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ABSTRACT

It is PMP® notes based on PMBOK Guide 5th Edition and updated PMP syllabus from Nov, 2015. Please read PMBOK® Guide 5th Edition book thoroughly before going through this notes. Most of contents are referred from PMBOK Guide 5th Edition. This notes are designed to recall all definition and diagram from PMBOK book.

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PMP NOTES

**Based on PMBOK Guide 5th Edition and
updated PMP syllabus from Nov, 2015
By JustPMP**

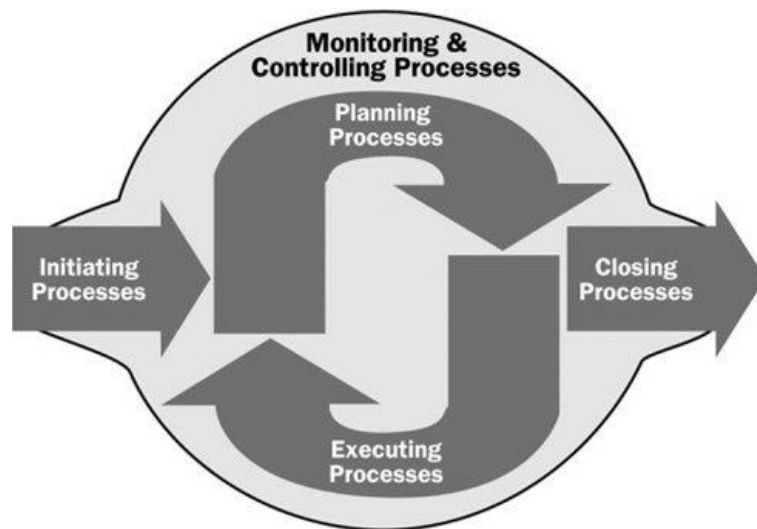
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Chapter – 1 Introduction

What is project?

A project is temporary in that it has a defined beginning and end in time, and therefore defined scope and resources and a project is unique in that it is not a routine operation, but a specific set of operations designed to accomplish a singular goal.

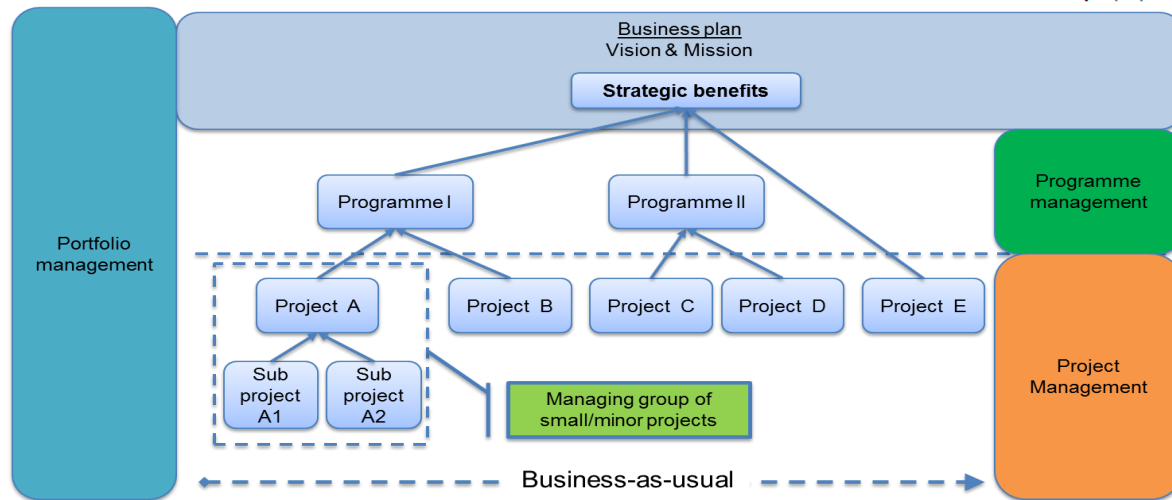
Project management processes groups are as follows.



The Relationships among Portfolios, Programs, and Projects.

- **Portfolio:** Portfolio refers to a collection of projects, programs, sub portfolios, and operations managed as a group to achieve strategic objectives.
- **Programs:** Programs are comprised of subprograms, projects, or other work that are managed in a coordinated fashion in support of the portfolio.
- **Projects:** Individual projects that are either within or outside of a program are still considered part of a portfolio.

Although the projects or programs within the portfolio may not necessarily be interdependent or directly related, they are linked to the organization's strategic plan by means of the organization's portfolio.



Below are Project Management Knowledge areas.

Table A1-1. Project Management Process Group and Knowledge Area Mapping

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work	4.4 Monitor and Control Project Work 4.5 Perform Integrated Change Control	4.6 Close Project or Phase
5. Project Scope Management	Project Plan	5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
6. Project Time Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Resources 6.5 Estimate Activity Durations 6.6 Develop Schedule		6.7 Control Schedule	
7. Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
8. Project Quality Management	RACI	8.1 Plan Quality Management	8.2 Perform Quality Assurance	8.3 Control Quality	
9. Project Human Resource Management	Communications Plan	9.1 Plan Human Resource Management	9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team		
10. Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Control Communications	
11. Project Risk Management	Risk Log	11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses		11.6 Control Risks	
12. Project Procurement Management	Stakeholders	12.1 Plan Procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	12.4 Close Procurements
13. Project Stakeholder Management	13.1 Identify Stakeholders	13.2 Plan Stakeholder Management	13.3 Manage Stakeholder Engagement	13.4 Control Stakeholder Engagement	

Projects and Strategic Planning.

Projects are often utilized as a means of directly or indirectly achieving objectives within an organization's strategic plan. Projects are typically authorized as a result of one or more of the following strategic considerations.

- Market demand (e.g., a car company authorizing a project to build more fuel-efficient cars in response to gasoline shortages);
- Strategic opportunity/business need (e.g., a training company authorizing a project to create a new course to increase its revenues);
- Social need (e.g., a nongovernmental organization in a developing country authorizing a project to provide potable water systems, latrines, and sanitation education to communities suffering from high rates of infectious diseases);
- Environmental consideration (e.g., a public company authorizing a project to create a new service for electric car sharing to reduce pollution);
- Customer request (e.g., an electric utility authorizing a project to build a new substation to serve a new industrial park);
- Technological advance (e.g., an electronics firm authorizing a new project to develop a faster, cheaper, and smaller laptop based on advances in computer memory and electronics technology); and
- Legal requirement (e.g., a chemical manufacturer authorizing a project to establish guidelines for proper handling of a new toxic material).

