 10-15-96.
- DOE M 450.4-1, *Integrated Safety Management System Manual*, dated 11-1-06.
- DOE G 450.4-1B Volume 1, *Integrated Safety Management System Guide (Volume 1) for use with Safety Management System Policies (DOE P 450.4, DOE P 450.5, and DOE P 450.6); The Functions, Responsibilities, and Authorities Manual; and the DOE Acquisition Regulation*, dated 3-1-01.

These directives collectively add that both federal and contractor personnel should "possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities."

The specific experience, knowledge, skills, and abilities that both the DOE and contractor members should have are broader than typically realized. Both functional area and project skills are essential for project success.

2.6.2.1 Functional Discipline Qualifications

IPT members should be well-versed in the functional disciplines they represent.

DOE has institutionalized a formal certification process to help ensure that the correct match of functional discipline abilities is achieved, on the Federal side of the ledger, for at least one category of projects. This process is titled the Federal Technical Capability Program. It applies to all defense nuclear facility projects and is explained in DOE P 426.1 and DOE M 426.1-1A. The specific functional area competency requirements associated with the Federal Technical Capability Program are contained in the following Standards:

- Radiation Protection (DOE-STD-1107)
- Electrical Systems (DOE-STD-1170)
- Instrumentation and Control (DOE-STD-1162)
- Fire Protection (DOE-STD-1137)
- Industrial Hygiene (DOE-STD-1138)
- Quality Assurance (DOE-STD-1150)
- Environmental Compliance (DOE-STD-1156)
- Facility Representative (DOE-STD-1151)
- Waste Management (DOE-STD-1159)
- Occupational Safety (DOE-STD-1160)
- Mechanical Systems (DOE-STD-1161)
- Deactivation and Decommissioning (DOE-STD-1166)
- Safeguards and Security (DOE-STD-1171)
- Safety Software Quality Assurance (DOE-STD-1172)
- Criticality Safety (DOE-STD-1173)
- Chemical Processing (DOE-STD-1176)

- Technical Program Manager (DOE-STD-1178)
- Construction Management (DOE-STD-1180)
- Facility Maintenance Management (DOE-STD-1181)
- Civil Structural Engineering (DOE-STD-1182)
- Nuclear Safety (DOE-STD-1183)

Field element managers, Principal Secretarial Officers, and the Administrator of the National Nuclear Security Administration designate positions and/or individuals in their organizations that will participate in the program and certify the competency of these individuals following verification of their competency.

Principles of the Federal Technical Capability Program designated for Defense Nuclear Facilities are effective and can be employed in other projects. The program acknowledges that individuals within any of the covered competency areas may possess anywhere from "familiarity level" to "expert level" knowledge of particular subtopics within their domains, and that fact is germane when selecting IPT members.

DOE O 413.1A requires that the Chiefs of Defense Nuclear Safety and Nuclear Safety "validate that Federal personnel assigned to the IPT as nuclear safety experts are appropriately qualified."[36] This validation is limited to Hazard Category 1, 2, and 3 nuclear facilities and is normally performed as part of the technical independent project review required for Critical Decision 1, but it can be performed when the IPT is established.

DOE quality assurance directives and 10 CFR 830 Subpart A can also come into play in regards to the functional area qualifications of the IPT members. DOE O 414.1C specifies that each DOE and contractor organization must develop and implement a quality assurance program that addresses actions taken to "train and qualify personnel to be capable of performing assigned work."

DOE G 414.1-2A goes on to state that "personnel should be qualified based on—

- previous experience, education, and training;
- performance demonstrations or tests to verify previously acquired skills;
- completion of training or qualification programs; and/or
- on-the-job training."

[36] DOE O 413.3A, paragraph 6o(5).

2.6.2.2 Project Area Qualifications

DOE G 414.4.1-2 also suggests the project area knowledge, skills, and abilities that the IPT members should possess. It states:

"Project/task-specific training should impart the knowledge required for personnel to perform their assigned duties safely and successfully. This training may include project-task goals and schedules, implementing procedures, safety and hazard controls, methods, requirements, process metrics, and skills. Project/task-specific training requirements should be defined by project managers."

