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INTRODUCTION

Scope

Project management is the application of knowledge, skills, tools, and techniques for project activities in order to meet or exceed stakeholder needs and expectations in a project. A project is a temporary endeavor undertaken to create a unique product or Service that is different in some distinguishing way from all similar products or services. Energy conservation projects and process improvement efforts that result in better business processes or more efficient operations can be defined as projects. Projects usually include constraints and risks regarding cost, schedule or performance outcomes.

Many efforts are called “projects” but actually become programs as they extend indefinitely and cover broader, less specific business objectives. Projects must have a clear, definitive goal or objective. The objective is specific, identifiable, and can be accomplished. A project usually involves varied activities, which produce quantifiable and qualifiable deliverables that when added together, accomplish the overall objective.

Projects have become the new way of accomplishing and managing business activities. Projects are the temporary assemblage of key personnel designed to accomplish specific business objectives with identifiable customers in mind. A project has a beginning and an end. The project team dissolves once the objectives are met. It is fluid and driven by the specific needs of that business. The project approach to managing business activities embraces change and complexity.

Project management includes developing a project plan, which includes defining and confirming the project goals and objectives, identifying tasks and how goals will be achieved, quantifying the resources needed, and determining budgets and timelines for completion. It also includes managing the implementation of the project plan, along with operating regular controls to ensure that there is accurate and objective information on performance relative to the plan, and the mechanisms to implement recovery actions where necessary.

This design guideline presents steps for managing projects using basic tools needed for success. The steps should be modified for each individual project as it applies to the given effort. These steps provide a methodical approach to conducting projects so that they meet the needs of the project sponsors successfully and consistently.

This design guideline covers how to guide project managers through corporate project management methodology. The project life cycle consists of five major phases: Initiating, Planning, Executing, Controling, and Closing. It assists engineers to understand the basic project management. In addition, this guideline consist of development of project, implementation plan for top management, strategies of a project, etc.

The guideline is also useful in directing a project manager to have skills in forming, leading and facilitating a group. There are methodls of how to face a team and people in a project, how to solve problems when a project has an imposed delivery deadline from the sponsor that is not realistic based on the estimates, and how to carry on risks in a project, along with other skills which should be owned by a project manager.

General Consideration

Projects and project management operate in an environment broader than that of the project itself. The project management team must understand how to manage the day-to-day activities of the project successfully. The following explanations are a set of step by step instructions that outline and detail how to accomplish a desired goal.

The Project Life Cycle

Because projects are unique undertakings, they involve a degree of uncertainty. Organizations performing projects will usually divide each project into several project phases to provide better management control and appropriate links to the ongoing operations of the performing organization. Collectively, the project phases are known as the project life cycle. The following figure is a construction project life cycle with its description as illustrated in figure 2.