Relationship between Project Management, Operations Management, and Organizational Strategy.

Operations are *ongoing endeavors that produce repetitive outputs*, with resources assigned to do basically the same set of tasks according to the standards institutionalized in a product life cycle. *Unlike the ongoing nature of operations, projects are temporary endeavors.*

Chapter – 2 Organizational Influences and Project Life cycle

Influence of Organizational Structures on Projects.

An organization's culture, style, and structure influence how its projects are performed.

<div>Organization Structure</div> <div>Project Characteristics</div>	Functional	Matrix			Projectized
		Weak Matrix	Balanced Matrix	Strong Matrix	
Project Manager's Authority	Little or None	Limited	Low to Moderate	Moderate to High	High to Almost Total
Resource Availability	Little or None	Limited	Low to Moderate	Moderate to High	High to Almost Total
Who controls the project budget	Functional Manager	Functional Manager	Mixed	Project Manager	Project Manager
Project Manager's Role	Part-time	Part-time	Full-time	Full-time	Full-time
Project Management Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

- A. **Functional organization** - In a functional organization, maximum power rests with the functional manager and the project manager's role in decision making is minimal. Project managers play a coordinator / facilitator role. Control over the team by project manager is minimal
- B. **Matrix organization** - Matrix organization is a hybrid of both functional and projectized organization, trying to leverage the strength of both. The team members report to two bosses, the project manager and the functional manager. In a strong matrix, the power rests with the project manager. In a weak matrix, the power rests with the functional manager. In a balanced matrix, the power is shared between the project manager and the functional manager.
- C. **Projectized organization** - The project manager has total control over the projects. Personnel are assigned to and report to a project manager.

Note: A project expeditor works as staff assistant and communications coordinator. The expeditor cannot personally make or enforce decisions. Project coordinators have power to make some decisions, have some authority, and report to a higher-level manager.

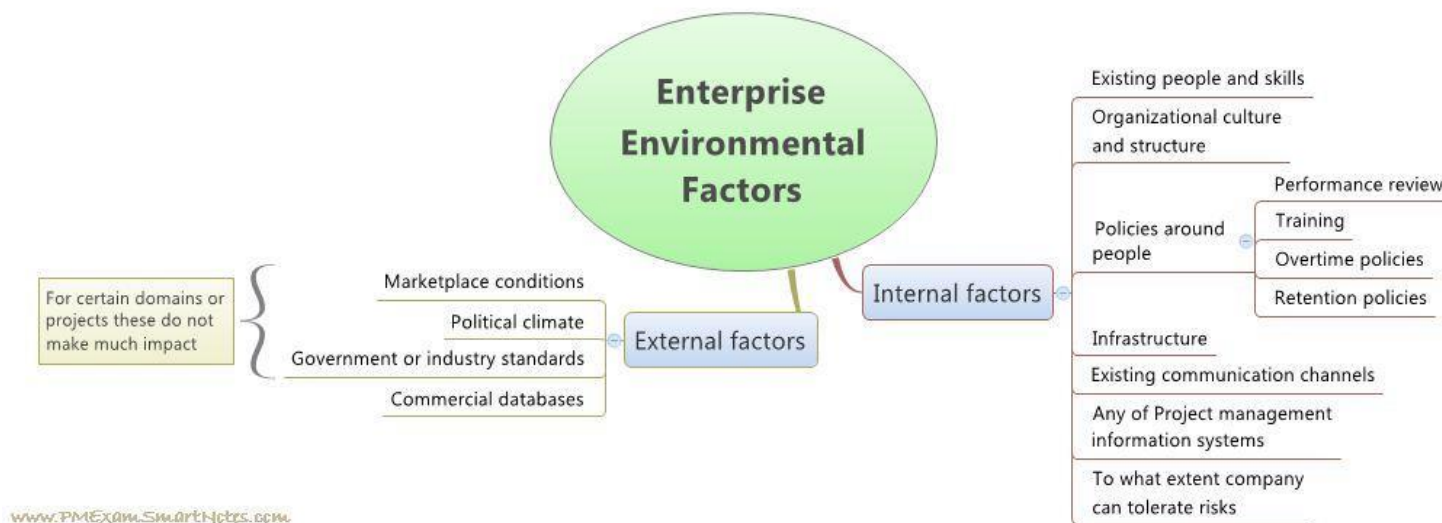
What is Organizational Process Assets?

Organizational Process Assets may include but not limited to all the documents, templates, policies, procedures, plans, guidelines, lesson learned, historical data and information, earned value, estimating, risk etc.



What is Enterprise Environmental Factors?

Enterprise environmental factors refer to conditions, not under the control of the project team, that influence, constrain, or direct project.

