An Introduction to Project Management

The purpose of this briefing paper is to introduce key project management terms and concepts to provide a common language for discussion, including what is:

- A project
- Project management
- Project success
- A project manager
- A project management plan

Successful project management has several significant characteristics. To understand the value of project management, it is necessary to understand the fundamental nature of a project; the core characteristics of project management processes; how success is evaluated, the roles, responsibilities, and activities of a project manager and the expertise required; and the context in which projects are performed, conceptually illustrated by figure 1.[1]

Throughout this document, references are made to The Project Management Institute's (PMI®) Project Management Body of Knowledge (PMBOK®). Developed over the past 30 years, the PMBOK is a collection and organization of knowledge on the project management profession. It is widely accepted to include the core elements of successful project management practices. It is a regularly updated and internationally referenced standard (ANSI /PMI 99-001-2004) and provides a basis for universal discourse on practices. Most modern

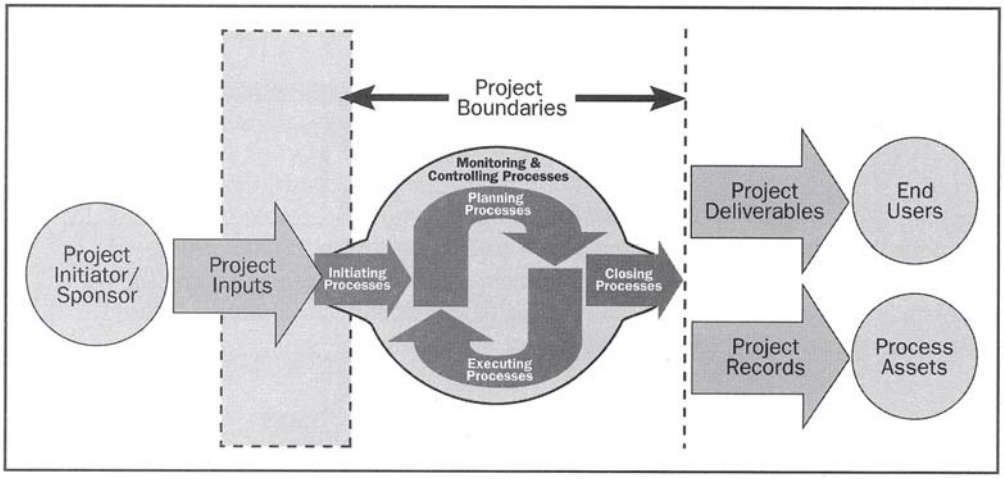

Figure 1.

[1] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, p. 43.

academic and practical publications on the subject of project management reference the PMBOK, adopt its methodology, and incorporate its terminology.

What Is a Project?

The fundamental nature of a project is that it is a "**temporary** endeavor undertaken to create a **unique** product, service, or result."[2] Projects are distinguished from operations and from programs.

Temporary Endeavor

To be temporary signifies that there is a discrete and definable commencement and conclusion; the management of a project requires tailored activities to support this characteristic, as such, a key indicator of project success is how it performs against its schedule—that is, does is start and end on time.

Unique Deliverable

The uniqueness of the deliverable, whether it is a product, service, or result, requires a special approach in that there may not be a pre-existing blueprint for the project's execution and there may not be a need to repeat the project once it is completed. Uniqueness does not mean that there are not similarities to other projects, but that the scope for a particular project has deliverables that must be produced within constraints, through risks, with specific resources, at a specific place, and within a certain period; therefore, the process to produce the deliverable as well as the deliverable itself is unique.

Progressive Elaboration

This unique process and deliverable produces the third characteristic of a project: progressive elaboration. Project management is a group of interrelated processes, implemented in a progressively elaborative manner, in which to produce the deliverable. Progressive elaboration is the revealing and focusing of details through time. For example, in the engineering design process, a general and broad concept may be a starting point for the design team; but through the design process, the concept is narrowed to a specific scope and is further elaborated to achieve the completed design; moreover, it may continue to be elaborated and not be finalized until the product, service, or result is delivered.

Other "Projects"

A clarification should be made with respect to Reclamation language. In Reclamation, a project is typically a congressionally authorized or directed activity that allows Reclamation to do something specific. Traditionally, projects

[2] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, p. 5.

are groups of infrastructure, such as the Central Arizona Project, the Lower Colorado Dams Project, or the Central Valley Project. The Reclamation "project" activities would range from the traditional planning, designing, and building of structures, to negotiating and signing delivery contracts, developing operations plans, and completing environmental compliance documents.[3] In historic Reclamation vernacular, the operation and maintenance of the completed project is also often considered as part of the "project." Additionally at times in Reclamation, the people managing projects are often referred to as something other than project managers—they may be called team leaders, coordinators, activity managers or program managers; people managing "projects" may be called area managers or facility managers. Because of these connotations, care should be taken to distinguish between Reclamation "projects" and projects as defined above.

