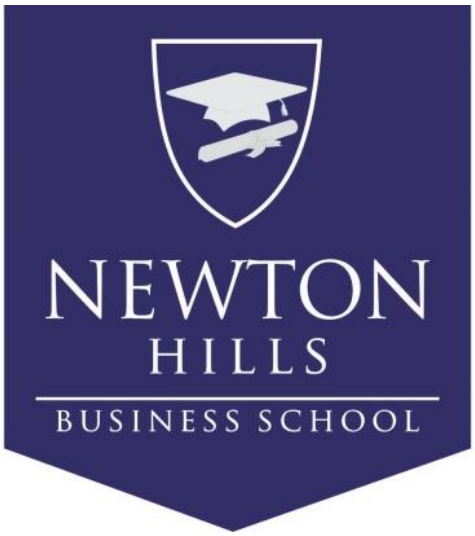


SCHOOL OF PROJECT MANAGEMENT

STUDY PACK

FOR

PROJECT INTEGRATION MANAGEMENT

AND

PROJECT SCOPE MANAGEMENT

Table of Content

Chapter 1

An Introduction to Project Management

Objectives

The purpose of this training 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.

What is a Project?

The fundamental nature of a project is that it is a "temporary endeavour undertaken to create a unique product, service, or result."

Projects are distinguished from operations and from programs.

The temporary nature of projects indicates a definite beginning and end. The end is reached when the project's objectives have been achieved or when the project is terminated because its objectives will not or cannot be met, or when the need for the project no longer exists. Temporary does not necessarily mean short in duration. Temporary does not generally apply to the product, service, or result created by the project; most projects are undertaken to create a lasting outcome. For example, a project to build a national monument will create a result expected to last centuries. Projects can also have social, economic, and environmental impacts that far outlast the projects themselves.

Every project creates a unique product, service, or result. Although repetitive elements may be present in some project deliverables, this repetition does not change the fundamental uniqueness of the project work.

An ongoing work effort is generally a repetitive process because it follows an organization's existing procedures. In contrast, because of the unique nature of projects, there may be uncertainties about the products, services, or results that the project creates. Project tasks can be new to a project team, which necessitates more dedicated planning than other routine work. In addition, projects are undertaken at all organizational levels. A project can involve a single person, a single organizational unit, or multiple organizational units.

Temporary Endeavour

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 blue print 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

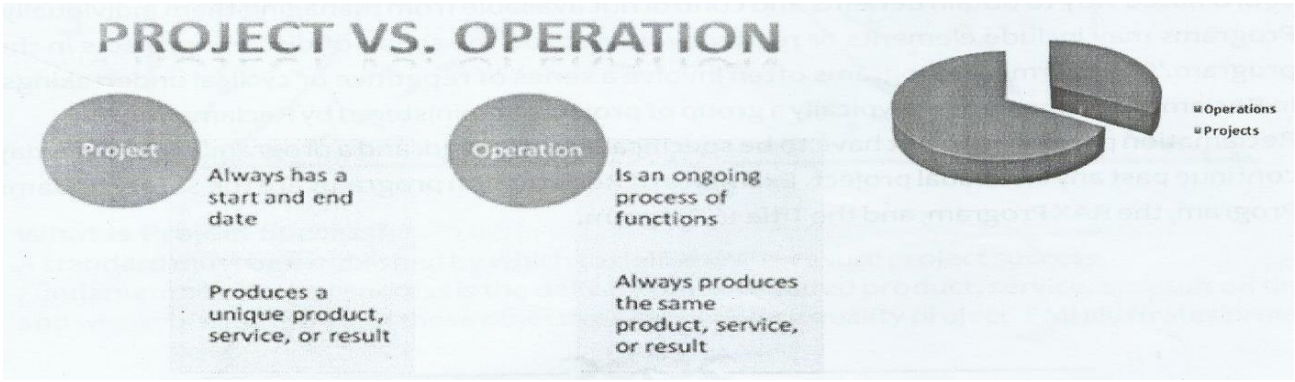
This unique process and deliverable produces the third characteristic of a project: progressive elaboration. Project management is a group of interrelated processes, implemented in a progressively elaborative manner, in which to produce the deliverable. Progressive elaboration is the revealing and focusing 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.

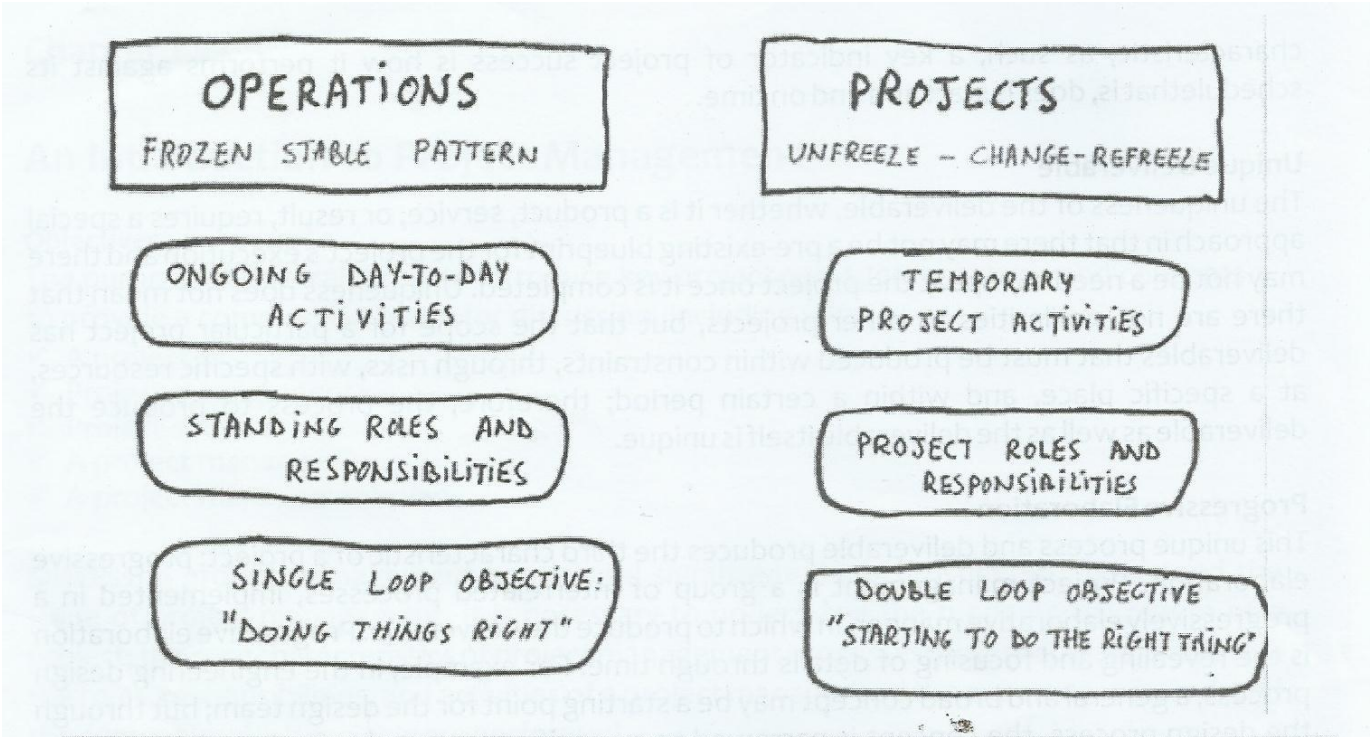
A project can create:

- ✓ A product that can be either a component of another item or an end item in itself,
- ✓ A capability to perform a service (e.g., a business function that supports production or distribution),
- ✓ A result such as an outcome or document (e.g., a research project that develops knowledge that can be used to determine whether a trend is present or a new process will benefit society).
- ✓ An improvement in the existing Product or service lines (e.g., A Sigma Project Undertaken to reduce Defect)

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.