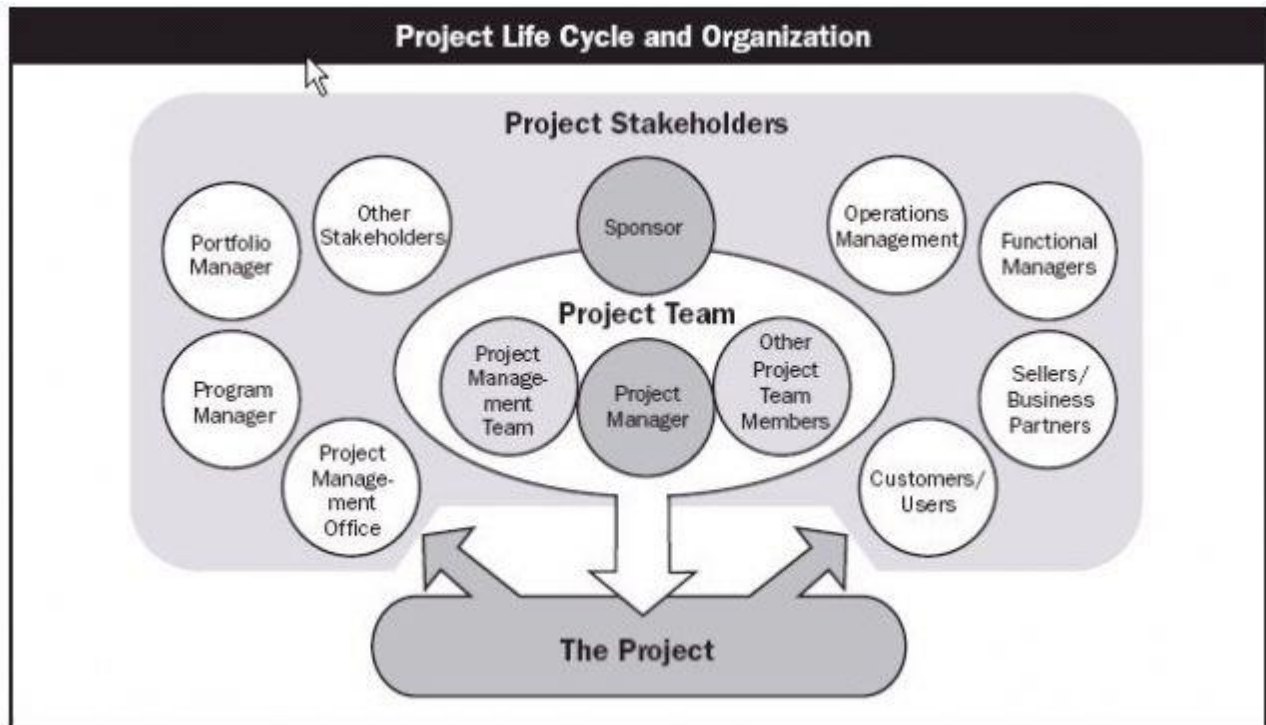


Project Stakeholders and Governance.

Stakeholder is an individual, group, or organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project. Stakeholders may be actively involved in the

project or have interests that may be positively or negatively affected by the performance or completion of the project.

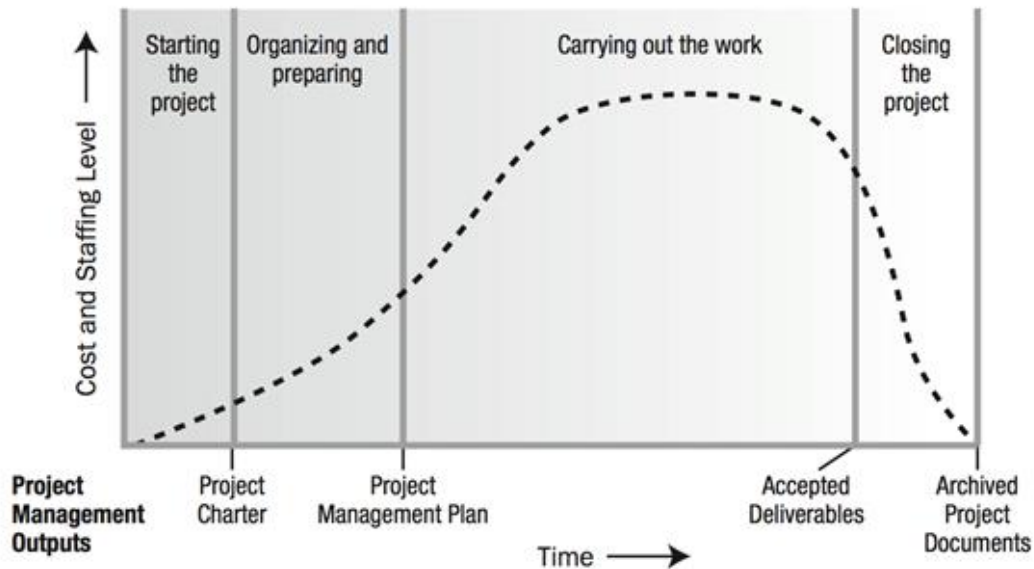
Stakeholder identification is a continuous process throughout the entire project life cycle.



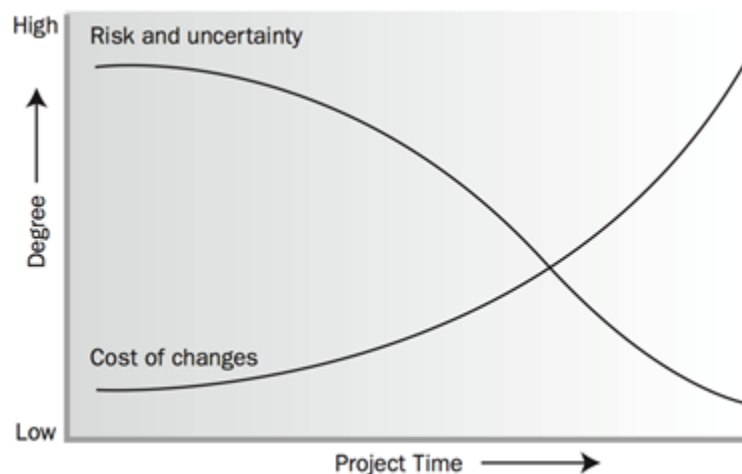
Project Life cycle?

A project life cycle is the series of phases that a project passes through from its initiation to its closure. Phases are generally time bounded, with a start and ending or control point.

Typical Cost and Staffing Levels across a Generic Project Life Cycle Structure



Impact of Variable Based on Project Time.



What is Project Phases and types of relationship within phases?

Phase-to-Phase Relationships - When projects have more than one phase, the phases are part of a generally sequential process designed to ensure proper control of the project and attain the desired product, service, or result. However, there are situations when a project might benefit from overlapping or concurrent phases.

- **Sequential** - In a sequential relationship, a phase starts only when the previous phase is complete.
- **Overlapping Relationship** - In an overlapping relationship, a phase starts prior to completion of the previous one

Predictive Life cycles - Predictive life cycles (also known as fully plan-driven) are ones in which the project scope, and the time and cost required to deliver that scope, are determined as early in the project life cycle as practically possible

Iterative and Incremental Life cycles - Iterative and incremental life cycles are ones in which project phases (also called iterations) intentionally repeat one or more project activities as the project team's understanding of the product increases

Adaptive Life Cycles - Adaptive life cycles (also known as change-driven or agile methods) are intended to respond to high levels of change and ongoing stakeholder involvement.