The goal of project/task specific training is to ensure that each IPT member has at least:

- a working level knowledge of the project's mission and how this mission relates to the sponsoring program;
- a working level knowledge of the procedures IPTs normally utilize in fulfilling each of their assigned roles and responsibilities;
- a working level knowledge of the Department's project management directives;
- a familiarity level knowledge of non-project management directives that could impact the project;
- a working level ability to communicate findings and recommendations.

2.6.3 Stakeholder Involvement

Both private and public sector IPTs seek input from customers (i.e., the owners and user community); constructors; key suppliers; regulators; supporting functions; and, non-governmental interest groups that may be impacted by or have impact on the eventual outcome of the project. Although this input is necessary for the planning process, it should be recognized that, other than the owner, stakeholders are seldom responsible for cost or schedule and may have little incentive to compromise or look beyond their own self interests. The challenge is to find a method of involving these groups without losing sight of the key concept that IPTs seldom find a means of satisfying all of the stakeholders desires and can only be effective when the members focus on what is best for the project from a combined frame-of-reference.

2.6.4 Organization and Structure

The need to integrate many different functional disciplines, organizations, and stakeholders views and knowledge creates a significant organizational problem for the IPT. Having more people on the team means a broader and deeper pool of knowledge, but it also means more opinions to reconcile, increased time spent distributing information, and an increased likelihood that not all of the members will be heard. IPTs normally become ineffective if they are made up of more than 25 members, which is far fewer than the number of functional disciplines and organizational representative involved in even a medium sized DOE project.

This problem can be eased slightly by finding members with multi-discipline functional knowledge and skill. However, this does not provide a complete solution.

The appropriate approach, for most projects, is to create a core IPT at the federal level with supporting sublevel IPTs within each of the major contractor organizations and satellite IPTs or subcommittees for special focus areas that are challenging enough to warrant the participation of both DOE and contractor subject matter experts. Each sublevel or satellite IPT should retain a cross-functional/cross organizational composition and should be led by a member of the core IPT. DOE-STD-1189 describes how a sublevel IPT (the safety design integration team) should be utilized on a Hazard Category 1, 2, or 3 project.

The need for sublevel and satellite IPTs should be determined by the core IPT as it develops project planning documents. Sublevel and satellite IPTs typically have shorter periods of existence than the core IPT and differ in membership and seniority (with the exception of the leads). This makes them easier to staff, since they do not involve the same level of commitment as the IPT.

2.6.5 The IPT Charter

DOE O 413.3A indicates that with the IPT support, the FPD is responsible for preparing and maintaining the IPT's charter and operating guidance.[37] The charter defines the level of decision-making authority to be delegated to the IPT. An example of an IPT charter is provided in Attachment 1**.**

The appropriate level of decision-making authority to be devolved to the IPT should depend on both the project's phase and IPT performance factors that will be described in Section 3; therefore, it is recommended that the charter be updated and reissued at each Critical Decision. This approach allows the charter to identify both the specific challenges/issues that the IPT should focus on during the upcoming phase and their level of decisional authority relating to that challenge/issue. It also provides the acquisition executive and the FPD valuable insight into the quality and quantity of IPT members that will be required for the upcoming phase prior to Critical Decision approval.

The FPD will need the core IPT's input to accurately identify the challenges/issues and their accompanying staffing requirements. This input may involve contractual questions and must, therefore, be coordinated with the Contracting Officer.

2.6.6 Contractor Participation

The management and operating contractor's project manager and the architect/engineering firm's project manager should both be members of the core IPT.

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[37] DOE O 413.3A, paragraph 6g(11).

While they must be excluded from some duties that can only be performed by the Federal members, direct federal and contractor collaboration is desirable on the bulk of the IPTs roles and responsibilities. The term IPT was, in fact, originally coined by the Department of Defense to differentiate joint federal/contractor teams from their previous, federal only, “project teams.”

The leads for any other contractor IPTs, or satellite IPTs should also be members of the core IPT to ensure direct communications between the IPTs. The lack of such direct communications negates the rationale for IPTs. Direct communications between the organizations is particularly important when dealing with topics such as nuclear safety that have historically been prone to misalignment. A partial list of the nuclear safety areas that have proven to be the most troublesome in this regard is provided as Attachment 3. It is recommended that the functional discipline members responsible for each of these areas within each organization form either separate working groups or satellite IPTs to assist the alignment process.

