Integrated Project Teams - An Essential Element of Project Management during Project Planning and Execution-12155

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ABSTRACT

Managing complex projects requires a capable, effective project manager to be in place, who is assisted by a team of competent assistants in various relevant disciplines. This team of assistants is known as the Integrated Project Team (IPT). he IPT is composed of a multidisciplinary group of people who are collectively responsible for delivering a defined project outcome and who plan, execute, and implement over the entire life-cycle of a project, which can be a facility being constructed or a system being acquired. An ideal IPT includes empowered representatives from all functional areas involved with a project—such as engineering design, technology, manufacturing, test and evaluation, contracts, legal, logistics, and especially, the customer.

Effective IPTs are an essential element of scope, cost, and schedule control for any complex, large construction project, whether funded by DOE or another organization. By recently assessing a number of major, on-going DOE waste management projects, the characteristics of high performing IPTs have been defined as well as the reasons for potential IPT failure.

INTRODUCTION

The authors, under contract to DOE-EM, led a team effort to assess the operation of IPTs of a number of large DOE-EM waste management projects operating under DOE Order 413.3B, which specifies IPT responsibilities (1).

The assessments were conducted on a confidential, non-attribution basis and involved interviews with management and staff from both DOE and the participating contractors (2). As part of this effort, the authors also looked at IPTs operated by other federal agencies and private industry (3, 4, 5).

These evaluations led to the identification of characteristics of both high performing and less-successful IPTs. Jointly with the Federal Project Directors (FPDs) of the projects assessed, the effort led to defining a set of best practices for successful IPTs. The team then developed a Best Practices Guide for IPTs (6) and a One-day Orientation and Training program for IPTs (7), both of which provide useful information to project teams on the formation and operation of IPTs, including characteristics of high performing IPTs and the reasons why an IPT might not be successful.

Often, IPTs are formed too late in the project timeline to be fully effective, or the members receive little or no orientation or training regarding their roles and responsibilities. The IPT needs to be formed early-on, ideally as soon as a project's mission need is approved, and it may be formed before the project manager is

assigned. This allows the IPT members to be fully involved in looking for alternatives, identifying and developing technology needs, developing cost and schedule ranges, and providing the management structure for the project.

The authors determined that when IPTs were formed later, after the selected alternative had been chosen by some other group, the project team did not fully own the alternative, and when no training or orientation was provided to the members, the IPTs were less effective than they could be.

DISCUSSION AND FINDINGS

An IPT is the primary entity that brings together for a project the various organizations, disciplines, professions, and levels of management that can assist the FPD deliver a defined project outcome. Under the leadership of a project manager, a successful IPT combines these elements to form a unit that can effectively share pertinent information, balance conflicting priorities, and jointly plan and support the project manager to execute the project. Thus, an IPT is a multidisciplinary group of people who are collectively responsible for supporting the project manager to succeed on a project by effective planning, execution, and implementation of decisions impacting the project.

Forming an IPT

The size and structure of an IPT should be established based on the project activities required and what entity will be performing certain function. The IPT's size and structure should be determined by the size and complexity of the project. For smaller projects, there may be just a single IPT, while for larger projects, there may be a primary (or core) IPT and one or more subordinate, specialized IPTs.

The process of forming an IPT should begin by:

- Identifying all functional areas and disciplines needed to accomplish a project's activities,
- Identifying a set of individuals representing these functional areas and disciplines,
- Defining appropriate goals, tasks, and responsibilities for the IPT, and then
- Providing training and orientation for members in how to function effectively in an IPT.

An IPT scenario that has been successfully used with large, complicated projects within the DOD and private industry, and which is increasingly being seen within DOE, is the Merged IPT depicted below in figure 1. This model can function with IPTs operating on several different levels. Government-only and contractor-only IPTs can exist for specific purposes to support the project, as shown in the figure. However, a central tenet of this model is having in place a core, or merged, IPT where both the government and the contractor each participate at appropriate levels in their organization to discuss and solve the most pressing issues affecting a project. This model is emerging as a Best

Practice with the size of the core IPT and supporting IPTs tailored to the size and complexity of the project.

Fig. 1 Merged Integrated Project Teams

The IPT should be formed as early in the project life as practicable. Often, IPTs are not formed until the design and/or technology have been selected. In that situation, IPT members may not have a complete sense of ownership for the project, since they were not involved in the early planning and selection.

Securing appropriate membership for an IPT is critical to its ultimate success, and the FPD typically plays a key role in this process. Members of an IPT should be selected based on their ability to:

- Take ownership of the IPT's charter, goals, and objectives,
- Work effectively with the project contractor,
- Effectively support project cost, performance, schedule, and quality objectives,
- Identify and meet project commitments, and
- Maintain effective communication with their respective functional managers.

It is important to ensure that IPT members have the education, experience, and training necessary to meet specific project demands and demonstrate "competence commensurate with responsibility." Useful project-specific knowledge that qualified IPT members should possess includes:

- Project's mission and how the mission relates to the overall program,
- Applicable DOE project management directives,
- Other directives that could impact the project,
- Technical capabilities, risks, and maturity of the technology (or technologies) being implemented on their project, and
- Sufficient technical experience to ensure the quality of the engineering design being developed, as well as its implementation.