Chapter 3 - Project Management Processes

What is project Management Processes? Define Project Management Process groups.

Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

Project management processes are grouped into five categories known as Project Management Process Groups.

- **Initiating Process Group.** Those processes performed to define a new project or a new phase of an existing project by obtaining authorization to start the project or phase.
- **Planning Process Group.** Those processes required to establish the scope of the project, refine the objectives, and define the course of action required to attain the objectives that the project was undertaken to achieve.
- **Executing Process Group.** Those processes performed to complete the work defined in the project management plan to satisfy the project specifications.
- **Monitoring and Controlling Process Group.** Those processes required to track, review, and regulate the progress and performance of the project; identify any areas in which changes to the plan are required; and initiate the corresponding changes.
- **Closing Process Group.** Those processes performed to finalize all activities across all Process Groups to formally close the project or phase.

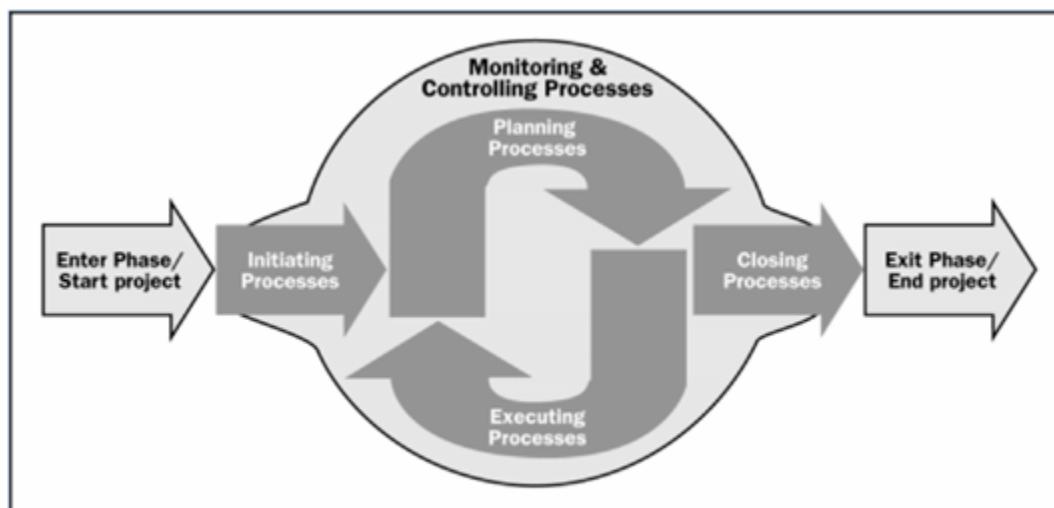
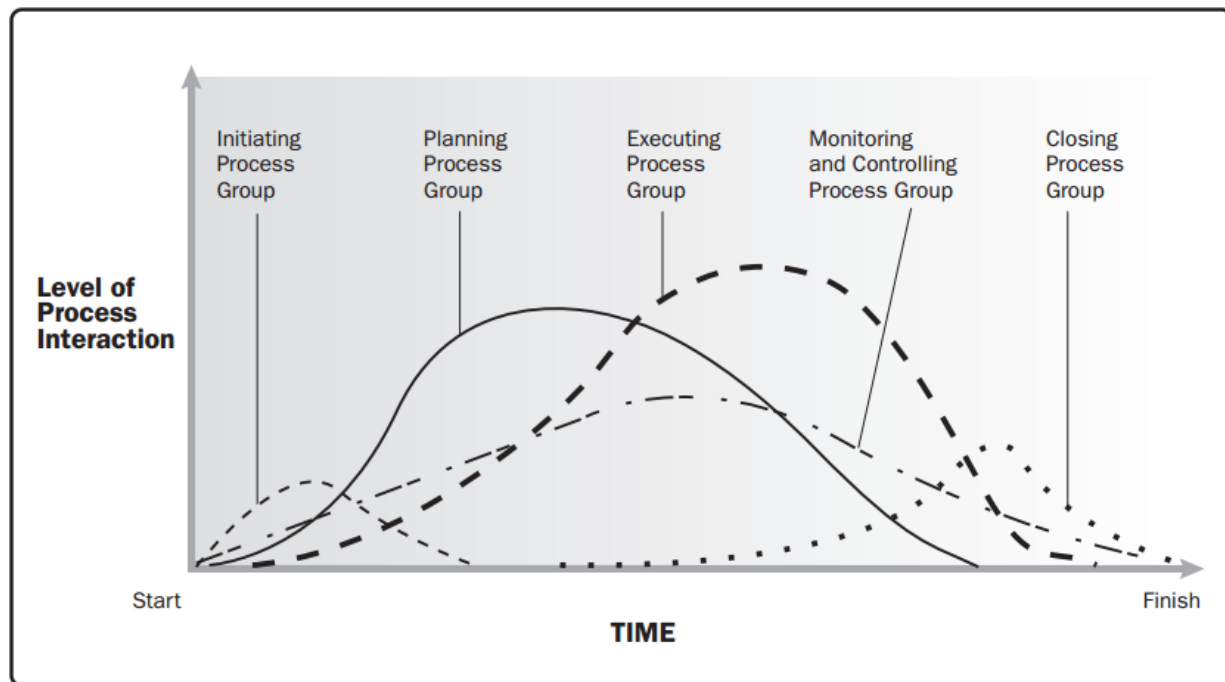


Figure 3-1. Project Management Process Groups

A Guide to the Project Management Body of Knowledge (PMBOK® Guide) – Fourth Edition. ©2008 Project Management Institute, Inc. All Rights Reserved.

Below figure illustrates how the Process Groups interact and shows the level of overlap at various times. If the project is divided into phases, the Process Groups interact within each phase.



The Process Groups are not project life cycle phases. In fact, it is possible that all Process Groups could be conducted within a phase.

Project Information.

Throughout the life cycle of the project, a significant amount of data and information is collected, analyzed, transformed, and distributed in various formats to project team members and other stakeholders.