In keeping with this line of thought, both the private sector and the Department of Defense have now expanded the concept of multi-organizational IPTs even further and are including key subcontractors and suppliers on their IPT. The government receives the greatest advantage from this approach when these participants can be engaged early in the design process, but this is only appropriate in selected cases, and can only be done within the bounds of the procurement regulations so as not to provide the representatives with an unfair competitive advantage.

From experience with multi-organizational IPTs the Department of Defense has found that the ratio between federal and contractor personnel needs to be kept in reasonable balance. It is important that DOE profit from this experience and not turn the reins of the IPT over to contractors that may not share the same objectives as the federal government.

3.0 IPT PERFORMANCE

3.1 Factors Influencing IPT Performance

The degree of IPT success depends upon numerous factors, the most critical of which are addressed below.

3.1.1 Staffing

GAO and internal reviews consistently reveal a significant shortage of vital functional discipline members and skill levels. These functional discipline shortages are not confined to DOE, but are government wide. Projects should be vigilant of such capability gaps and augment federal staff with contractor support where appropriate.

3.1.2 Personnel Utilization

Finding an adequate number of functional discipline members to fill the IPT organization chart does not guarantee an end to the staffing challenge. Independent reviews of failing projects often show that some matrix support members are "phantoms" who generally attend a few meetings and then drift away because of time issues, competing work demands, a lack of clearly defined work assignments, or a perceived lack of authority.

It is the FPD's responsibility to ensure these situations do not occur. Research has repeatedly indicated that IPTs are successful only when they are given clear roles to perform and authority commensurate with these roles.

Projects of longer duration can relieve the problem of name-only participation by either having the core IPT members reassigned to the project or by entering into formal agreements with IPT members' parent organizations to guarantee a specific level of commitment.

3.1.3 Team Distribution

Physically collocated IPTs bond into a seamless unit more quickly and successfully, than physically distributed teams. OMB states, "Agencies should strongly consider co-locating the IPT …"[38] While electronic communications can partially offset the problems of physical separation, face-to-face communication is a strong basis for developing esprit-de-corps. It is particularly important that funding be available to allow virtual teams to come together physically for at least a period of time at the start of the project to melt barriers that may exist and arrive at a shared vision.

3.1.4 Federal Project Director Leadership

The act of assigning people to a cross-functional/cross-organizational group does not automatically create an IPT. Each IPT member comes with his or her own values, biases, and priorities. The FPD should not wait passively for collaboration to occur but should be diligent in making the members aware of their inter-dependencies and collective interests; showing how each member contributes to the projects mission; communicating the importance of that mission; and, by rotating lead responsibility within the IPT based upon which member has the most knowledge and capability of the subject being addressed.

3.2 Measuring the IPT's Performance

There are three ascending levels of IPT success. Starting at the lowest level, they occur when the IPT arrives at a common vision or goal, when individual members or organizations are able to align their efforts so that no one is working at cross purposes, and when the team can draw upon each person's or organization's unique perspective to see challenges and solutions that were not apparent from any singular frame-of-reference. This third level of performance is difficult to reach but essential when undertaking a large, complex project.

[38] OMB Capital Programming Guide, paragraph I.2.1, page 9.

- An experienced observer can tell almost immediately what level of performance an IPT has reached by simply watching how the members approach an issue or task. A few of the more obvious indicators of level one or two performance are:

- meeting attendance and participation;

- the amount of positive energy members display;

- whether members appear to like what they are doing and the other members of the team with whom they are working;

- absence of personality conflicts;

- open communication between team members;

- whether communication is directed toward creating a common understanding or advocates a member's personal views and priorities;

- degree of alignment on early trade-offs relating to project requirements, priorities, strategies, etc;

- the extent to which members reflect ownership of assigned and unassigned tasks; and

- whether the team has correctly identified the barriers to project and team success and focused their efforts towards the elimination of these barriers.

It is necessary to look beyond the surface indicators of consensus when assessing an IPT's performance level. What appears to be consensus may, if fact, be no more than passive submission of some members or "group-think." Both are indicators that the project is headed in a negative direction.