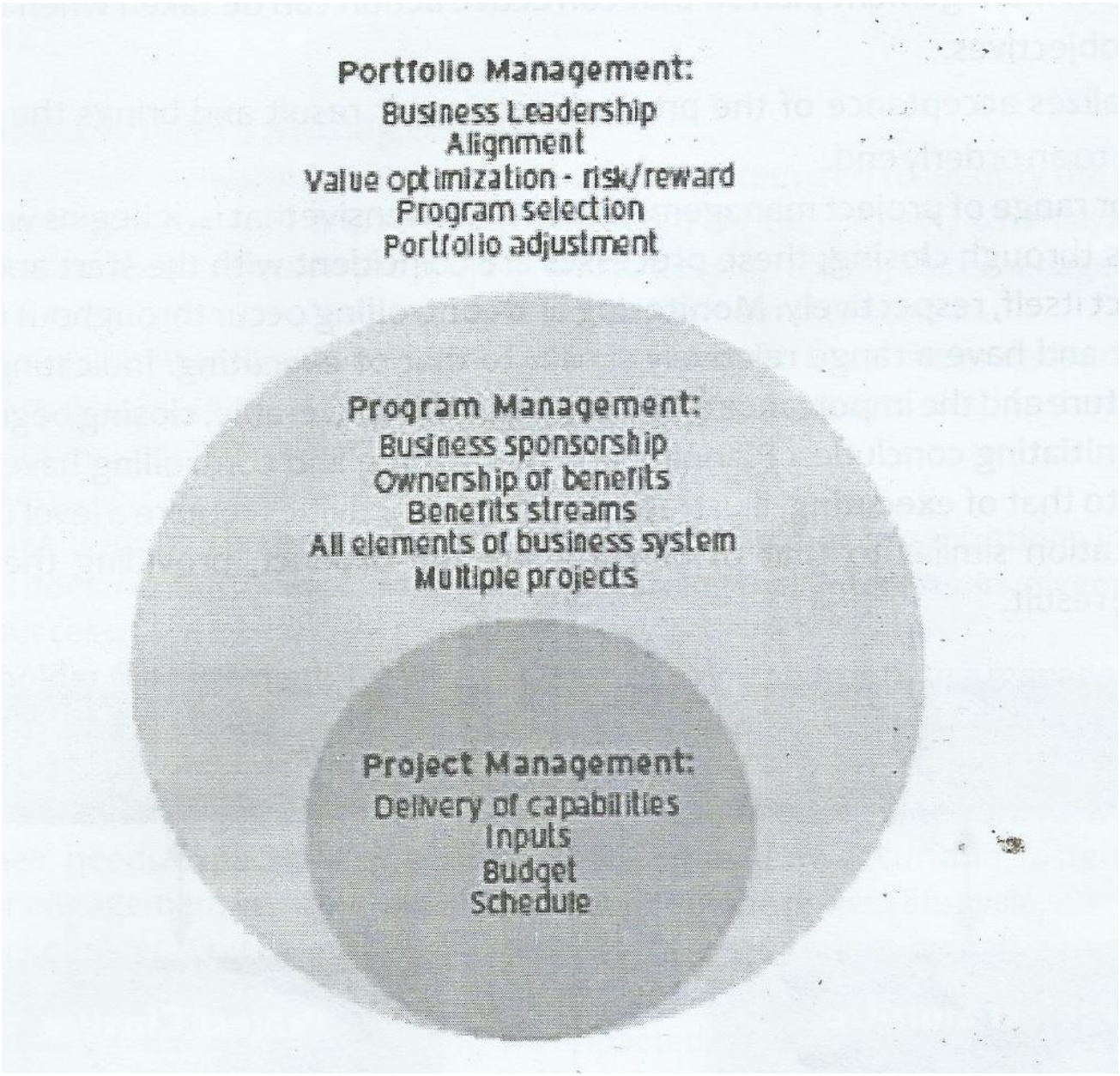


Constraints	Operations	Projects
Existence	Permanent	Temporary and unique
Scope	Continous and repetitive	First time, Terminates after finishing objectives
Time	No Time Span defined. Its ongoing	Definite Time Span
Budget	Operations have to maintain a specific profit margin	Project has to stick with a definite budget

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." 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.



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." That is, project management is an interrelated group of processes that enables the project 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.

Process Groups

The project management process groups are initiating, planning, executing, onitoring and controlling, and closing.

Initiating defines and authorizes the projector a project phase.

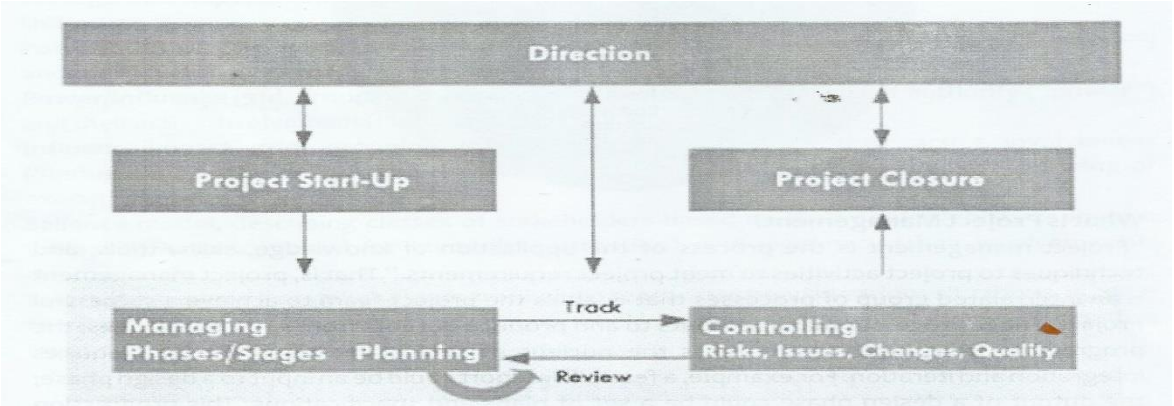
Planning defines and refines objectives and plans the course of action required to attain the objectives and scope that the project was undertaken to address.

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.

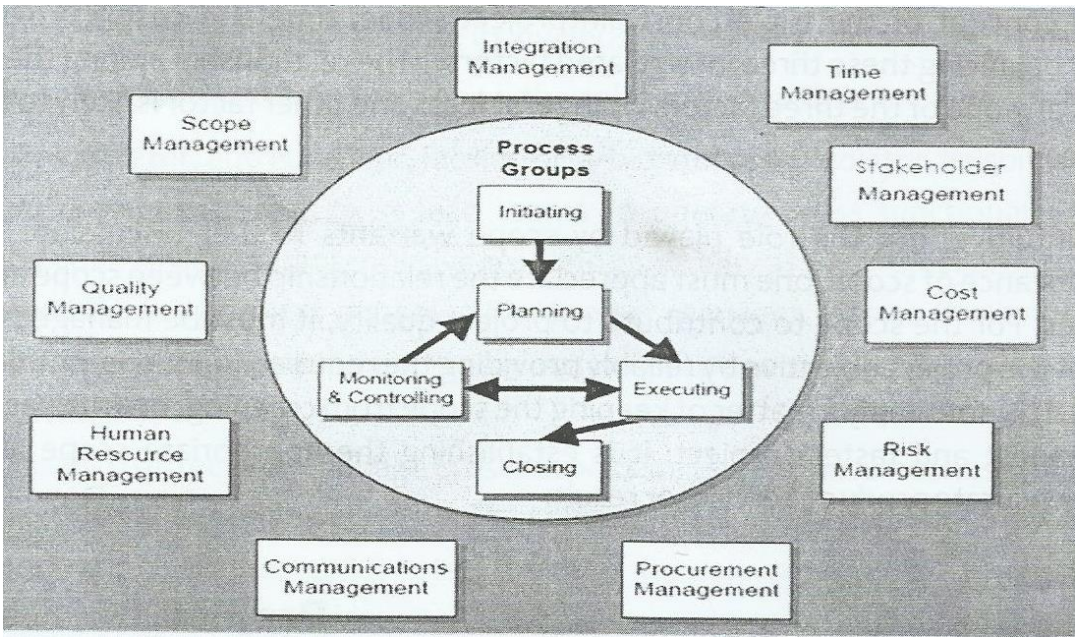
The breadth or range of project management is comprehensive that is, it begins with initiating and continues through closing; these processes are coincident with the start and end of the specific project itself, respectively. Monitoring and controlling occur throughout the duration of the project and 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.