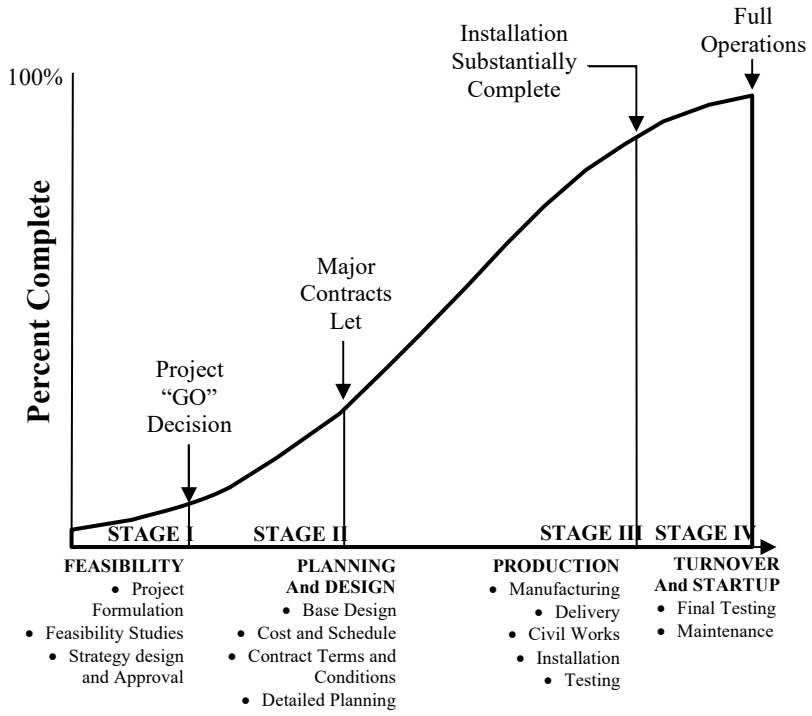

Figure 2 : construction project life cycle

Project Management Process

Projects are composed of processes that bring about a result. Project management processes can be organized into five groups of one or more processes. The process groups are linked by the results outcome of one becomes an input to another. These connections are illustrated in figure 3.

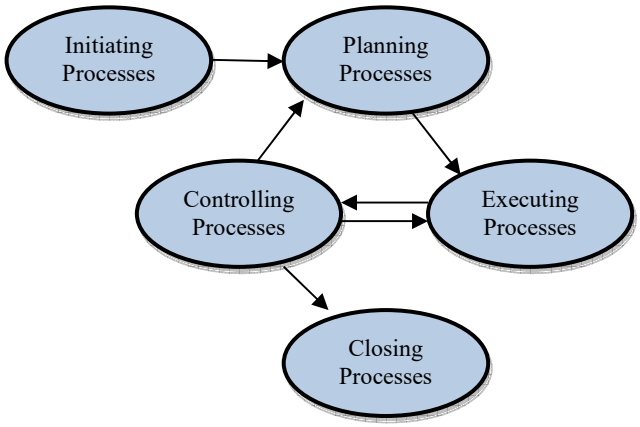

Figure 3 : project management process

Each of groups can be defined as follows :

1. Initiating processes, purpose for recognizing that a project or phase should begin and committing to do so.
2. Planning processes, purpose for devising and maintaining a workable scheme to accomplish the business need that the project was undertaken to address.
3. Executing processes, purpose for coordinating people and other resources to carry out the plan.
4. Controlling processes, purpose for ensuring that project objectives are met by monitoring and measuring progress and taking corrective action when necessary.
5. Closing processes, purpose for formalizing acceptance of the project or phase and bringing it to an orderly end.

The project management process groups are not discrete, one-time events; they are overlapping activities which occur at varying levels of intensity throughout each phase of the project as shown in figure 4.

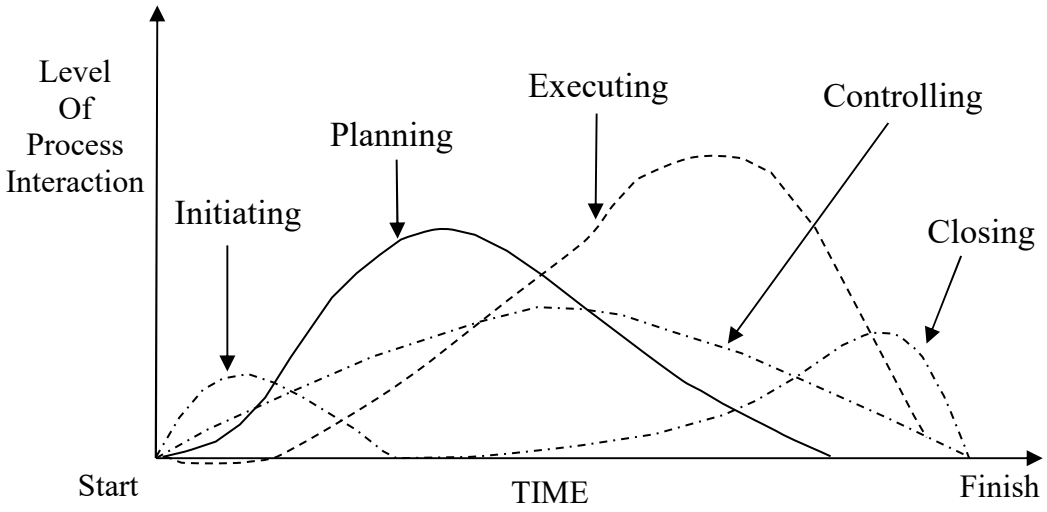

Figure 4 : Overlap of Process Groups in a Phase

The Project Management Knowledge Areas

The Project Management Knowledge Areas, describes project management knowledge and practice in terms of its component processes. These processes have been organized into nine knowledge areas as described below and as illustrated in figure 5.