The need to integrate many different functional disciplines, organizations, and stakeholder views and knowledge creates a significant organizational problem for an IPT. Having more people on the IPT 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. An IPT normally becomes ineffective if it is made up of more than 25 members. This problem can be eased slightly by finding members with multi-discipline functional knowledge and skills. However, this does not provide a complete solution.

For most DOE projects, an appropriate approach is to create a merged core IPT with supporting sublevel IPTs (if needed) for special focus areas that are challenging enough to warrant the participation of both DOE and contractor SMEs. Each sublevel or satellite IPT should retain a cross-functional/cross organizational composition and should be led by a member of the core IPT.

IPT Roles and Responsibilities

The IPT has a number of roles and responsibilities that must be faithfully fulfilled in order to ensure a successful project. DOE Order 413.3B identifies the IPT's responsibilities.

- **Supporting the Federal Project Director (FPD)**

The first requirement is to support the FPD by providing individual expertise and capabilities in the various project disciplines. The IPT members act as liaison between the IPT and their functional organizations. They should be empowered to act for the FPD.

The FPD will formally delineate the limits of empowerment for each member, based upon their function in the IPT and their experience. Empowerment, properly employed, reduces the burden on the FPD while better utilizing the capabilities of the individual members of the IPT.

- **Acquisition Planning**

The IPT assists in developing a project Acquisition Strategy (AS) or Acquisition Plan (AP), as applicable. Management should provide the IPT with an estimate of the range of funds that may be available for the asset. The IPT should then conduct surveys to see what is available or may be developed commercially that can provide an asset that will satisfy the mission need within the funding constraint. Emphasis should be placed on generating innovation and competition from private industry and the use of commercial items and existing items to satisfy the mission need. The IPT should determine: 1) availability, 2) affordability, 3) cost and benefits, 4) sustainable design principles, and 5) risk.

- **Managing Environment, Safety, and Health (ESH) and Quality Assurance (QA)**

The extent of an IPT's involvement in environmental, safety, and health (ESH) depends upon the nature of the project. While this involvement extends over the length of the project, the identification and definition of requirements require significant IPT involvement in the period between CD-0 and CD-1. If the requirements are not defined early, the result can be costly downstream rework and delay.

Some ESH requirements may seem to conflict with other requirements, or may conflict within the ESH sphere. The IPT must be aware of potential conflicts and

must consider the effect of solving one issue on the other issues, which may require that several issues be addressed simultaneously.

The IPT will determine the Quality Assurance (QA) requirements for a project and monitor compliance with those requirements as the project progresses. QA decisions can involve tradeoffs.

- **Other Project Planning Tasks**

In its role of supporting the FPD, the IPT should be heavily involved in developing both of these plans, as well as other project documentation such as the Integrated Safety Management Plan (ISMS), the Preliminary Hazards Analysis (PHA), and the Quality Assurance (QA) Program.

- **Defining Key Technical, Schedule, and Cost Parameters**

The IPT identifies and defines appropriate and adequate project technical scope, schedule, and cost parameters. The technical scope should define what the project is to accomplish. If processes are involved, the scope should define the state of the process output, the input requirements and parameters, and the throughput. Schedule parameters should include how long the project will take. Various amounts of schedule detail may be provided at this time

The IPT needs to recognize the link between the length of the schedule and the availability of money—a longer funding profile will lead to a longer schedule. Cost parameters should include TPC, contingency, and estimate of management reserve. The IPT must recognize the link between total cost and funding profile. A longer funding profile will generally lead to a larger TPC because of inefficiencies and hotel load. The cost parameters should also include an allowance for SMEs and federal project staff augmentation.

The IPT also to establishes Key Performance Parameters (KPP) for a project that reflect the key technical, schedule, and cost parameters for the project.

- **Managing Interfaces and Change**

The IPT has the responsibility to ensure project interfaces are identified, defined, and managed to completion. The IPT must manage changes to cost, schedule, and scope. It must review change requests, as appropriate, and support the change control process. The IPT should prepare an analysis of the estimated changes in cost, schedule, and performance goals if the existing goals will not be achieved and determine the reasons for cost, schedule or performance deviations and evaluate whether the corrective actions are likely to be effective. Failure to do so can result in a project that is out of control

- **Reviewing and Approving Project Deliverables**

The IPT has responsibility for reviewing, and in some instances, recommending approval (or disapproval) of key project deliverables. The IPT must review all CD packages and recommend approval/disapproval; review and comment on Project deliverables (e.g., drawings, specifications, procurement, and construction packages), and; support preparation, review, and approval of project completion and closeout documentation.

- **Contractor Oversight**

It is an essential part of the responsibility of IPT to exercise oversight of the contractor regardless of what type of contract is in place on a project. While the degree of oversight can vary from project to project, experience has shown that contractor oversight by an IPT is critical.

Members of an IPT should also participate in periodic, in-depth design reviews of their project and conduct appropriate follow-up on findings to ensure the recommendations have been properly acted upon.