- **Work performance data.** The raw observations and measurements identified during activities performed to carry out the project work. Examples include reported percent of work physically completed, quality and technical performance measures, start and finish dates of schedule activities, number of change requests, number of defects, actual costs, actual durations, etc.
- **Work performance information.** The performance data collected from various controlling processes, analyzed in context and integrated based on relationships across areas. Examples of performance information are status of deliverables, implementation status for change requests, and forecasted estimates to complete.
- **Work performance reports.** The physical or electronic representation of work performance information compiled in project documents, intended to generate decisions or raise issues, actions, or awareness. Examples include status reports, memos, justifications, information notes, electronic dashboards, recommendations, and updates.

Project Management Process Group and Knowledge Area Mapping

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Chapter - 4 Project Integration Management



	Inputs	Tools & Techniques	Outputs
Develop Project Charter	.1 Project Statement of Work .2 Business case .3 Agreements .4 Enterprise Environment factors .5 Organizational Process assets	.1 Expert Judgment .2 Facilitation Techniques	.1 Project Charter
Develop Project Management Plan	.1 Project charter .2 Outputs from other processes .3 Enterprise environmental factors .4 Organizational process assets	.1 Expert Judgment .2 Facilitation Techniques	.1 Project Management Plan
Direct and Manage Project Work	.1 Project Management Plan .2 Approved Change requests .3 Enterprise Environment factors .4 Organizational process assets	.1 Expert judgment .2 Meetings .3 Project management information system	.1 Project management plan updates .2 Work performance data .3 Change requests .4 Project documents updates Deliverables
Monitor and Control Project work	.1 Project management plan .2 Work performance .3 Validated changes .4 Schedule forecasts .5 Cost forecasts information .6 Enterprise environmental factors .7 Organizational process assets	.1 Expert judgment .2 Meetings .3 Project management information system .4 Analytical techniques	.1 Project management plan updates .2 Work performance reports .3 Change requests .4 Project documents updates
Perform Integrated Change Control	.1 Project management plan .2 Work performance reports .3 Change requests .4 Enterprise environmental factors .5 Organizational process assets	.1 Expert judgment .2 Meetings .3 Change control tools	.1 Project management plan updates .2 Approved change requests .3 Project documents updates .4 Change log

Close Project or Phase	.1 Project management plan .2 Accepted deliverables .3 Organizational process assets	.1 Expert judgment .2 Meetings .3 Analytical techniques	.1 Final product, service, or result transition .2 Organizational process assets updates

.1 Develop Project Charter:

Develop Project Charter is the process of developing a document that formally authorizes the existence of a project and provides the project manager with the authority to apply organizational resources to project activities.

The key benefit of this process is a well-defined project start and project boundaries, creation of a formal record of the project, and a direct way for senior management to formally accept and commit to the project

Inputs:

1. **Project Statement of Work** – The project statement of work (SOW) is a narrative description of products, services, or results to be delivered by a project. The SOW references the following – Business need, Product Scope Description.
2. **Business case** - The business case is created as a result of one or more of the following, Market demand, Organizational need, Customer request, Technological advance, Legal requirement, Ecological impacts and Social need.
3. Agreements
4. Enterprise Environment factors
5. Organizational Process assets

Tools and Techniques:

1. Expert Judgement
2. Facilitation Techniques

Outputs:

1. **Project Charter**

.2 Develop Project Management Plan:

Develop Project Management Plan is the process of defining, preparing, and coordinating all subsidiary plans and integrating them into a comprehensive project management plan.

The project management plan defines how the project is executed, monitored and controlled, and closed.

Inputs:

1. Project charter
2. Outputs from other processes
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Expert Judgment
2. Facilitation Techniques

Outputs:

1. Project Management Plan

.3 Direct and Manage Project:

Direct and Manage Project Work is the process of leading and performing the work defined in the project management plan and implementing approved changes to achieve the project's objectives.

Direct and Manage Project Work activities include, but are not limited to:

Perform activities to accomplish project objectives;

Create project deliverables to meet the planned project work;

Provide, train, and manage the team members assigned to the project;

Obtain, manage, and use resources including materials, tools, equipment, and facilities;

Direct and Manage Project Work also requires review of the impact of all project changes and the implementation of approved changes:

- **Corrective action**—an intentional activity that realigns the performance of the project work with the Project management plan;
- **Preventive action**—an intentional activity that ensures the future performance of the project work is aligned with the project management plan; and/or
- **Defect repair**—an intentional activity to modify a nonconforming product or product component.

Inputs:

1. Project Management Plan
2. Approved Change requests - Approved change requests are an output of the Perform Integrated Change Control process, and include those requests reviewed and approved for implementation by the change control board (CCB).
3. Enterprise Environment factors
4. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Meetings

3. **Project management Information system** - part of the environmental factors, provides access to tools, such as a scheduling tool, a work authorization system

Outputs:

1. Project management plan updates
2. Work performance data - Work performance data are the raw observations and measurements identified during activities being performed to carry out the project work. Examples of work performance data include work completed, key performance indicators, technical performance measures, start and finish dates of schedule activities, number of change requests, number of defects, actual costs, and actual durations, etc.
3. Change requests - A change request is a formal proposal to modify any document, deliverable, or baseline and it may include below changes.
 - Corrective action—An intentional activity that realigns the performance of the project work with the project management plan;
 - Preventive action—An intentional activity that ensures the future performance of the project work is aligned with the project management plan;
 - Defect repair—An intentional activity to modify a nonconforming product or product component; and/or
 - Updates—Changes to formally controlled project documents, plans, etc., to reflect modified or additional ideas or content.
4. Project documents updates
5. Deliverables

.4 Monitor and Control Project Work:

Monitor and Control Project Work is the process of tracking, reviewing, and reporting the progress to meet the performance objectives defined in the project management plan. The key benefit of this process is that it allows stakeholders to understand the current state of the project, the steps taken, and budget, schedule, and scope forecasts.

Inputs:

1. Project management plan
2. Work performance
3. Validated changes
4. Schedule forecasts - The forecast may be used to determine if the project is still within defined tolerance ranges and identify any necessary change requests
5. Cost forecasts information -
6. Enterprise environmental factors
7. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Meetings
3. Project management information system

4. Analytical techniques

Outputs:

1. Project management plan updates
2. Work performance reports
3. Change requests
4. Project documents updates

.5 Perform Integrated Change Control:

The process of reviewing all change requests; approving changes and managing changes to deliverables, organizational process assets, project documents, and the project management plan; and communicating their disposition.