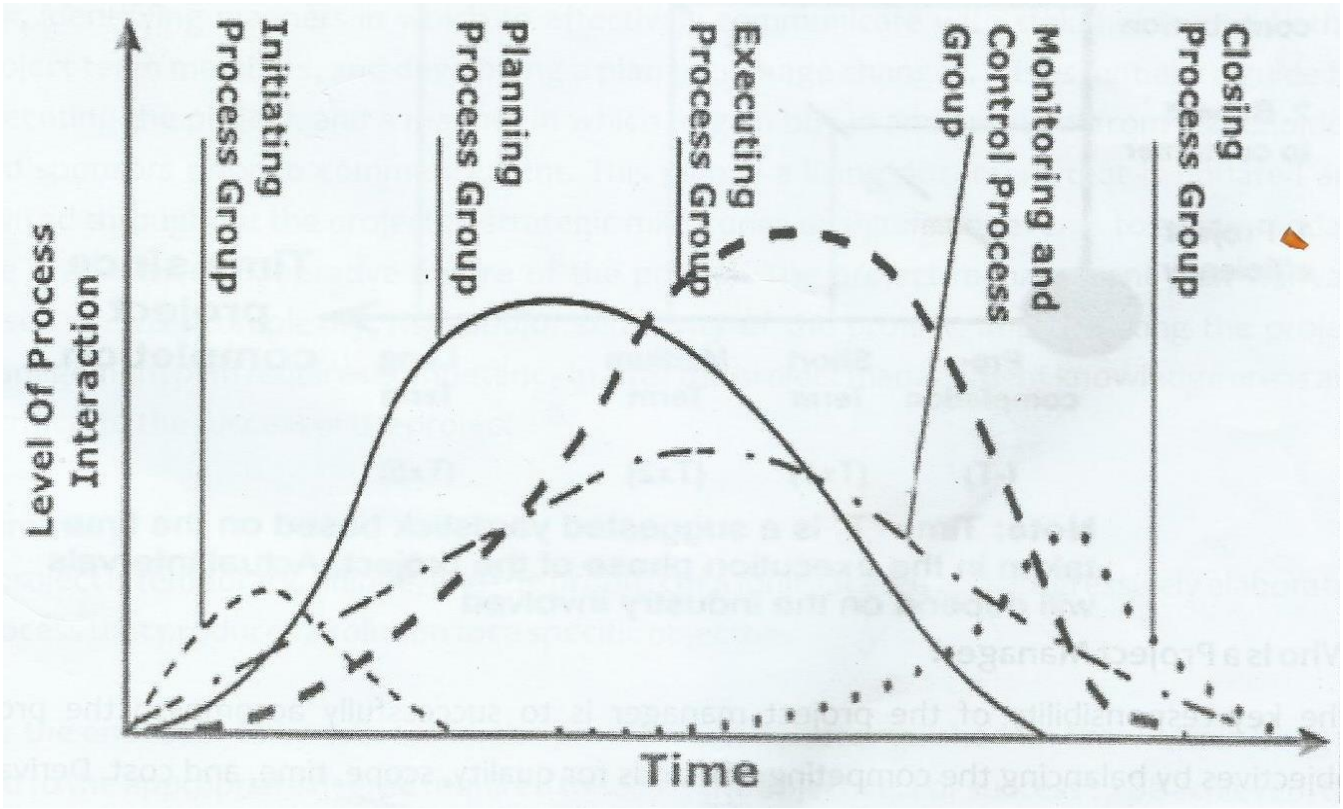
To manage the breadth or range of a project, active and proactive project management is required throughout the duration of the project. It cannot be simply initiated and/or planned and left alone; it must be continually planned and monitored and controlled. Sustained reactive project management is indicative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

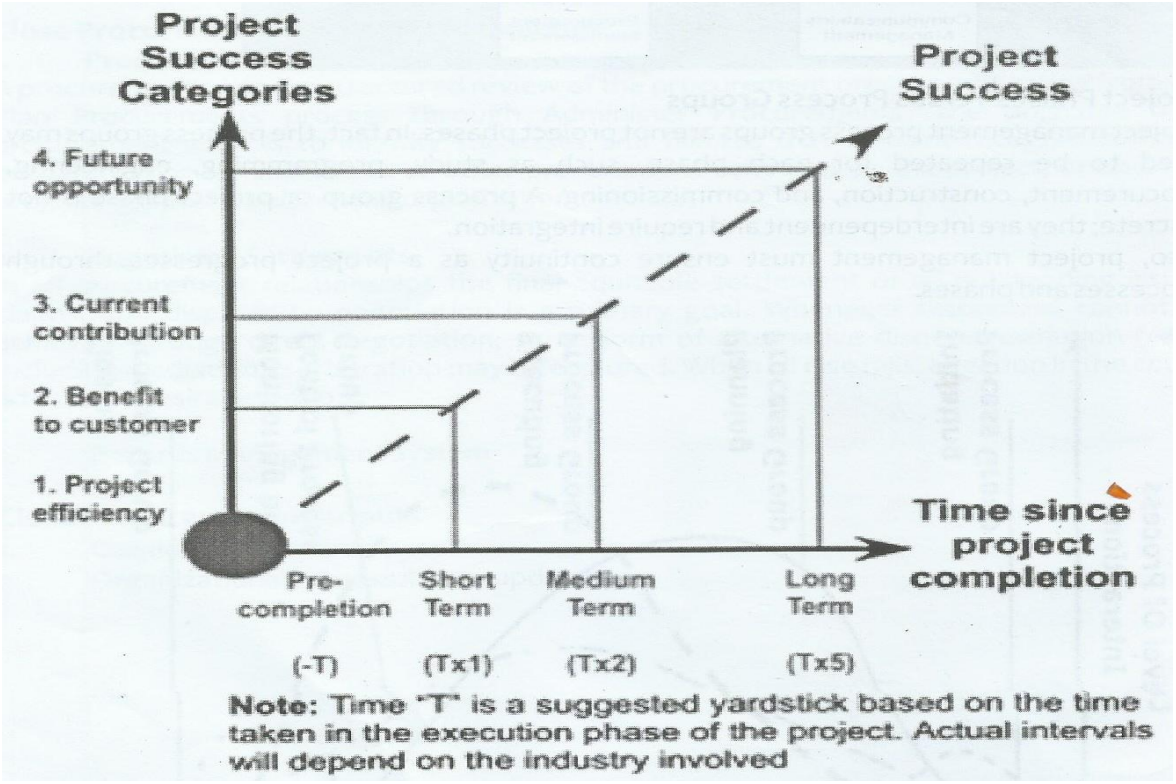
Also, project management must ensure continuity as a project progresses through processes and phases.



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."

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.



Who 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. 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 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.”

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.

What Is a Project Management Plan (PMP)?

A project management plan is a fundamental tool for the project manager 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.

Chapter 2

Project Life Cycle and Organization

The project life cycle Overview

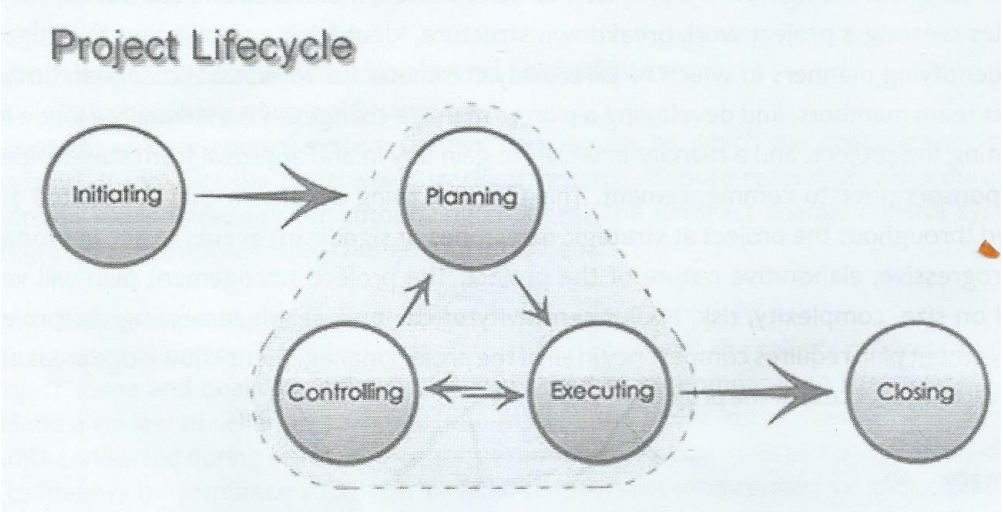
A project life cycle is a collection of generally sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application.

Projects and project management take place in an environment that is broader than that of the project itself. It is imperative to understand these environments and structure approaches that would enhance project success.

- ✓ Divides the project into phases that provide better management
- ✓ Deliverable usually approved before the work starts on the next phase, but sometimes a subsequent phase is begun prior to approve of the previous phase (Fast Tracking)
- ✓ Cost are low at the start and higher towards the end and drop as the project closes
- ✓ Project life cycle VS Project management process

Project Life Cycle:

- ✓ Describes what you need to do to achieve the project object (to do the work for the project)
- ✓ Phases are known as project life cycle



Project Management Process

- ✓ Describe what you need to do to manage the project to achieve the project objective and meet the requirements
- ✓ Cost and Staffing Levels across the Project Life Cycle
- ✓ Impact of Variable Based on Project Time

Project Phases

- ✓ Project phases are divisions within a project where extra control is needed to effectively manage the completion of a major deliverable.

- ✓ Project phases are typically completed sequentially, but can overlap in some project situations. Project Phase is not a Project Management Process Group.

Project Governance Across the Life Cycle

Project governance provides a comprehensive, consistent method of controlling the project and ensuring its success. The project governance approach should be described in the project management plan. A project's governance must fit within the larger context of the program or organization sponsoring it.