While there are relatively few ways to foresee an IPT's potential for reaching the third level of performance at the early stages of a project, there is a simple and highly reliable, indicator that can be utilized within the first week to determine the IPT's potential for moving beyond the second level. That indicator is the individual member's willingness to seek out and utilize lesson learned from other projects. Team members that are not willing to learn from similar projects are unlikely to willingly listen to, and learn from, their fellow team members and will, by definition, never reach the third level of performance.

The FPD is confronted with a difficult decision if an individual that has just been brought on board as one of the core IPT members clearly rejects the concept of utilizing lessons learned. Either the team member must be replaced or the FPD must accept the very real risk that that team member will prevent the entire IPT from rising above the second level of performance. The correct decision on most complex projects is to find a replacement, even if that replacement has less talent or experience within their particular functional discipline.

3.3 The Importance of IPTs to Project Success

It is the IPT that actually implements the bulk of the procedures laid out in DOE O 413.3A. Studies consistently show a strong positive correlation between the strength of the IPT and project success and failure. This correlation increases with each of the key variables identified in Section 2.3. The simple truth is, large, complex, technically challenging projects involving multiple stakeholders and tight budgetary, schedule, and safety constraints have a minimal chance of succeeding without an equally competent and committed IPT. The various organizational and functional elements of the project will not come together unless the IPT works together.

SAMPLE IPT CHARTER

(Appendix A of the Sample Charter is not included in this Guide)

Defense Nuclear Nonproliferation
Office of Fissile Materials Disposition

United States Department of Energy

MOX Fuel Fabrication Facility Federal Integrated Project Team Charter

February 2006

MOX Fuel Fabrication Facility
Federal Integrated Project Team Charter

Approve: ______________________________ **Date**

Acting Federal Project Director,
Office of Defense Nuclear Nonproliferation, NA-261
National Nuclear Security Administration

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Mixed Oxide Fuel Fabrication Facility
Federal Integrated Project Team Charter

1.0 Introduction The Mixed Oxide Fuel Fabrication Facility (MFFF) Federal Integrated Project Team (IPT) is a federal team comprised of members from several DOE organizations. The team supports the Federal Project Director in specifying the design requirements, coordinating project management, and overseeing design, construction, licensing and permitting, and cold startup of the MFFF at the Savannah River Site (SRS) in Aiken, SC. The IPT represents diverse disciplines with specific knowledge, skills, and abilities necessary to support the successful execution of the project. MFFF contractors and their roles are defined in the MOX Fuel Fabrication Facility Project Execution Plan (PEP).

1.1 References DOE O 413.3 *Program and Project Management for the Acquisition of Capital Assets*, 1-03-05; DOE M 413.3-1, *Project Management for the Acquisition of Capital Assets,* 3-28-03; *MOX Fuel Fabrication Facility Project Execution Plan*

1.2 Purpose The purpose of this charter is to accomplish the project objectives, as defined in MOX Fuel Fabrication Facility Project Execution Plan (PEP) by establishing clear lines of authority, duties, roles, and responsibilities, and interface responsibilities of the IPT members. It also provides guidelines for effective project management and federal stewardship.

1.3 Period of Performance Activities of this team are designed to be in effect from design through Critical Decision 4 when the facility will start operations and the project is complete.

1.4 Interface of Team Members The primary function of the IPT is to provide support to the Federal Project Director in management of the MFFF Project. Even though the members of the IPT report functionally to the Federal Project Director and administratively to other NNSA or DOE organizational managers, the Federal Project Director is the leader of the team and provides the "what, why, and when," of daily direction to the members of the IPT. The organizational managers of the IPT members provide administrative and personnel management as the team members carry out their MFFF Project duties assigned by the Federal Project Director. The Federal Project Director provides performance input to the organizational managers of each member of IPT.

Table 1 identifies the functional responsibilities of each IPT member, their organizational affiliation, and contact information. Biographical sketches of the team members are included in Attachment A of this document. Team members will dedicate some or all of their time to the project, depending on the needs of the project. As the project progresses from initiation to closeout, the IPT membership or assignments on the team may change. In such cases, the Federal Project Director will ensure the necessary skills and expertise are available to adapt the IPT to meet changing project needs. This charter will be updated as appropriate.