A Project Versus an Operation

The operations of an organization are continuing and repetitive activities that are executed to achieve its mission and sustain the business, but without a definable end to their performance and without a unique output—that is, it is not produced or provided only once.

A Project Versus a Program

A project differs from a program in that "a program is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements or related work outside the scope of discrete projects in the program."[4] Furthermore, programs often involve a series of repetitive or cyclical undertakings. In Reclamation, a program is typically a group of projects administered by Reclamation. Reclamation programs do not have to be specifically authorized, and a program's schedule may continue past any individual project. Examples of Reclamation programs are the Safety of Dams Program, the RAX Program, and the Title 16 Program.[5]

What Is Project Management?

"Project management is the process of the application of knowledge, skills, tools, and techniques to project activities to meet project requirements."[6] That is, project management is an interrelated group of processes that enables the project

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[3] Carly, Lauren. *Project Management Primer*. Bureau of Reclamation, 2004, p. 2.

[4] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, p. 16.

[5] Carly, Lauren. *Project Management Primer*. Bureau of Reclamation, 2004, p. 2.

[6] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, p. 37.

team to achieve a successful project. These processes manage inputs to and produce outputs from specific activities; the progression from input to output is the nucleus of project management and requires integration and iteration. For example, a feasibility report could be an input to a design phase; the output of a design phase could be a set of plans and specifications. This progression requires project management acumen, expertise, tools and techniques, including risk management, contingency development, and change control. Figure 1 illustrates the project context, its conceptual boundaries, or scope lines, as well as the process groups required to manage the inputs and deliver the outputs.

Process Groups

The project management process groups depicted in figure 1 are initiating, planning, executing, monitoring and controlling, and closing. **Initiating** defines and authorizes the project or a project phase. **Planning** defines and refines objectives and plans the course of action required to attain the objectives and scope that the project was undertaken to address. **Executing** integrates people and other resources to carry out the project management plan for the project. **Monitoring and controlling** regularly measures and monitors progress to identify variances from the project management plan so that corrective action can be taken when necessary to meet project objectives. **Closing** formalizes acceptance of the product, service, or result and brings the project or a project phase to an orderly end.[7] Figure 2[8] illustrates the relative depth, breadth, and interrelationship between these process groups.

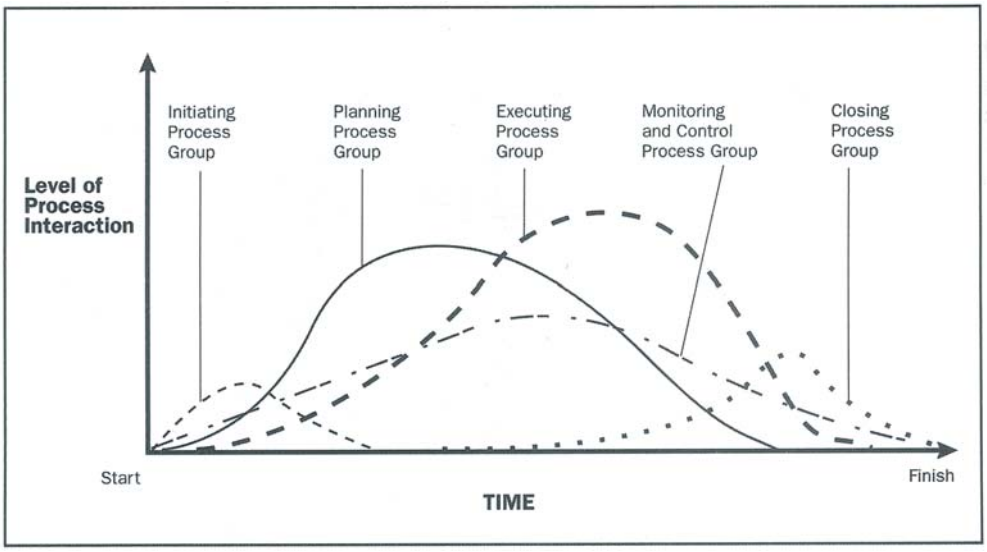

Figure 2.

[7] *Ibid*, p. 41.
[8] *Ibid*, p. 68.

Several significant observations regarding the nature of project management can be made from this figure. The breadth or range of project management is comprehensive—that is, it begins with **initiating** and continues through **closing**; these processes are coincident with the start and end of the specific project itself, respectively. **Monitoring and controlling** occur throughout the duration of the project and have a range relatively similar to that of **executing**. Indicating a project's temporary nature and the importance of the timing of the deliverable, **closing** begins relatively shortly after **initiating** concludes. **Planning** and **monitoring and controlling** have a collective depth similar to that of **executing**, illustrating that these activities require a level of effort and have a implication similar to that of constructing the product, providing the service, or producing the result.