Within those constraints, as well as the additional limitations of time and budget, it is up to the project manager and the project management team to determine the most appropriate method of carrying out the project. Decisions must be made regarding who will be involved, what resources are necessary, and the general approach to completing the work. Another important consideration is whether more than one phase will be involved and, if so, the specific phased structure for the individual project.

The phase structure provides a formal basis for control. Each phase is formally initiated to specify what is allowed and expected for that phase. A management review is often held to reach a decision to start the activities of a phase. This is especially true when a prior phase has not yet completed. An example would be when an organization chooses a life cycle where more than one phase of the project progresses simultaneously. The beginning of a phase is also a time to revalidate earlier assumptions, review risks and define in more detail the processes necessary to complete the phase deliverable(s).

For example, if a particular phase does not require purchasing any new materials or equipment, there would be no need to carry out the activities or processes associated with procurement.

A project phase is generally concluded and formally closed with a review of the deliverables to determine completeness and acceptance. A phase-end review can achieve the combined goal of obtaining authorization to close the current phase and start the subsequent one. The end of a phase represents a natural point to reassess the effort underway and to change or terminate the project if necessary. A review of both key deliverables and project performance to date to a) determine if the project should continue into its next phase and b) detect and correct errors cost effectively should be regarded as good practice. Formal phase completion does not necessarily include authorizing the subsequent phase. For instance, if the risk is deemed to be too great for the project to continue or if the objectives are no longer required, a phase can be closed with the decision to not initiate any other phases.

Business Value

This Concept is unique to each organization. Business Value is defined as the entire value of the business; the total sum of all tangible and intangible elements. Examples of tangible element include monetary assets, fixtures, stakeholder utility. Examples of intangible elements include goodwill, brand recognition, public benefit, and trademarks.

Depending on the organization, business value scope can be short- medium- or long term. Value may be created through the effective management of ongoing operations. However, through the effective use of portfolio, program and project management, organizations will possess the ability to employ reliable established processes to meet strategic objective and obtain greater business value from their project investments.

Though some organizations are not business driven every organization conduct business related activities,

Stakeholders

- ✓ Stakeholders are persons or organizations who are active involved in the project or whose interests may be positively or negatively affected by the performance or completion of the projects, they may also exert influence over the project, its deliverable, and the project team members.
- ✓ The project management team must identify both internal and external stakeholders in order to determine the project requirements and expectations for all parties involved.

- ✓ The PM must manage the influence of the various stakeholders in relation to the project requirements to ensure successful outcome.

What are stakeholders?

- ✓ Project Sponsor
- ✓ Project Manager
- ✓ Project Management Team
- ✓ Project Team Members
- ✓ Program Manager
- ✓ Portfolio Manager
- ✓ Program manager

Key Stakeholders

- ✓ Customer/User
- ✓ Performing Organization
- ✓ Influences
- ✓ Stakeholder Analysis

Stakeholders must be identified, have their needs and expectations understood and managed, and be communicated with frequently in order to complete the project successfully.

Organizational Structures

Organizational Structure is an enterprise environmental factor which can affect the availability of resources and influence how projects are conducted. Organizational Structures range from functional to projectized, with a variety of matrix structures between them. The following table shows key project related characteristics of the major types of Organizational Structures.

The classic functional organization is a hierarchy which each employee has one clear superior. Staff members are grouped by specialty at the top level. Each department will do its project work independent of other departments.

Matrix Organizations are a blend of functional and projectized characteristics. Weak matrices maintain many of the c/s of a functional organizational, and the project manager role is more of a coordinator or expediter than that of a true project manager. Strong matrices have many of the c/s of the projectized organization, and can have full true project managers with considerable authority and full time project administrative staff. While the balanced matrix organization recognizes the need for a project manager, it does not provide the project manager with the full authority over the project and project funding.

At the opposite the projectized organization shown in figure , team members are often co located most of the resources are involved in project work, and project managers have a great deal of independence and authority. lt often have departments either report directly to the project manager or provide support services to the various projects.

Many organizations involve all these structures at various levels as shown in the figure (Composite Organization) to coordinate between various projects.

PROJECT ROLES & EXPECTATIONS

- Customer/Business
- Project Sponsor
- Project Manager
- Project Steering Committee
- Project Team Members
- Other Stakeholders

Customer/Business

The organization or individual receiving the final product
Responsible for business requirements that must be met

Project Sponsor

Manager/Executive with demonstrable interest in the outcome of the project
Responsible for securing spending authority and resources for the project
Ideally, highest-ranking manager possible appropriate for the project size and scope

- ✓ Champions the project.
- ✓ Ultimate decision-maker for the project.
- ✓ Provides support for the Project Manager.
- ✓ Approves major deliverables.
- ✓ Signs off on approvals to proceed to each succeeding project phase.

Project Manager

- ✓ Responsible for ensuring that the Project Team completes the project
- ✓ Develops the Project Plan with the team
- ✓ Manages the team's performance of project tasks
- ✓ Secures acceptance and approval of deliverable from the Sponsor and Stakeholders
- ✓ Monitors performance and takes corrective actions when needed

Project Steering Committee

- ✓ Representatives from stakeholders.
- ✓ Review and approve major protect decisions or deliverable.
- ✓ When escalation reaches this level, make decisions on project issues and change requests.

Project Team

Responsible for executing tasks and producing deliverable:

- ✓ As outlined in the Project Plan.
- ✓ As directed by the Project Manager.
- ✓ At the level of effort or participation defined for them.

Vendor

- ✓ Contracted to provide additional product or services the project requires.
- ✓ PM manages relationship.
- ✓ May be part of Project Team.

Other Project Stakeholders:

Individuals and organizations actively involved in the project, or with interests that may be positively or negatively affected as a result of the completion of the project.

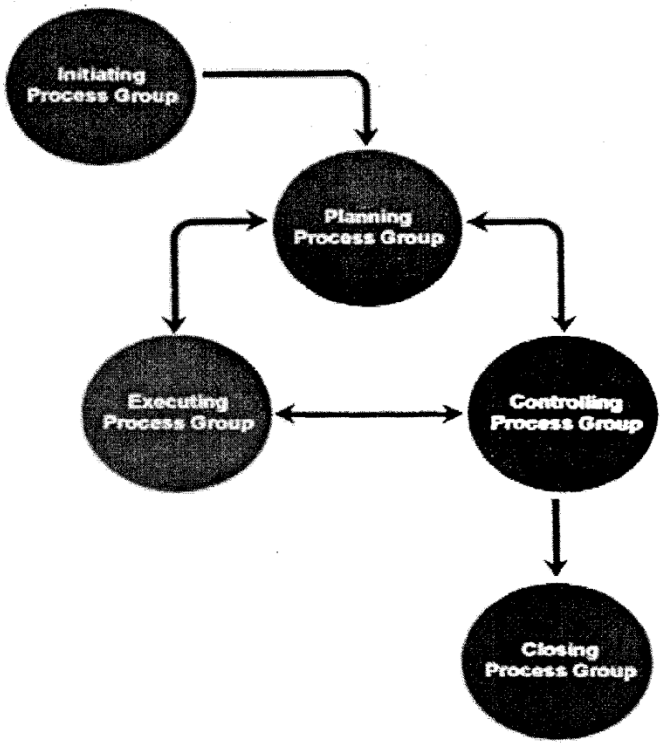
Chapter 3

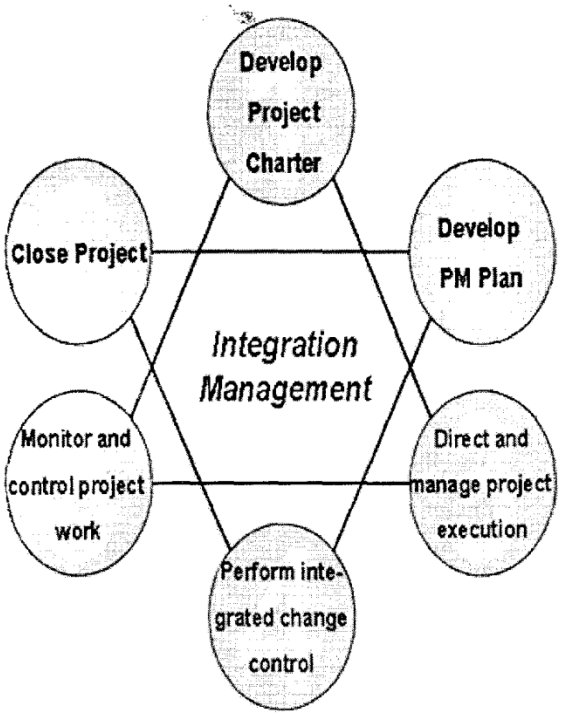
PROJECT INTEGRATION MANAGEMENT

'Management involves processes'

Project Integration Management includes the following:

- ✓ identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.
- ✓ integration includes characteristics of unification, consolidation, articulation, and integrative actions that are crucial to project completion, successfully managing stakeholder expectations, and meeting requirements.
- ✓ making choices about resource allocation, making trade-offs among competing objectives and alternatives, and managing the interdependencies among the project management Knowledge Areas.