1.5 Communications DCS is the contractor responsible for the design and construction of the MFFF. Day-to-day communications between IPT members and DCS staff are required; however, IPT members will not provide technical direction to DCS. Technical direction will be provided to DCS by the Federal Project Director or the authorized Contracting Officer's Technical Representatives. The Federal Project Director will be copied on all official project correspondence issued by team members to DCS. Copies of such correspondence will also be sent to the other affected IPT members.

Table 1. Functional Assignments and Contact Information

Name	IPT Function	Station	Organization	Telephone
	• Acting Federal Project Director • Civil/Structural Engineering	Washington	NA-261	
	• Project Control • Cost Estimation	Chicago	CHO	
	• Contracting Officer	Chicago	CHO	
	• Emergency Management • SRS Liaison	Aiken	NA-266	
	• Environmental Protection	Aiken	NA-266	
	• Aqueous Processing • Contracting Officer's Technical Representative (COTR) Manufacturing Design Group (MDG) • COTR Procurement Engineering Group (PEG)	Washington	NA-261	
	• Physical Security • Waste Management	Aiken	NA-266	
	• Operations Planning	Charlotte	NA-261	
	• Construction Engineering	Aiken	NA-261	
	• Mechanical Engineering • Integrated Safety Analysis	Aiken	NA-266	
	• Technical Evaluations	Chicago	CHO	
	• Procurement Contracting Officer	Chicago	CHO	
	• Electrical Engineering • Instrumentation and Control • Software Development • COTR Software Design Group (SDG)	Aiken	NA-266	
	• Integrated Project Schedule • Risk Management	Aiken	NA-266	
	• Safety and Licensing • Material Control and Accountability • Monitoring and Inspection	Washington	NA-261	
	• MOX Processing	Washington	NA-261	
	• Site Development • QA • Training	Aiken	NA-266	

2.0 Roles and Responsibilities Program management functions, budget formulation and management, and interfaces at the programmatic level and with other agencies are described in the MOX PEP.

The following describes roles and responsibilities of the Federal Project Director and the Federal Integrated Project Team, including the functional area responsibilities.

2.1 Federal Project Director

The Federal Project Director's role is to specify the design requirements, coordinate project management, and oversee the design, construction, licensing and permitting, and cold startup of the MFFF at the Savannah River Site (SRS) in Aiken, SC.

The responsibilities of the Federal Project Director include the following:

- Lead the Integrated Project Team;
- Work closely with Nuclear Nonproliferation program to assure project meets needs of program;
- Define project objectives and technical, schedule, and cost scopes;
- Develop the contracting strategy;
- Serve as Contracting Officers' Technical Representative for DCS for the MOX FFF Project (defined as Technical Manager under the DCS contract);
- Serve as the main point of contact between Federal and DCS contractor staff in all matters relating to the project and its performance.
- Coordinate activities with NA-266, which is the single point of contact for SRS M&O.
- Ensure the design, construction, environmental, safety, health, and quality efforts performed by contractors are in accordance with the contract, public law, regulations, and Executive orders;
- Develop and implement the Acquisition Strategy and this IPT Charter;
- Evaluate and verify reported progress, make projections of progress, and identify trends;
- Oversee and coordinate design reviews as well as review and accept contractor deliverables;
- Ensure timely, reliable, and accurate integration of contractor performance data into the project's scheduling, accounting, and performance measurement systems;
- Serve as the Chairman of the MOX Fuel Project Change Control Board and make the disposition decision on all proposed level 2 changes. Endorse and recommend higher consideration of level 0 and level 1 changes; and
- Evaluate prime contractor performance and recommend fee to the fee determining official.

2.2 Integrated Project Team

The Integrated Project Team represents diverse disciplines with specific knowledge, skills and abilities necessary to support the successful execution of the MFFF Project. All of the team members, except the Contracting Officer:

- Support Project performance, scope, schedule, cost and safety and quality objectives;
- Maintain communications within their respective organizations, with the Federal Project

Director, and with other Integrated Project Team members;

- Ensure all project interfaces are identified and managed;
- Routinely monitor and assess project performance and status against performance parameters, baselines, milestones, and deliverables in their delegated area of responsibility, providing corrective actions or recommendations as needed. Track corrective actions and interface with the contractor until they are complete;
- Review Critical Decision packages for completeness, recommending approval or disapproval;
- Participate in project reviews, audits, and appraisals, as necessary and requested by the Federal Project Director;
- Review and comment on project deliverables (e.g. design documentation and procurement and construction packages), recommending approval where appropriate;
- Review change requests in support of change control board actions; and
- Support the Federal Project Director.