Configuration control is focused on the specification of both the deliverables and the processes; while change control is focused on identifying, documenting, and approving or rejecting changes to the project documents, deliverables, or baselines.

Some of the configuration management activities included in the Perform Integrated Change Control process are as follows:

- A) Configuration identification.** Identification and selection of a configuration item to provide the basis for which the product configuration is defined and verified, products and documents are labeled, changes are managed, and accountability is maintained.
- B) 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.
- C) 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.

Inputs:

1. Project management plan
2. Work performance
3. Change requests
4. Enterprise environmental factors
5. Organizational Process assets

Tools and Techniques:

1. Expert judgment
2. Meetings
3. Change control tools

Outputs:

1. Approved Changes requests
2. Change log
3. Project Management Plan updates
4. Project Document updates

.6 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. The key benefit of this process is that it provides lessons learned, the formal ending of project work, and the release of organization resources to pursue new endeavors.

Inputs:

1. Project management plan
2. Accepted Deliverables
3. Organizational Process assets

Tools and Techniques:

1. Expert judgment
2. Analytical Techniques
3. Meetings

Outputs:

1. Final Product, Service or Result Transition
2. Organizational Process assets updates - Project files, Project or phase closure documents and Historical information.

Chapter - 5 Project Scope Management



	Inputs	Tools & Techniques	Outputs
Plan Scope Management	.1 Project management plan .2 Project charter .3 Enterprise environmental factors .4 Organizational process assets	.1 Expert judgment .2 Meetings	.1 Scope management plan .2 Requirements management plan
Collect Requirements	.1 Scope management plan .2 Requirements management Plan .3 Project charter .4 Stakeholder management plan .5 Stakeholder register	.1 Interviews .2 Focus groups .3 Facilitated workshops .4 Group creativity techniques .5 Group decision-making techniques .6 Questionnaires and surveys .7 Observations .8 Prototypes .9 Benchmarking .10 Context diagrams .11 Document analysis	.1 Requirements documentation .2 Requirements traceability matrix
Define Scope	.1 Scope management plan .2 Project charter .3 Requirements documentation .4 Organizational process assets	.1 Expert judgment .2 Product analysis .3 Alternatives generation .4 Facilitated workshops	.1 Project scope statement .2 Project documents updates
Create WBS	.1 Scope management plan .2 Project scope statement .3 Requirements documentation .4 Enterprise environmental factors .5 Organizational process assets	.1 Decomposition .2 Expert judgment	.1 Scope baseline .2 Project documents updates
Validate Scope	.1 Project management plan .2 Requirements documentation .3 Requirements traceability	.1 Inspection .2 Group decision-making techniques	.1 Accepted deliverables .2 Change requests .3 Work performance

	matrix .4 Verified deliverables .5 Work performance data		information .4 Project documents updates
Control Scope	.1 Project management plan .2 Requirements documentation .3 Requirements traceability matrix .4 Work performance data .5 Organizational process assets	.1 Variance analysis	.1 Work performance information .2 Change requests .3 Project management plan updates .4 Project documents updates .5 Organizational process assets updates

1. Plan Scope Management:

Plan Scope Management is the process of creating a scope management plan that documents how the project scope will be defined, validated, and controlled. The key benefit of this process is that it provides guidance and direction on how scope will be managed throughout the project

Inputs:

1. Project management plan
2. Project charter
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Meetings

Outputs:

1. **Scope management plan**- The scope management plan is a component of the project or program management plan that describes how the scope will be defined, developed, monitored, controlled, and verified
2. Requirements management plan

2. Collect Requirements:

Collect Requirements is the process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives. The key benefit of this process is that it provides the basis for defining and managing the project scope including product scope.

Inputs:

1. Scope management plan
2. Requirements management plan
3. Project charter

4. Stakeholder management plan
5. Stakeholder register

Tools and Techniques:

1. Interviews - An interview is a formal or informal approach to elicit information from stakeholders by talking to them directly. It is typically performed by asking prepared and spontaneous questions and recording the responses.
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 - Facilitated workshops are focused sessions that bring key stakeholders together to define product requirements.
4. Group creativity techniques - 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. Although brainstorming by itself does not include voting or prioritization, it is often used with other group creativity techniques that do.
 - **Nominal group technique.** A technique that enhances brainstorming with a voting process used to rank the most useful ideas for further brainstorming or for prioritization.
 - **Idea/mind mapping.** A technique in which ideas created through individual brainstorming sessions are consolidated into a single map to reflect commonality and differences in understanding, and generate new ideas.
 - **Affinity diagram.** A technique that allows large numbers of ideas to be classified into groups for review and analysis.
 - **Multicriteria decision analysis.** A technique that utilizes a decision matrix to provide a systematic analytical approach for establishing criteria, such as risk levels, uncertainty, and valuation, to evaluate and rank many ideas.
5. Group decision-making techniques – Below are various methods for group decision making technique.
 - **Unanimity.** A decision that is reached whereby everyone agrees on a single course of action. One way to reach unanimity is the **Delphi technique**, in which 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.
 - **Majority.** A decision that is reached with support obtained from more than 50 % of the members of the group. Having a group size with an uneven number of participants can ensure that a decision will be reached, rather than resulting in a tie.
 - **Plurality.** A decision that is reached whereby the largest block in a group decides, even if a majority is not achieved. This method is generally used when the number of options nominated is more than two.
 - **Dictatorship.** In this method, one individual makes the decision for the group.

6. Questionnaires and surveys - Questionnaires and surveys are written sets of questions designed to quickly accumulate information from a large number of respondents.
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. Observation is also known as “job shadowing” . It is usually done externally by an observer viewing a business expert performing a job.
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.
9. Benchmarking - Benchmarking involves comparing actual or planned practices, such as processes and operations, to those of comparable organizations to identify best practices, generate ideas for improvement, and provide a basis for measuring performance.
10. Context diagrams - The context diagram is an example of a scope model. Context diagrams visually depict the product scope by showing a business system (process, equipment, computer system, etc.), and how people and other systems (actors) interact with it.
11. Document analysis -Document analysis is used to elicit requirements by analyzing existing documentation and identifying information relevant to the requirements.