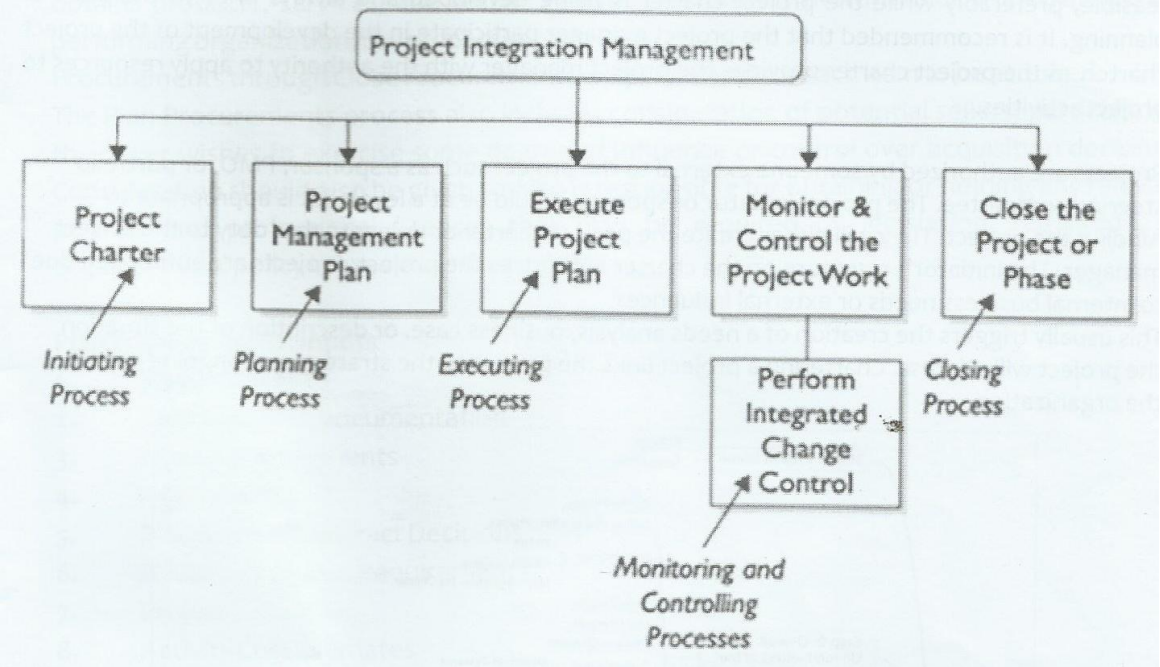


Develop Project Charter: The process of developing a document that formally authorizes a project or a phase and documenting initial requirements that satisfy the stakeholder's needs and expectations.

Develop Project management Plan: The process of documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans.

Direct and manage Project Work: The process of performing the work defined in the project management plan to achieve the project's objectives.

Monitor and Control Project work: The process of tracking, reviewing, and regulating the
Progress to meet the performance objectives defined in the project management plan.
Perform Integrated Change Control: The process of reviewing all change requests, approving changes, and managing changes to the deliverables, organizational process assets, project documents, and the project management plan.
Close Project or Phase: The process of finalizing all activities across the entire Project Management Process Groups to formally complete the project or phase.



The need for Project Integration Management is evident in situations where individual processes interact.
For example, a cost estimate ne for a contingency plan involves integrating the processes in the cost, time, and risk Knowledge Areas. When additional risks associated with various staffing alternatives are identified, then one or more of those processes may be revisited. The project deliverables may also need to be integrated with ongoing operations of either the performing organization or the customer's organization, or with the long term strategic planning that takes future problems and opportunities into consideration.
The integrative nature of projects and project management can be understood by thinking of other types of activities performed while completing a project. Examples of some activities performed by the project management team are:

- ✓ Analyze and understand the scope. This includes the project and product requirements, criteria) assumptions, constraints, and other influences related to a project, and how each will be managed or addressed within the project.

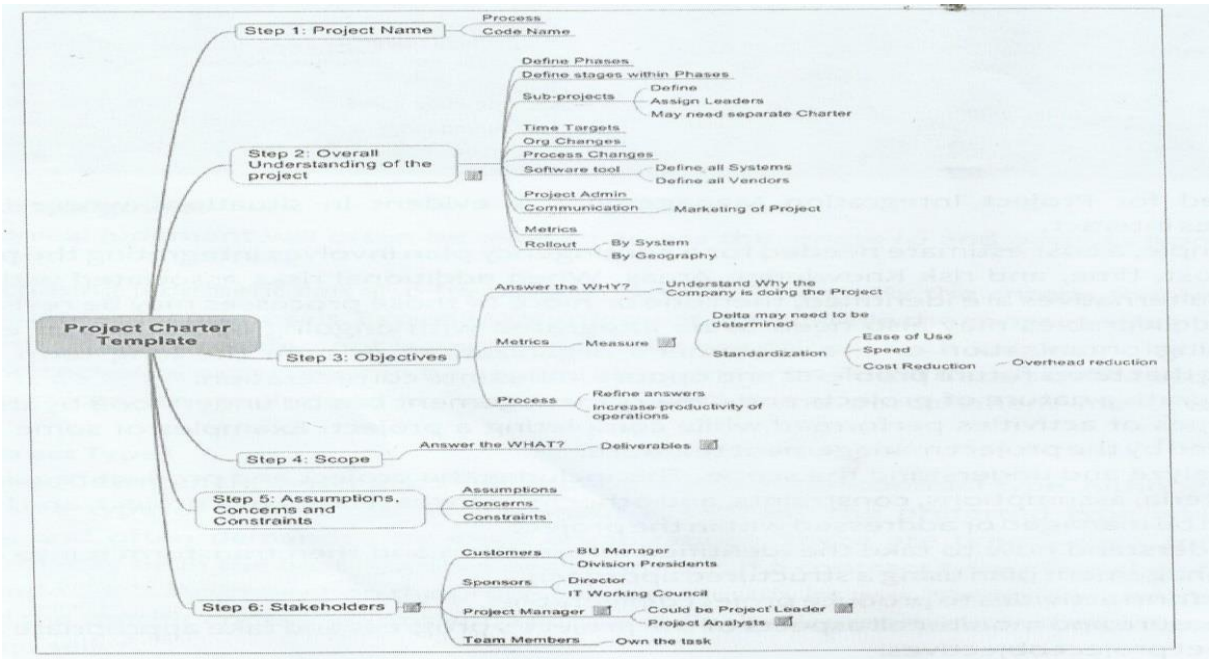
- ✓ Understand how to take the identified information and then transform it into a project management plan using a structured approach
- ✓ Perform activities to produce project deliverables.
- ✓ Measure and monitor all aspects of the project's progress and take appropriate action to meet project objectives.

Develop Project Charter

Develop Project Charter is the process of developing, a document that formally authorizes a project or a phase and documenting initial requirements that satisfy the stakeholders needs and expectations. It establishes a partnership between the performing organization and the requesting organization (or customer, in the case of external projects). The approved project charter formally initiates the project. A project manager is identified and assigned as early in the project as is feasible, preferably while the project charter is being developed and always prior to the start of planning. It is recommended that the project manager participate in the development of the project charter, as the project charter provides the project manager with the authority to apply resources to project activities.

Projects are authorized by someone external to the project such as a sponsor, PMO, or portfolio steering committee. The project initiator or sponsor should be at a level that is appropriate tofunding the project. They will either create the project charter or delegate that duty to the projectmanager. The initiator's signature on the charter authorizes the project. Projects are authorized due to internal business needs or external influences.

This usually triggers the creation of a needs analysis, business case, or description of the situation the project will address. Chartering a project links the project to the strategy and ongoing work of the organization.



Develop Project Charter: Inputs

1. Project Statement of work
   The statement of work (SOW) is a narrative description of products or services to be delivered by the project. For internal projects, the project initiator or sponsor provides the statement of work based on business needs, product, or service requirements. For external projects, the statement of work can be received from the customer as part of a bid document, for example, request for proposal, request for information, request for bid, or as part of a contract.
2. Business Case
   The business case or similar document provides the necessary information from a business standpoint to determine whether or not the project is worth the required investment.
3. Contract
   A contract is an input if the project is being done for an external customer.
4. Enterprise environmental Factors
5. Organizational Process assets

Develop Project Charter: tools and techniques

1. Expert judgment
   Expert judgment is often used to assess the inputs used to develop the project charter. Such judgment and expertise is applied to any technical and management details during this process.
2. Facilitation Techniques: Have broad application within project Management processes and guide the development of the project charter. Brainstorming, conflict resolution, problems solving, and meeting management are examples of key techniques used by facilitators to help teams and individuals accomplish project activities.