Process Group Interaction

The level of interaction of the five processes indicates a strong relational dependence not exclusive of one another. One process does not simply end and the next one begins. The presence of this interrelationship and range is a function of progressive elaboration. Projects are executed in increments and details are exposed and developed through the progression of time—objectives are developed, discoveries are made; investigations, studies, and surveys are completed; analysis is performed; constraints are changed; resources are amended; contingencies are exercised; changes are managed; risks are mitigated; and *Force Majeure* (unforeseeable or unpreventable circumstances) occurs.

To manage the breadth or range of a project, active and proactive project management is required throughout the duration of the project. It cannot be simply initiated and/or planned and left alone; it must be continually planned and monitored and controlled. Sustained reactive project management is indicative of incomplete or absent planning and/or monitoring and controlling.

Project Phases Versus Process Groups

Project management process groups are not project phases. In fact, the process groups may need to be repeated for each phase, such as study, programming, engineering, procurement, construction, and commissioning. A process group or project phase is not discrete; they are interdependent and require integration. Also, project management must ensure continuity as a project progresses through processes and phases.

What Is Project Success?

A standard must be established by which to define and measure project success. Fundamentally, project success is the delivery of the required product, service, or result on time and within budget. To meet these objectives is to deliver a quality project. PMI illustrates project quality through the concept of the triple

constraint—project scope, time and cost.[9] Project quality is affected by balancing these three interrelated factors. "The relationship among these factors is such that if any one of the three factors change, at least one other factor is likely to be affected."[10] Figure 3 illustrates this constrained relationship, sometimes called the "iron triangle."

Figure 3.

Cost and time are intuitive, but the role played by scope warrants further discussion. To understand the significance of scope, one must appreciate the relationship between scope and the project objectives. For the scope to contribute to project quality, it must be managed to meet the demands of the project objective by reliably providing the required functions, nothing more or nothing less. It is not simply a matter of keeping the scope from creeping, or a matter of completing the cheapest and fastest project; it is establishing the appropriate scope and delivering the commensurate product, service, or result.

What Is a Project Manager?

The key responsibility of the project manager is to successfully accomplish the project objectives by balancing the competing demands for quality, scope, time, and cost.[11] Derivative responsibilities include identifying the project requirements; establishing clear and achievable objectives; and adapting the specifications, plans, and approach to the different concerns and expectations of the various stakeholders. Fundamentally, the project manager must direct the project from its inputs, through its nucleus, to delivery of its outputs. In order to accomplish these multifaceted responsibilities, the roles of the project manager include that of a leader, administrator, entrepreneur, facilitator, arbitrator and mediator, liaison, and coordinator.

The project manager must lead teams to operate cross functionally towards a common objective while assuring cohesiveness and continuity as the project

[9] *Ibid*, p. 8.
[10] *Ibid*.
[11] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, p. 8.

progresses through project processes and project phases. "The project manager acts as the key catalyst to stimulate effective communication and coordination between design, procurement and construction activities."[12]

In order to effectively manage these responsibilities and assume these roles, a project manager must have experience in the following project management knowledge areas: project integration, scope, time, cost, quality, human resources, communications, risk, and procurement management.[13]

What Is a Project Management Plan (PMP)?

A project management plan is a fundamental tool for the project manger to deliver the project successfully. This document is a strategic and formalized roadmap to accomplish the project's objectives by describing how the project is to be executed, monitored and controlled, which includes creating a project work breakdown structure, identifying and planning to mitigate risk, identifying manners in which to effectively communicate with stakeholders and other project team members, and developing a plan to manage changes. It is essentially a guide for executing the project, and a manner in which to gain buy-in and approval from stakeholders and sponsors prior to commencement. This plan is a living document that is updated and revised throughout the project at strategic milestones or significant events to accommodate the progressive, elaborative nature of the project. The project management plan will vary based on size, complexity, risk, and/or sensitivity of the project. Implementing the project management plan requires competency in all of the project management knowledge areas and is critical to the success of the project.

Summary

A project is temporary, unique, and the product of a multifaceted and progressively elaborated process that produces a solution for a specific objective. For the endeavor to be successful, the project must be accomplished on time, within budget, and to the appropriate degree required to satisfy the objective. For success to be achieved, the project manager must be skilled and operate in an environment which enables a project team to function. Excellence in project management should be viewed as the positive trend in the performance of successful projects.

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[12] Bent, James. *Project Management for Engineering and Construction*. Englewood Cliffs, New Jersy, Prentice Hall, 1989, p. 2.

[13] Project Management Institute. *A Guide to the Project Management Body of Knowledge: PMBOK® Guide*, 3rd Edition. Newtown Square, Pennsylvania, Project Management Institute, 2004, pp. 9-10.