Outputs:

1. Requirements Documentation - Components of requirements documentation can include Business requirements, Stakeholder requirements, Solution requirements, Project requirements, Transition requirements and Requirements assumptions, dependencies, and constraints.
2. Requirements Traceability Matrix - The requirements traceability matrix is a grid that links product requirements from their origin to the deliverables that satisfy them.

Requirements Traceability Matrix								
Project Name:								
Cost Center:								
Project Description:								
ID	Associate ID	Requirements Description	Business Needs, Opportunities, Goals, Objectives	Project Objectives	WBS Deliverables	Product Design	Product Development	Test Cases
001	1.0							
	1.1							
	1.2							
	1.2.1							
002	2.0							
	2.1							
	2.1.1							
003	3.0							
	3.1							
	3.2							
004	4.0							
005	5.0							

Figure 5-6. Example of a Requirements Traceability Matrix

3. Define Scope:

Define Scope is the process of developing a detailed description of the project and product. The key benefit of this process is that it describes the project, service, or result boundaries by defining which of the requirements collected will be included in and excluded from the project scope.

Inputs:

1. Scope management plan
2. Project charter
3. Requirements documentation
4. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Product analysis
3. Alternatives generation - Alternatives generation is a technique used to develop as many potential options as possible in order to identify 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, analysis of alternatives, etc.
4. Facilitated workshops

Outputs:

1. Project scope statement
2. Project documents updates

4. Create WBS:

Create WBS is the process of subdividing project deliverables and project work into smaller, more manageable components. The key benefit of this process is that it provides a structured vision of what has to be delivered.

Inputs:

1. Scope management plan
2. Project scope statement
3. Requirements documentation
4. Enterprise environmental factors
5. Organizational process assets

Tools and Techniques:

1. Decomposition - Decomposition is a technique used for dividing and subdividing the project scope and project deliverables into smaller, more manageable parts. The work package is the work defined at the lowest level of the WBS for which cost and duration can be estimated and managed. 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; and
 - Verifying that the degree of decomposition of the deliverables is appropriate.
- .2 Expert judgment

Outputs:

1. Scope baseline - The scope baseline is the approved version of a scope statement, work breakdown structure (WBS), and its associated WBS dictionary, that can be changed only through formal change control procedures and is used as a basis for comparison.
- **Project scope statement.** The project scope statement includes the description of the project scope, major deliverables, assumptions, and constraints.
- **WBS.** The WBS is a hierarchical decomposition of the total scope of work to be carried out by the project team to accomplish the project objectives and create the required deliverables. Each descending level of the WBS represents an increasingly detailed definition of the project work.
- **WBS dictionary.** The WBS dictionary is a document that provides detailed deliverable, activity, and scheduling information about each component in the WBS. The WBS dictionary is a document that supports the WBS. Information in the WBS dictionary may include.
 - ✓ Code of account identifier,
 - ✓ Description of work,
 - ✓ Assumptions and constraints,
 - ✓ Responsible organization,
 - ✓ Schedule milestones,
 - ✓ Associated schedule activities,
 - ✓ Resources required,

- ✓ Cost estimates,
- ✓ Quality requirements,
- ✓ Acceptance criteria,
- ✓ Technical references, and
- ✓ Agreement information.

2. Project documents updates

5. Validate Scope:

Validate Scope is the process of formalizing acceptance of the completed project deliverables. The key benefit of this process is that it brings objectivity to the acceptance process and increases the chance of final product, service, or result acceptance by validating each deliverable.

Inputs:

1. Project management plan
2. Requirements documentation
3. Requirements traceability matrix
4. Verified deliverables
5. Work performance data

Tools and Techniques:

1. Inspection - Inspection includes activities such as measuring, examining, and validating to determine whether work and deliverables meet requirements and product acceptance criteria. Inspections are sometimes called reviews, product reviews, audits, and walkthroughs.
2. Group decision-making techniques

Outputs:

1. Accepted deliverables
2. Change requests
3. Work performance information
4. Project documents updates

6. Control Scope:

Control Scope is the process of monitoring the status of the project and product scope and managing changes to the scope baseline. The key benefit of this process is that it allows the scope baseline to be maintained throughout the project.

Inputs:

1. Project management plan
2. Requirements documentation
3. Requirements traceability matrix
4. Work performance data
5. Organizational process assets

Tools and Techniques:

1. Variance analysis - Variance analysis is a technique for determining the cause and degree of difference between the baseline and actual performance. Project performance measurements are used to assess the magnitude of variation from the original scope baseline.

Outputs:

1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates
5. Organizational process assets updates

Chapter - 6 Project Time Management



	Inputs	Tools & Techniques	Outputs
Plan Schedule Management	.1 Project charter .2 Project management plan .3 Enterprise environmental factors .4 Organizational process assets	.1 Expert judgment .2 Meetings .3 Analytical techniques	.1 Schedule Management Plan
Define Activities	.1 Schedule management plan .2 Scope baseline .3 Enterprise environmental factors .4 Organizational process assets	.1 Expert judgment .2 Decomposition .3 Rolling wave planning	.1 Activity list .2 Activity attributes .3 Milestone list
Sequence Activities	.1 Schedule management plan .2 Activity list .3 Activity attributes .4 Milestone list .5 Project scope statement .6 Enterprise environmental factors .7 Organizational process assets	.1 Precedence diagramming method (PDM) .2 Dependency determination .3 Leads and lags	.1 Project schedule network diagrams .2 Project documents updates
Estimate Activity Resources	.1 Schedule management plan .2 Activity list .3 Activity attributes .4 Resource calendars .5 Risk register .6 Activity cost estimates .7 Enterprise environmental factors .8 Organizational process assets	.1 Expert judgment .2 Alternative analysis .3 Published estimating data .4 Bottom-up estimating .5 Project management software	.1 Activity resource requirements .2 Resource breakdown structure .3 Project documents updates
Estimate Activity Durations	.1 Schedule management plan .2 Activity list .3 Activity attributes .4 Activity resource requirements .5 Resource breakdown structure .6 Resource calendars .7 Project scope statement	.1 Expert judgment .2 Analogous estimating .3 Parametric estimating .4 Three-point estimating .5 Group decision-making techniques .6 Reserve analysis	.1 Activity duration estimates .2 Project documents updates