Develop Project Charter: outputs

1. Project Charter

Develop Project management Plan

Develop Project Management Plan is the process of documenting the actions necessary to define, prepare, integrate, and coordinate all subsidiary plans. The project management plan defines how the project is executed, monitored and controlled, and closed. The project management plan content will vary depending upon the application area and complexity of the project. The project management plan is developed through a series of integrated processes until project closure. This process results in a project management plan that is progressively elaborated by updates and controlled and approved through the Perform Integrated Change Control process.

Develop Project management Plan: Inputs

1. Project Charter
2. Outputs from Planning Processes

3. Enterprise environmental Factors
4. Organizational Process assets

Develop Project management Plan: tools and techniques

1. Expert judgment

When developing the project management plan, expert judgment is utilized to:

- ✓ Tailor the process to meet the project needs
- ✓ Develop technical and management details to be included in the project management plan,
- ✓ Determine resources and skill levels needed to perform project work,
- ✓ Define the level of configuration management to apply on the project, and
- ✓ Determine which project documents will be subject to the formal change control process.

2. Facilitation Techniques: Have broad application within project Management processes and guide the development of the project charter. Brainstorming, conflict resolution, problem solving, and meeting management are examples of key techniques used by facilitators to help teams and individuals accomplish project activities.

Develop Project management Plan: outputs

1. Project management Plan

Direct and manage Project execution

Direct and Manage Project Execution is the process of performing the work defined in the project management plan to achieve the project's objectives. These activities include, but are not limited to:

- ✓ Perform activities to accomplish project requirements;
- ✓ Create project deliverables;
- ✓ Staff, train, and manage the team members assigned to the project;
- ✓ Obtain, manage, and use resources including materials, tools, equipment, and facilities;
- ✓ Implement the planned methods and standards;
- ✓ Establish and manage project communication channels, both external and internal to the project team;
- ✓ Generate project data, such as cost, schedule, technical and quality progress, and status to facilitate forecasting;
- ✓ Issue change requests and adapt approved changes into the project's scope, plans, and environment;
- ✓ Manage risks and implement risk response activities;
- ✓ Manage sellers and suppliers; and
- ✓ Collect and document lessons learned, and implement approved process improvement activities.

The Direct and Manage Project Execution process is directly affected by the project application area. Deliverables are produced as outputs from processes performed to accomplish the project work planned and scheduled in the project management plan. Work performance information, about the completion status of the deliverables and what has been accomplished, is collected as part of project execution and is fed into the performance reporting process. The work performance information will also be used as an input to the Monitoring and Controlling Process Group.

Direct and Manage Project Execution also requires implementation of approved changes covering:

- ✓ Corrective action. Documented direction for executing the project work to bring expected future performance of the project work in line with the project management plan.
- ✓ Preventive action. A documented direction to perform an activity that can reduce the probability of negative consequences associated with project risks.
- ✓ Defect repair. The formally documented identification of a defect in a project component with a recommendation to either repair the defects or completely replace the component.

Direct and manage Project execution: Inputs

1. Project management Plan
2. Approved Change Requests
3. Enterprise environmental Factors
4. Organizational Process assets

Direct and manage Project execution: tools and techniques

1. Expert judgment

Expert judgment is used to assess the inputs needed to direct and manage execution of the project management plan. Such judgment and expertise is applied to all technical and management details during this process. This expertise is provided by the project manager and the project management team using specialized knowledge or training.

2. Project Management Information System

The project management information system, part of the enterprise environmental factors, provides access to an automated tool, such as a scheduling software tool, a configuration management system, an information collection and distribution system, or web interfaces to other online automated systems used during the Direct and Manage Project Execution effort.

3. **Meeting:** These are used to discuss and address pertinent topics of the project when directing and managing project works. Attendees at the meetings may include the project manager, the project team and appropriate stakeholders involved or affected by the topics addressed. Each attendee should have a defined role to ensure appropriate participation. The project Manager must also ensure that the agenda of

the meeting is published and given to everyone some days before the meeting; this would enhance better participation.

Direct and manage Project execution: outputs

1. Deliverables
2. Work Performance Information
3. Change Requests
4. Project management Plan updates
5. Project Document updates

Monitor and Control Project work

Monitor and Control Project Work is the process of tracking, reviewing, and regulating the progress to meet the performance objectives defined in the project management plan. Monitoring is an aspect of project management performed throughout the project.

Monitoring includes collecting, measuring, and distributing performance information, and assessing measurements and trends to effect process improvements. Continuous monitoring gives the project management team insight into the health of the project, and identifies any areas that may require special attention. Control includes determining corrective or preventive actions or re-planning and following up on action plans to determine if the actions taken resolved the performance issue.

The Monitor and Control Project Work process is concerned with:

- ✓ Comparing actual project performance against the project management plan;
- ✓ Assessing performance to determine whether any corrective or preventive actions are indicated, and then recommending those actions as necessary;
- ✓ Identifying new risks and analyzing, tracking, and monitoring existing project risks to make sure the risks are identified, their status is reported, and that appropriate risk response plans are being executed;
- ✓ Maintaining an accurate, timely information base concerning the projects product(s) and their associated documentation through project completion;
- ✓ Providing information to support status reporting, progress measurement, and forecasting;
- ✓ Providing forecasts to update current cost and current schedule information; and
- ✓ Monitoring implementation of approved changes as they occur

Monitor and Control Project work: Inputs

1. Project management Plan
2. Performance Reports
3. enterprise environmental Factors
4. organizational Process assets

Monitor and Control Project work: Tools and Techniques

1. Expert judgment

Expert judgment is used by the project management team to interpret the information provided by the monitor and control processes. The project manager, in collaboration with the team, determines the actions required to ensure project performance matches expectations.

2. **Analytical Techniques:** are applied in project management to forecast potential out comes based on possible variations of project or environment variables and their relationships with other variables. Examples may include:

- ✓ Regression analysis
- ✓ Grouping methods
- ✓ Causal Analysis
- ✓ Root Cause analysis
- ✓ Reserve Analysis
- ✓ Earned Value management
- ✓ Variance Analysis
- ✓ Fault Tree analysis
- ✓ Failure Mood and Effect Analysis

3. **Meeting:** These are used to discuss and address pertinent topics of the project when directing and managing project works. Attendees at the meetings may include the project manager, the project team and appropriate stakeholders involved or affected by the topics addressed. Each attendee should have a defined role to ensure appropriate participation. The project Manager must also ensure that the agenda of the meeting is published and given to everyone some days before the meeting; this would enhance better participation.

Monitor and Control Project work: outputs

1. Change Requests
2. Project management Plan updates

Perform Integrated Change Control

Perform Integrated Change Control is the process of reviewing all change requests, approving changes and managing changes to the deliverables, organizational process assets, project documents and the project management plan. The Perform Integrated Change Control process is conducted from project inception through completion. The project management plan, the project scope statement, and other deliverables are maintained by carefully and continuously managing changes, either by rejecting changes or by approving changes thereby assuring that only approved changes are incorporated into a revised baseline.

The Perform Integrated Change Control process includes the following change management activities in differing levels of detail, based upon the progress of project execution:

- ✓ Influencing the factors that circumvent integrated change control so that only approved changes are implemented;

- ✓ Reviewing, analyzing, and approving change requests promptly, which is essential, as a slow decision may negatively affect time, cost, or the feasibility of a change;
- ✓ Managing the approved changes;
- ✓ Maintaining the integrity of baselines by releasing only approved changes for incorporation into the project management plan and project documents;
- ✓ Reviewing, approving, or denying all recommended corrective and preventive actions;
- ✓ Coordinating changes across the entire project (e.g., a proposed schedule change will often affect cost, risk, quality, and staffing); and
- ✓ Documenting the complete impact of change requests.

Changes may be requested by any stakeholder involved with the project. Although they may be initiated verbally, they should always be recorded in written form and entered into the change management and/or configuration management system. Change requests are subject to the process specified in the change control and configuration control systems. Those change request processes may require information on estimated time impacts and estimated cost impacts.

Every documented change request must be either approved or rejected by some authority within the project management team or an external organization. On many projects, the project manager is given authority to approve certain types of change requests as defined in the project's roles and responsibilities documentation.

Whenever required, the Perform Integrated Change Control process includes a change control board (CCB) responsible for approving or rejecting change requests. The roles and responsibilities of these boards are clearly defined within the configuration control and change

control procedures, and are agreed upon by appropriate stakeholders. Many large organizations provide for a multi-tiered board structure, separating responsibilities among the boards. If the project is being provided under a contract, then some proposed changes may need to be approved by the customer as perthe contract.