2.3 Contracting Officer

The Contracting Officer is responsible for administration of the DCS Contract, for which overall responsibilities are established in the Federal Acquisition Regulations. This Contracting Officer will:

- Advise and assist the Federal Project Director in acquisition of the DCS Contract;
- Provide assistance to Federal Project Director in preparing Contract work statements and fee incentive structure;
- Interpret Contract requirements, policies, and regulations;
- Review, approve, and evaluate the DCS's purchasing systems for conformance with Contract requirements and Government acquisition policies;
- Review, approve, and monitor the DCS's small and disadvantaged business subcontracting plan;
- Review DCS activities to ensure compliance with labor statutes and regulations, Executive Orders, and other directives;
- Oversee use and administer performance-based incentives employed by the MOX FFF project;
- Verify and document evidence of actual or potential performance problems, constructive changes, or other deviations;
- Review BCPs and variances to cost and schedule to ensure adequate funding is available on the contract;
- Support baseline reviews;
- Ensure configuration management of the contract and consistency with the acquisition strategy, such as the decision to buy data rights or other strategies to ensure that a second source can build the hardware;
- Recommend stop work when contractor deficiencies are expected to result in delivery of nonconforming technical products; and
- Ensure that DCS is responsible for the professional quality, technical accuracy and coordination of all services required under their contract and that they are held liable for government costs resulting from errors or deficiencies in designs furnished under its contract.

3.0 Integrated Project Team Functional Area Roles and Responsibilities

The functional area roles and responsibilities are listed below. The IPT member responsible for each functional area is listed in Table 1.

The **Federal Project Director** roles and responsibilities are detailed in Section 2.1.

The **Civil/Structural Engineering** function oversees design, construction, and start-up of building civil/structural systems.

The **Project Control** function oversees project control tools (e.g. variance reporting, trending, scheduling, cost accounting, performance metrics) to verify compliance with procedures, standards, and guidelines. This function assures that execution and use of the tools are adequate for DCS to manage the project and provide accurate reporting to the Federal Project Director. This function includes oversight of the Integrated Project Schedule development and development of the cost estimate and life cycle estimate.

The **Cost Estimation** function oversees development of and reviews all cost estimates prepared by DCS.

The **Contracting Officer** roles and responsibilities are detailed in Section 2.3.

The **Emergency Management** function reviews emergency management plans and design products for conformance with established requirements. This function oversees development of protocols for SRS provision of emergency management services during construction and start-up.

The **SRS Liaison** function facilitates SRS support to the MOX project relative to design, licensing, construction, startup, and operations.

The **Environmental Protection** function oversees the environmental program including permitting, external communications with environmental regulators, and environmental process improvements.

The **Aqueous Processing** function oversees design of the Aqueous Polishing process (AP), including the chemical process, layout, and process equipment. This function oversees equipment procurement activities.

The **Contracting Officer's Technical Representative, MDG and PEG** function has delegated COTR responsibility for the Manufacturing Design Group and the Procurement Engineering Group scope of the DCS contract and therefore provides DCS technical direction in this area.

The **Physical Security** function oversees design, construction, and start-up of the physical security features for the MFFF, including engineered barriers, electronic detection and assessment systems, and access control systems. This includes assurance that the MFFF physical security posture addresses and meets the DOE Design Basis Threat. Additional activities include review and oversight of relevant security analyses of the engineered systems and deployment planning of the facility protective force.

The **Waste Management** function oversees planning and design activities for waste minimization and pollution prevention and managing waste streams that will be generated during facility construction, start-up and operations. This function facilitates interfaces with the Waste Solidification Building and other Savannah River Site waste management facilities.

The **Operations Planning** function oversees planning for startup and operations including development of the startup and testing plans, training program, and procedures.

The **Construction Engineering** function provides day-to-day presence at the construction site to assure to ensure that the construction scope of work (including site preparation activities) is budgeted, planned, monitored, and executed in a safe, secure, and cost effective manner according to schedule, quality, and operating requirements. This function will also facilitate change control real-time in the field in support of the Federal Project Director. The function will serve as the Contractor(s) Construction Manager's primary point of contact with the NNSA.