1. Project Integration Management, describes the processes required to ensure that the various elements of the project are properly coordinated.
2. Project Scope Management, describes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully.
3. Project Time Management, describes the processes required to ensure timely completion of the project.
4. Project Cost Management, describes the processes required to ensure that the project is completed within the approved budget.
5. Project Quality Management, describes the processes required to ensure that the project will satisfy the needs for which it was undertaken.
6. Project Human Resource Management, describes the processes required to make the most effective use of the people involved with the project.
7. Project Communications Management, describes the processes required to ensure timely and appropriate generation, collection, dissemination, storage, and ultimate disposition of project information.
8. Project Risk Management, describes the processes concerned with identifying, analyzing, and responding to project risk.
9. Project Procurement Management, describes the processes required to acquire goods and services from outside the performing organization.

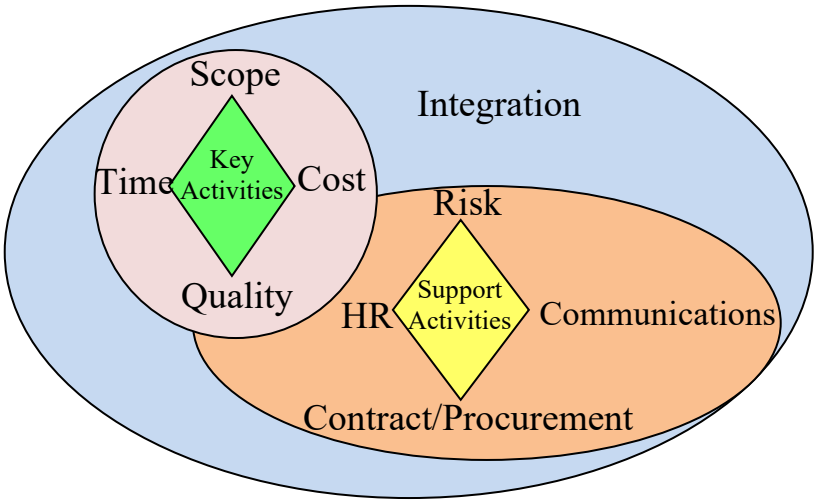

Figure 5 : the project management knowledge areas

Project Types

In general, there are two types of projects: small and standard. The two types differ in terms of complexity, duration, scope, funding, deliverables, and risk[5]. The following table is similarities and differences between the two project types.

Table 1: similarities and differences of project types

	Standard Project	Small Project
Common Characteristics	An effort to meet specific objectives : • It solves a technical problem, provides a service, builds a product, implements a plan of action, or involves other unique efforts. • It has its funding • It has a defined starting point, defined objectives, and defined delivery schedule.	
Distinguishing Characteristics	Complex	Straightforward
	Long	Short
	Broad scope	Narrow scope
	Costs more than $ 300,000	Costs less than $ 300,000
	New or unknown technologies	No new or unknown technologies
	Deliverables with multiple interdependencies	Deliverables with few interdependencies
	High level of potential risks	Low level of potential risks
Best Practice Expectations	Project follows basic best practices in this guide and tailors the Project Management Plan Template	

DEFINITION

Closing - formalizing acceptance of the project or phase of work and bringing it to an orderly end.

Contract - a mutually binding agreement which obligates the seller to provide the specified product and obligates the buyer to pay for it.

Cost Variance (CV) - any difference between the estimated cost of an activity and the actual cost of that activity.

Critical Path Method (CPM) - a *network analysis* technique used to predict project duration by analyzing which sequence of activities (which *path*) has the least amount of scheduling flexibility (the least amount of *float*)

Deliverable - any measurable, tangible, verifiable outcome, result, or item that must be produced to complete a project or part of a project.

Detailed Schedule - a schedule used to communicate day-to-day activities to working levels on the project.