Approved change requests can require new or revised cost estimates, activity sequences, schedule dates, resource requirements, and analysis of risk response alternatives. These changes can require adjustments to the project management plan or other project management plans/documents. The applied level of change control is dependent upon the application area, complexity of the specific project, contract requirements, and the context and environment in which the project is performed.

A configuration management system with integrated change control provides a standardized, effective, and efficient way to centrally manage approved changes and baselines within a project.

Configuration control is focused on the specification of both the deliverables and the processes while change control is focused on identifying, documenting and controlling changes to the project and the product baselines. Project-wide

application of the configuration management system, including change control processes, accomplishes three main objectives:

- ✓ Establishes an evolutionary method to consistently identify and request changes to established baselines, and to assess the value and effectiveness often changes,
- ✓ Provides opportunities to continuously validate and improve the project by considering the impact of each change, and
- ✓ Provides the mechanism for the project management team to consistently communicate all approved and rejected changes to the stakeholders.

Some of the configuration management activities included in the integrated change control process are as follows:

- ✓ Configuration identification. Selection and identification of a configuration item provides the basis for which product configuration is defined and verified, products and documents are labeled, changes are managed, and accountability is maintained.
- ✓ Configuration status accounting. Information is recorded and reported as to when appropriate data about the configuration item should be provided. This information includes a listing of approved configuration identification, status of proposed changes to the configuration, and the implementation status of approved changes.
- ✓ Configuration verification and audit. Configuration verification and configuration audits ensure the composition of a project's configuration items is correct and that corresponding changes are registered, assessed, approved, tracked, and correctly implemented.

  This ensures the functional requirements defined in the configuration documentation have been met.

Perform Integrated Change Control: Inputs

1. Project management Plan
2. work Performance Information
3. Change Requests
4. enterprise environmental Factors
5. organizational Process assets

Perform Integrated Change Control: Tools and Techniques

1. **Expert judgment**

   In addition to the project management team's expert judgment, stakeholders may be asked to provide their expertise and may be asked to sit on the change control board. Such judgment and expertise is applied to any technical and management details during this process and may be provided by various sources

2. **Change Control meetings**

   A change control board is responsible for meeting and reviewing the change requests and approving or rejecting those change requests. The roles and

responsibilities of these boards are clearly defined and are agreed upon by appropriate stakeholders. All change control board decisions are documented and communicated to the stakeholders for information and follow-up actions.

3. **Change Control Tools:** In the quest to facilitate configuration and change management, manual or automated tools may be used. Tool selections should be based on the needs of the project stake holders including organizational and environmental considerations and for constraints.

Uses of the Change Control Tools:

1. They are used to manage the change requests and the result in
2. They are also used to facilitate communications among stake holders during the sessions of change control

Perform Integrated Change Control: outputs

If a change request is deemed feasible but outside the project scope, its approval requires a baseline change. If the change request is not deemed feasible, the change request will be rejected and possibly sent back to the requester for additional information.

1. Change Request Status updates
2. Project management Plan updates
3. Project Document updates

Close Project or Phase

Close Project or Phase is the process of finalizing all activities across all of the Project Management Process Groups to formally complete the project or phase. When closing the project, the project manager will review all prior information from the previous phase closures to ensure that all project work is complete and that the project has met its objectives. Since project scope is measured against the project management plan, the project manager will review that document to ensure completion before considering the project closed. The Close Project or Phase process also establishes the procedures to investigate and document the reasons for actions taken if a project is terminated before completion.

This includes all of the activities necessary for administrative closure of the project or phase, including step by- step methodologies that address:

- ✓ Actions and activities necessary to satisfy completion or exit criteria for the phase or project;
- ✓ Actions and activities necessary to transfer the project's products, services, or results to the next phase or to production and/or operations; and
- ✓ Activities needed to collect project or phase records, audit project success or failure, gather lessons learned and archive project information for future use by the organization.

Close Project or Phase: Inputs

1. Project management Plan
2. Accepted Deliverables
3. organizational Process assets

Close Project or Phase: Tools and Techniques

- ✓ Expert judgment
- ✓ Expert judgment is applied when performing administrative closure activities. These experts ensure the project or phase closure is performed to the appropriate standards.
- ✓ Analytical Techniques: as earlier described. The examples of analytical techniques used during closing include

a. Regression Analysis
b. Trend Analysis

4. Meetings: meetings may be face-to-face, virtual, formal or informal/ This may include project team members and other stakeholder, involved in or affected by the project/ Types of meetings include, but are not limited to lesson learned, closeout, user group, and review meetings.

Close Project or Phase: outputs

1. Final Product, Service, or Result transition
2. Organizational Process assets updates

A Quick Note

Regression Analysis: Though, the subject of regression analysis is not covered in the PMBOK, it is important to understand the definition of this term. Regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the project manager and other investigators seek to ascertain the causal effect of one variable upon another the effect of a price increase upon demand, for example, or the effect of changes in the money supply upon the inflation rate. To explore such issues, the project manager and other investigators assemble data on the underlying variables of interest and employs regression to estimate the quantitative effect of the causal variables upon the variable that they influence. The investigator also typically assesses the “statistical significance” of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship.

Trend analysis: In project management trend analysis is a mathematical technique that uses historical results to predict future outcome. This is achieved by tracking variances in cost and schedule performance. In this context, it isa project management quality control tool

Chapter 4

PROJECTSCOPE MANAGEMENT

Project Scope Management includes the processes required to ensure that the project includes all the work required, and only the work required, to complete the project successfully. Managing the project scope is primarily concerned with defining and controlling what is and is not included in the project.

Project Scope Management processes

1. Collect Requirements: The process of defining and documenting stakeholders' needs to meet the project objectives.
2. Define Scope: The process of developing a detailed description of the project and product.
3. Create WBS: The process of subdividing project deliverables and project work into smaller, more manageable components.
4. Validated scope: The process of formalizing acceptance of the completed project deliverables.
5. Control Scope: The process of monitoring the status of the project and product scope and managing changes to the scope baseline.

In the project context, the term scope can refer to:

- ✓ **Product scope:** The features and functions that characterize a product, service, or result
- ✓ **Project scope:** The work that needs to be accomplished to deliver a product, service, or result with the specified features and functions.

This base lined scope is then monitored, verified, and controlled throughout the lifecycle of the project.

Scope Management is preceded by a planning effort by the project management team.

Scope Management processes need to be well integrated with the other Knowledge Area processes, so that the work of the project will result in delivery of the specified product scope.

Collect Requirements

Collect Requirements is the process of defining and documenting stakeholders' needs to meet the project objectives.

The project's success is directly influenced by the care taken in capturing and managing project and product requirements. Requirements include the quantified and documented needs and expectations of the sponsor, customer, and other stakeholders.

These requirements need to be elicited, analyzed, and recorded in enough detail to be measured once project execution begins. Collecting requirements is defining and managing customer expectations. Requirements become the foundation of the WBS. Cost, schedule, and quality planning are all built upon these requirements. The

development of requirements begins with an analysis of the information contained in the project charter and the stakeholder register.

Many organizations categorize requirements into project requirements and product requirements. Project requirements can include business requirements, project management requirements, delivery requirements, etc.

Product requirements can include information on technical requirements, security requirements, performance requirements etc.

Collect Requirements: Inputs

1. **Project Charter**

   The project charter is used to provide the high-level project requirements and high-level product description of the project so that detailed product requirements can be developed.

2. **Stakeholder Register**

   The stakeholder register is used to identify stakeholders that can provide information on detailed project and product requirements. The stakeholder register is described in

Collect Requirements: Tools and Techniques

1. **Interviews**

   An interview is a formal or informal approach to discover information from stakeholders by talking to them directly.

   It is typically performed by asking prepared and spontaneous questions and recording the responses. Interviews are often conducted “one-on-one,” but may involve multiple interviewers and/or multiple interviewees. Interviewing experienced project participants, stakeholders, and subject matter experts can aid in identifying and defining the features and functions of the desired project deliverables.

2. **Focus groups**

   Focus groups bring together prequalified stakeholders and subject matter experts to learn about their expectations and attitudes about a proposed product, service, or result. A trained moderator guides the group through an interactive discussion, designed to be more conversational than a one on- one interview.

3. **Facilitated Workshops**

   Requirements works hops are focused sessions that bring key cross-functional stakeholders together to define product requirements. Workshops are considered a primary technique for quickly defining cross-functional requirements and reconciling stakeholder differences. Because of their interactive group nature, well-facilitated sessions can build trust, foster relationships, and improve communication among the participants which can lead to increased stakeholder consensus. Another benefit of this technique is that issues can be discovered and resolved more quickly than in individual sessions.