The **Mechanical Engineering** function reviews and oversees design, construction and start-up of mechanical systems, including fire protection and ventilation designs.

The **Integrated Safety Analysis** function assures that the project activities are integrated with the SRS Integrated Safety Management System and that analyses are conducted in conformance with applicable DOE Orders and best management practices. The objective of this function is to assure that there is an adequate safety basis for authorizing operation of the facility.

The **Technical Evaluations** function reviews all significant technical evaluations prepared by DCS. This function utilizes the support of other technical functions for these reviews.

The **Procurement Contracting Officer** function reviews and coordinates procurement strategies and plans for the project spanning requisitioning, delivery, receipt inspection, storage, and issuance of materials/equipment. This function acts as primary contact and resource for the IPT in resolving procurement issues, and provides status of procurement activities, ensures that contractor procurement procedures are in compliance with applicable regulations, and routinely monitors contractor procurement activities to ensure that they are executed in compliance with regulations.

The **Electrical Engineering** function oversees design, construction, and start-up of electrical systems.

The **Instrumentation and Control** function oversees design, construction, and startup of instrumentation and controls.

The **Software Development** function oversees development of the process software and instrumentation and controls. This function also oversees cyber security issues.

The **Contracting Officer's Technical Representative, SDG** function has delegated COTR responsibility for the Software Design Group scope of the DCS contract and therefore provides DCS technical direction in this area.

The **Integrated Project Schedule** function oversees development of and administration of the project schedule, evaluation of the logic, interdependencies, deliverables, and durations; use of schedule as management tool, and provision of routine schedule status.

The **Risk Management** function oversees the risk management program, including identification and analysis of program/project risks and mitigation of risks throughout the life of the project.

The **Safety and Licensing** function is responsible for overseeing all aspects of nuclear safety, occupational safety, and chemical safety including NRC and OSHA interface activities. This responsibility includes oversight of DCS preparation of Nuclear Safety Evaluations, Nuclear Criticality Safety Evaluations, the Integrated Safety Analysis summary, the License Application and security licensing documents prepared to meet Nuclear Regulatory Agency requirements. This function also oversees preparation of safety and health plans to govern occupational safety during nuclear construction, start-up, and operations.

The **Material Control and Accountability** function is responsible for overseeing activities related to control and accountability of nuclear materials within the facility, including preparation of the DCS MC&A plan.

The **Monitoring and Inspection** function is responsible for reviewing all documents and plans associated with the monitoring and inspection of the plutonium materials within the facility. This function includes the responsibility for interfacing with the International Atomic Energy Agency.

The **MOX Processing (MP)** function oversees design of the MOX fuel fabrication process, including the process, layout, and process equipment. This function supports the oversight of MP equipment procurement activities.

The **Site Development** function oversees all activities associated with preparing the sites for construction assuring that work is safely performed and maintained on schedule and within budget, including land clearing, grading, utility tie-ins, permitting, and contracting.

The **Quality Assurance** function oversees the contractors' QA programs and performance and supports NNSA QA audits.

The **Training** function coordinates scheduling and administration of training courses beneficial to team productivity.

AREAS HISTORICALLY REQUIRING CROSS ORGANIZATION ALIGNMENT AT THE FUNCTIONAL DISCIPLINE LEVEL

- Safety-class and safety-significant fire protection systems.
- Adequacy of water supplies
- Fireproofing of structural steel
- Degradation of HEPA filters
- Combustible loadings
- Fire detection and suppression system activation mechanisms
- Hydrogen and flammable gas generation accumulation in systems and components.
- Seismic
- Ground motion
- Adequacy of geotechnical investigations
- Soil settlement
- Structural engineering
- Soil-structure interaction analyses
- Load paths for seismic and settlement induced forces.
- Finite element analysis
- Structural computer codes
- Confinement strategy
- Analysis of the adequacy of the confinement barriers
- Magnitude of the radiological source term
- Models
- Criticality standards
- Chemical process safety

- Definition, selection, and implementation of quality assurance requirements
- Potential for solids settlement in pipes and ducts
- Application of lessons learned
- Assumptions bases
- Degree of conservatism
- Timely verification/confirmation
- The technical defensibility of calculations and designs.
- Nuclear safety basis documentation

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