Duration - the total number of calendar days that it takes to complete a task

Earned Value (EV) - a method for measuring project performance. It compares the amount of work that was planned with what was actually accomplished to determine if cost and schedule performance is as planned.

Effort - total number of hours that will be expended on a task

Feasibility Studies - the methods and techniques used to examine technical and cost data to determine the economic potential and the practicality of project applications.

Float - the amount of time that an activity may be delayed from its early start without delaying the project finish date.

Forward Pass - the calculation of the early start and early finish dates for the uncompleted portions of all network activities.

Milestone - a significant event in the project, usually completion of a major deliverable.

Quality Assurance (QA) - the process of evaluating overall project performance on a regular basis to provide confidence that the project will satisfy the relevant quality standards.

Quality Control (QC) - the process of monitoring specific project results to determine if they comply with relevant quality standards and identifying ways to eliminate causes of unsatisfactory performance.

Schedule Variance (SV) - any difference between the scheduled completion of an activity and the actual completion of that activity.

Scope - The work content and products of a project or component of a project. Scope is fully described by naming all activities performed, the resources consumed, and the resulting end products, including quality standards.

Solicitation - Obtaining quotations, bids, offers, or proposals as appropriate.

Sponsor - the individual or group within the performing organization

Planning - devising and maintaining a workable scheme to accomplish the business need for the project

Project Charter - The primary document used to state the project mission, goals and objectives consistent with approved business plans. It defines the business opportunity, contains the scope statement, and summarizes project impacts and estimates in relation to the business plan.

Project manager - person responsible for accomplishing the project objectives.

Work Breakdown Structure (WBS) - a deliverable-oriented grouping of project elements which organizes and defines the total scope of the project. Each descending level represents an increasingly detailed definition of a project component.

THEORY

I. Project Management Processes

A. Initiating

At the start of any project, there will be a variety of ideas and opinions about the purpose and scope of the project, what the final product of the project will be, and how the project will be carried out. The project initiation is concerned with taking these ideas and intentions and developing them into a formal, planned, resourced and funded project.

In order to define a project in this way, it is first necessary to clearly and explicitly define what the project is intended to achieve and what its scope of interest will be. If this stage is not performed well, it is unlikely that the project will be successful in meeting the business's needs. Key project controls needed in this process are to understand of the business environment and make sure that all necessary controls are incorporated into the project. The initiation stage should include a cohesive plan that encompasses the following areas:

a. Study analysing the business requirements in measurable goals
b. Review of the current operations
c. Conceptual design of the operation of the final product
d. Equipment and contracting requirements including an assessment of long lead time items
e. Financial analysis of the costs and benefits including a budget
f. Stakeholder analysis, including users, and support personnel for the project
g. Project charter including costs, tasks, deliverables, and schedule

In energy course, this stage is to identify components of the project. Projects may be identified both internally and externally[3]:

a. Internal identification takes place when the energy manager identifies a package of energy saving opportunities during the day-to-day energy management activities, or from facility audits.

b. External identification of energy savings can occur through systematic energy audits undertaken by a reputable energy auditor or energy service company.

In screening projects, the following criteria should be used to rank-order project opportunities.

a. Cost-effectiveness of energy savings of complete package of measures (Internal rate of return, net present value, cash flow, average payback)
b. Sustainability of the savings over the life of the equipment.
c. Ease of quantifying, monitoring, and verifying electricity and fuel savings.
d. Availability of technology, and ease of adaptability of the technology to Indian conditions.
e. Other environmental and social cost benefits (such as reduction in local pollutants, e.g. SO_x).

B. Planning

The planning stage is considered the most important phase in project management. Project planning defines project activities that will be performed; the products that will be produced, and describes how these activities will be accomplished and managed. Planning involves identifying and documenting scope, tasks, schedules, cost, risk, quality, and staffing needs. A small project the planning as a small prototype may be relatively easy and short. Perhaps it is just validating the deliverables, creating a task list, understanding the client expectations and then start.

The result of the project planning, the project plan, will be an approved, comprehensive document that allows a project team to begin and complete the work necessary to achieve the project goals and objectives. The project plan will address how the project team will manage the project elements. It will provide a high level of confidence in the organization's ability to meet the scope, timing, cost, and quality requirements by addressing all aspects of the project.