- **Innovation**

New ideas, processes, tools, techniques, methods, and relationships can all help an IPT reduce project costs, eliminate waste, shorten cycle time, and improve performance. Teams can either work harder or work smarter. Innovation, like everything that is new, brings some uncertainty that inherently carries risk with it. The focus here is on the ability of an IPT to be innovative in creating new and more effective ways of managing a project. Innovation means the creation of new ideas and the transformation of those ideas into useful applications. Both are needed to get results. Both are difficult, and each requires its own process for success.

The PM and senior management have significant influence on the development and effectiveness of innovation within an IPT. The IPT has a tendency to follow its leader's approach to risk taking. If the PM supports new ideas and is willing to take prudent risks, so will the IPT. Senior management can also encourage innovation. By follow-up actions like accepting reasonable mistakes and not rejecting new ideas,

they demonstrate the acceptability and importance of IPTs investigating, evaluating and proposing creative solutions to problems.

- **Accessing Subject Matter Experts (SME)**

An IPT will more than likely need specialized expertise from time to time. An IPT should have an effective and timely means to access appropriate SMEs to evaluate or assist with the development, validation, and implementation of the technology selected for their project, including resolution of technical issues. SMEs can provide a different perspective on the problem and potential solutions that may not be obvious to the normal IPT members, resulting in improved decision making and improved IPT performance.

SMEs may also be used to supplement the workforce of an IPT when special expertise or more depth in the skill base is needed. The PM should anticipate these needs and develop SME support plans based on identified needs and anticipated problems that need to be addressed early. This plan would identify the particular SME, their expected work, the anticipated timeframe for their work and an estimate for that work. The plan could also include the method (contract, task or other mechanism) that will be used to acquire the SME services. The needs could then be rolled up and included in the project annual budget.

Characteristics of High Performance IPTs

High performance IPTs are customer-oriented, work product-focused, multidisciplinary groups that share common goals with the evolving project timeline. IPT members are individually empowered to make decisions within well-defined bounds, as is the IPT collectively. The members are mutually and individually responsible to the project manager for executing the project within allocated resources and for adhering to approved policies and processes. Decisions are timely and project-optimized and have involved all affected disciplines. In other words, a high performance IPT will deliver the required product on schedule and within the baseline cost.

Among the DOE projects reviewed, high-performance IPTs demonstrated the following six characteristics:

- **Effective Leadership, Chartering, and Launch** – The project exhibits leadership and drives preparation of an early action plan, maintains a relevant Charter identifies and meets key milestones, and arranges for necessary training and orientation for IPT members.
- **Alignment of Goals** – The IPT's goals and objectives are explicitly aligned with the goals and objectives of the project.
- **Open Discussions** – Team discussions within the IPT are full and open with no secrets, because each IPT member brings unique and needed expertise to the Team, and because each person's views are important in the overall development of a successful project.

- **Empowered, Qualified Team Members** – All IPT members are empowered by their leadership and able to speak for their superiors in the decision-making process; empowerment is critical to making and keeping agreements essential to an effective IPT.
- **Dedicated/Committed Proactive Participation** – IPT members participate proactively in the work of the Team and are committed to the success of the project.
- **Issues Raised and Resolved Early** – IPT members openly raise and discuss issues at the earliest possible opportunity, so they can be addressed and resolved within the Team, seeking additional functional expertise when necessary.

Why IPTs Fail

IPTs can fail or not meet expectations for a variety of reasons. And it must be remembered that if the IPT fails, the project usually does not meet cost, schedule, and technical goals. Among the DOE projects evaluated, IPTs that had less success in working with DOE were those that in which common goals and objectives were not shared and where there was an adversarial relationship between the Federal IPT and the contractor.

Factors that lead to lack of success include the following:

- **IPT Time Usage** – There is no sense of urgency among the IPT members to conduct project business. IPT membership is thought of as a secondary job, to be worked only after their perceived primary job is done.

- **Role, Authority, and Leadership of the Project Manager** – The PM does not have the support of his upper management; the PM has no clear role, and his decision making authority is not well defined; the PM is inexperienced and has no relevant training; the PM is a weak leader; the PM has not empowered his team members.

- **IPT Direction, Purpose, and Scope** – There is little sense of purpose, there is little direction, and the scope of the IPT roles, responsibilities, accountabilities, and authorities is ill defined. There are major disagreements among stakeholders. There is no IPT charter to provide guidance and operating methods. There are no clear measures of success defined.

- **Formal IPT Processes Are Not Developed and In Use** – There is no planning; there is no training for IPT members.

- **IPT Membership is Haphazard** – No formal criteria or selection process is used when selecting IPT members; Members are unable to represent their stakeholders; the IPT members devote only minimal time to IPT operations, IPT members receive little or no training.

RECOMMENDATIONS

Project managers should use IPTs to plan and execute projects, but the IPTs must be properly constituted and the members capable and empowered. For them to be effective, the project manager must select the right team, and provide them with the training and guidance for them to be effective. IPT members must treat their IPT assignment as a primary duty, not some ancillary function. All team members must have an understanding of the factors associated with successful IPTs, and the reasons that some IPTs fail. Integrated Project Teams should be used by both government and industry.

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