4. Group Creativity Techniques

Several group activities can be organized to identify project and product requirements. Some of the group creativity techniques that can be used are:

- ✓ **Brainstorming:** A technique used to generate and collect multiple ideas related to project and product requirements.
- ✓ **Nominal group technique.** This technique enhances brainstorming with a voting process used to rank the most useful ideas for further brainstorming or for prioritization.
- ✓ **The Delphi Technique.** A selected group of experts answers questionnaires and provides feedback regarding the responses from each round of requirements gathering. The responses are only available to the facilitator to maintain anonymity.
- ✓ **Idea/mind mapping.** Ideas created through individual brainstorming are consolidated into a single map to reflect commonality and differences in understanding, and generate new ideas.
- ✓ **Affinity diagram.** This technique allows large numbers of ideas to be sorted into groups for review and analysis.

5. Group Decision Making Techniques

Group decision making is an assessment process of multiple alternatives with an expected outcome in the form of future actions resolution. These techniques can be used to generate, classify, and prioritize product requirements.

There are multiple methods of reaching a group decision, for example:

- ✓ **Unanimity.** Everyone agrees on a single course of action.
- ✓ **Majority.** Support from more than 50% of the members of the group.
- ✓ **Plurality.** The largest block in a group decides even if a majority is not achieved.
- ✓ **Dictatorship.** One individual makes the decision for the group.

Almost any of the decision methods described previously can be applied to the group techniques used in the requirements gathering process.

6. Questionnaires and Surveys

Questionnaires and surveys are written sets of questions designed to quickly accumulate information from a wide number of respondents. Questionnaires and/or surveys are most appropriate with broad audiences, when quick turnaround is needed, and where statistical analysis is appropriate.

7. Observations

Observations provide a direct way of viewing individuals in their environment and how they perform their jobs or tasks and carry out processes. It is particularly helpful for detailed processes when the people that use the product have difficulty or are reluctant to articulate their requirements.

Observation, also called “job shadowing,” is usually done externally by the observer viewing the user performing his or her job. It can also be done by a

"participant observer" who actually performs a process or procedure to experience how it is done to uncover hidden requirements.

8. **Prototypes**
   Prototyping is a method of obtaining early feedback on requirements by providing a working model of the expected product before actually building it. Since prototypes are tangible, it allows stakeholders to experiment with a model of their final product rather than only discussing abstract representations of their requirements.

Collect Requirements: Outputs

1. **Requirements Documentation**
   Requirements documentation describes how individual requirements meet the business need for the project. Requirements may start out at a high level and become progressively more detailed as more is known. Before being base lined, requirements must be unambiguous (measurable and testable), traceable, complete, consistent, and acceptable to key stakeholders. The format of a requirements document may range from a simple document listing all the requirements categorized by stakeholder and priority, to more elaborate forms containing executive summary, detailed descriptions, and attachments.
2. **Requirements Management Plan**
   The requirements management plan documents how requirements will be analyzed, documented, and managed throughout the project.
3. **Requirements Traceability Matrix**
   The requirements traceability matrix is a table that links requirements to their origin and traces them throughout the project life cycle. The implementation of a requirements traceability matrix helps ensure that each requirement adds business value by linking it to the business and project objectives.

Define Scope

Define Scope is the process of developing a detailed description of the project and product. The preparation of a detailed project scope statement is critical to project success and builds upon the major deliverables, assumptions, and constraints that are documented during project initiation. During planning, the project scope is defined and described with greater specificity as more information about the project is known. Existing risks, assumptions, and constraints are analyzed for completeness; additional risks, assumptions, and constraints are added as necessary.

Define Scope: Inputs

1. Project Charter
2. Requirements Documentation
3. Organizational Process Assets

Define Scope: Tools and Techniques

1. Expert judgment

'Expert judgment is often used to analyze the information needed to develop the project scope statement. Such judgment and expertise is applied to any technical details. Such expertise is provided by any group or individual with specialized knowledge or training, and is available from many sources, including:

2. Product Analysis

For projects that have a product as a deliverable, as opposed to a service or result, product analysis can be an effective tool. Each application area has one or more generally accepted methods for translating high-level product descriptions into tangible deliverables.

3. Alternatives Identification

Identifying alternatives is a technique used to generate different approaches to execute and perform the work of the project. A variety of general management techniques can be used such as brainstorming, lateral thinking, pair wise comparisons, etc.

4. Facilitated Workshops

Define Scope: Outputs

1. Project Scope Statement

The project scope statement describes, in detail, the project's deliverables and the work required to create those deliverables. The project scope statement also provides a common understanding of the project scope among project stakeholders. It may contain explicit scope exclusions that can assist in managing stakeholder expectations.

2. Project Document Updates Create WBS

Create WBS is the process of subdividing project deliverables and project work into smaller, more manageable components. The work breakdown structure (WBS) is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team to accomplish the project objectives and create the required deliverables, with each descending level of the WBS representing an increasingly detailed definition of the project work. The WBS organizes and defines the total scope of the project, and represents the work specified in the current approved project scope statement.

The planned work is contained within the lowest level WBS components, which are called work packages.

A work package can be scheduled, cost estimated, monitored, and controlled. In the context of the WBS, work refers to work products or deliverables that are the result of effort and not to the effort itself.

Create WBS: Inputs

1. **Project Scope Statement**
2. **Requirements Documentation**
3. **Organizational Process Assets**

Create WBS: Tools and Techniques

1. **Decomposition**

   Decomposition is the subdivision of project deliverables into smaller, more manageable components until the work and deliverables are defined to the work package level. The work package level is the lowest level in the WBS, and is the point at which the cost and activity durations for the work can be reliably estimated and managed. The level of detail for work packages will vary with the size and complexity of the project.

   Decomposition of the total project work into work packages generally involves the following activities:

- ✓ Identifying and analyzing the deliverables and related work
- ✓ Structuring and organizing the WBS
- ✓ Decomposing the upper WBS levels into lower level detailed components
- ✓ Developing and assigning identification codes to the WBS components
- ✓ Verifying that the degree of decomposition of the work is necessary and sufficient.

Create WBS: Outputs

1. **WBS**

   The WBS is a deliverable-oriented hierarchical decomposition of the work to be executed by the project team, to accomplish the project objectives and create the required deliverables, with each descending level of the WBS representing an increasingly detailed definition of the project work.

2. **WBS Dictionary**

The WBS dictionary is a document generated by the Create WBS process that supports the WBS.

3. **Scope Baseline**

The scope baseline is a component of the project management plan.

Validate Scope

Validate Scope is the process of formalizing acceptance of the completed project deliverables. Validating scope includes reviewing deliverables with the customer or sponsor to ensure that they are completed satisfactorily and obtaining formal acceptance of deliverables by the customer or sponsor. Scope validation differs from quality control in that scope verification is primarily concerned with acceptance of

the deliverables, while quality control is primarily concerned with correctness of the deliverables and meeting the quality requirements specified for the deliverables. Quality control is generally performed before scope Validation, but these two processes can be performed in parallel.

Validate Scope: Inputs

1. Project Management Plan
2. Requirements Documentation
3. Requirements Traceability Matrix
4. Validated Deliverables

Validate Scope: Tools and Techniques

1. Inspection

Inspection includes activities such as measuring, examining, and verifying to determine whether work and deliverables meet requirements and product acceptance criteria. Inspections are sometimes called reviews, product reviews, audits, and walkthroughs. In some application areas, these different terms have narrow and specific meanings.

Validate Scope: Outputs

1. Accepted Deliverables

Deliverables that meet the acceptance criteria are formally signed off and approved by the customer or sponsor. Formal documentation received from the customer or sponsor acknowledging formal stakeholder acceptance of the project's deliverables is forwarded to the Close Project or Phase process.

2. Change Requests

Those completed deliverables that have not been formally accepted are documented, along with the reasons for non-acceptance. Those deliverables may require a change request for defect repair.

The change requests are processed for review and disposition through the Perform Integrated Change Control process.

3. Project Document Updates

Control Scope

Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. Controlling the project scope ensures all requested changes and recommended corrective or preventive actions are processed through the Perform Integrated Change Control process.

Project scope control is also used to manage the actual changes when they occur and is integrated with the other control processes. Uncontrolled changes are often referred to as project scope creep. Change is inevitable, thereby mandating some type of change control process.

Control Scope: Inputs

1. Project Management Plan
2. Work Performance Information
3. Requirements Documentation
4. Requirements Traceability Matrix
5. organizational Process Assets

Control Scope: Tools and Techniques

1. **Variance Analysis**
   Project performance measurements are used to assess the magnitude of variation from the original scope baseline.
   Important aspects of project scope control include determining the cause and degree of variance relative to the scope baseline and deciding whether corrective or preventive action is required.

Control Scope: Outputs

1. **Work Performance Measurements**
   Measurements can include planned vs. actual technical performance or other scope performance measurements. This information is documented and communicated to stakeholders.
2. **Organizational Process Assets Updates**
3. **Change Requests**
4. **Project Management Plan Updates**
5. **Project Document Updates**