	.8 Risk register .9 Enterprise environmental factors .10 Organizational process assets		
Develop Schedule	.1 Schedule management plan .2 Activity list .3 Activity attributes .4 Project schedule network .5 diagrams .6 Activity resource requirements .7 Resource calendars .8 Activity duration estimates .9 Project scope statement .10 Risk register .11 Project staff assignments .12 Resource breakdown structure .13 Enterprise environmental factors .14 Organizational process assets	.1 Schedule network analysis .2 Critical path method .3 Critical chain method .4 Resource optimization techniques .5 Modeling techniques .6 Leads and lags .7 Schedule compression .8 Scheduling tool	.1 Schedule baseline .2 Project schedule .3 Schedule data .4 Project calendars .5 Project management plan updates .6 Project documents updates
Control Schedule	.1 Project management plan .2 Project schedule .3 Work performance data .4 Project calendars .5 Schedule data .6 Organizational process assets	.1 Performance reviews .2 Project management software .3 Resource optimization techniques .4 Modeling techniques .5 Leads and lags .6 Schedule compression .7 Scheduling tool	.1 Work performance information .2 Schedule forecasts .3 Change requests .4 Project management plan updates .5 Project documents updates .6 Organizational process assets updates

1. Plan Schedule Management Plan:

The process of establishing the policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule.

Inputs:

1. Project management plan
Scope baseline. - The scope baseline includes the project scope statement and the work breakdown
2. Structure (WBS) details used for defining activities, duration estimation, and schedule management.

3. Project charter
4. Enterprise environmental factors
5. Organizational Process assets

Tools and Techniques:

1. Expert judgment
2. Meetings
3. Analytical techniques

Outputs:

1. Schedule Management Plan - Schedule management plan can establish the following: Project schedule model development, Level of accuracy, Units of measure, Organizational procedures links, Project schedule model maintenance Control thresholds, Rules of performance measurement, Reporting formats, Process descriptions.

2. Define Activities:

Define Activities is the **process of identifying and documenting the specific actions to** be performed to produce the project deliverables.

The key benefit of this process is to break down work packages into activities that provide a basis for estimating, scheduling, executing, monitoring, and controlling the project work.

Inputs:

1. Schedule management plan
2. Scope baseline
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. **Decomposition** - Decomposition is a technique used for dividing and subdividing the project scope and project deliverables into smaller, more manageable parts.
2. **Rolling wave planning** - Rolling wave planning is an iterative planning technique in which the work to be accomplished in the near term is planned in detail, while the work in the future is planned at a higher level. It is a form of progressive elaboration.
3. **Expert judgment**

Outputs:

1. **Activity list** - The activity list is a comprehensive list that includes all schedule activities required on the project.
2. **Activity attributes** - Activity attributes extend the description of the activity by identifying the multiple components associated with each activity.
3. **Milestone list** - A milestone is a significant point or event in a project. Milestones are similar to regular schedule activities, with the same structure and attributes, but they have zero duration because milestones represent a moment in time.

3. Sequence Activities:

Sequence Activities is the process of identifying and documenting **relationships among the project activities**. The key benefit of this process is that it defines the logical sequence of work to obtain the greatest efficiency given all project constraints.

Inputs:

1. Schedule management plan
2. Activity list
3. Activity attributes
4. Milestone list
5. Project scope statement
6. Enterprise environmental factors
7. Organizational process assets

Tools and Techniques:

1. *Precedence diagramming method (PDM)* - The precedence diagramming method (PDM) is a technique used for constructing a schedule model in which activities are represented by nodes and are graphically linked by one or more logical relationships to show the sequence in which the activities are to be performed.
PDM includes four types of dependencies or logical relationships.
Finish-to-start (FS) - Successor activity cannot start until a predecessor activity has finished.
Finish-to-finish (FF), Start-to-start (SS), Start-to-finish (SF).
2. *Dependency determination* - Mandatory dependencies, Discretionary dependencies (**Discretionary dependencies are sometimes referred to as preferred logic, preferential logic, or soft logic**), External dependencies, Internal dependencies.
3. *Leads and lags*

Outputs:

Project Schedule Network Diagrams
Project Documents Updates

4. Estimate Activity Resources:

Estimate Activity Resources is the process of estimating the type and quantities of material, human Resources, equipment, or supplies required to perform each activity. The key benefit of this process is that it identifies the type, quantity, and characteristics of resources required to complete the activity which allows more accurate cost and duration estimates.

Inputs:

1. Schedule management plan
2. Activity list
3. Activity attributes
4. Resource calendars
5. Risk register
6. Activity cost estimates
7. Enterprise environmental factors

8. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Alternative analysis
3. Published estimating data - Several organizations routinely publish updated production rates and unit costs of resources.
4. Bottom-up estimating - Bottom-up estimating is a method of estimating project duration or cost by aggregating the estimates of the lower-level components of the WBS.
5. Project management software

Outputs:

1. Activity resource requirements
2. Resource breakdown structure
3. Project documents updates

5. Estimate Activity Durations:

The key benefit of this process is that it provides the amount of time each activity will take to complete, which is a major input into the Develop Schedule process.

Inputs:

1. Schedule management plan
2. Activity list
3. Activity attributes
4. Activity resource requirements
5. Resource calendars
6. Project scope statement
7. Risk register
8. Resource breakdown structure
9. Enterprise environmental factors
10. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Analogous estimating - Analogous estimating is a technique for estimating the duration or cost of an activity or a project using historical data from a similar activity or project. Analogous estimating uses parameters from a previous, similar project, such as duration, budget, size, weight, and complexity, as the basis for estimating the same parameter or measure for a future project.
3. Parametric estimating - Parametric estimating uses a statistical relationship between historical data and other variables (e.g., square footage in construction) to calculate an estimate for activity parameters, such as cost, budget, and duration.
4. Three-point estimating - program evaluation and review technique (PERT) uses three estimates to define an approximate range for an activity's duration:
Most likely (tM), Optimistic (tO), Pessimistic (tP).

- **Triangular Distribution.** $tE = (tO + tM + tP) / 3$
- **Beta Distribution** (from the traditional PERT technique). $tE = (tO + 4tM + tP) / 6$

5. Group decision-making techniques
6. Reserve analysis

Outputs:

1. Activity duration estimates
2. Project documents updates

6. Develop Schedule:

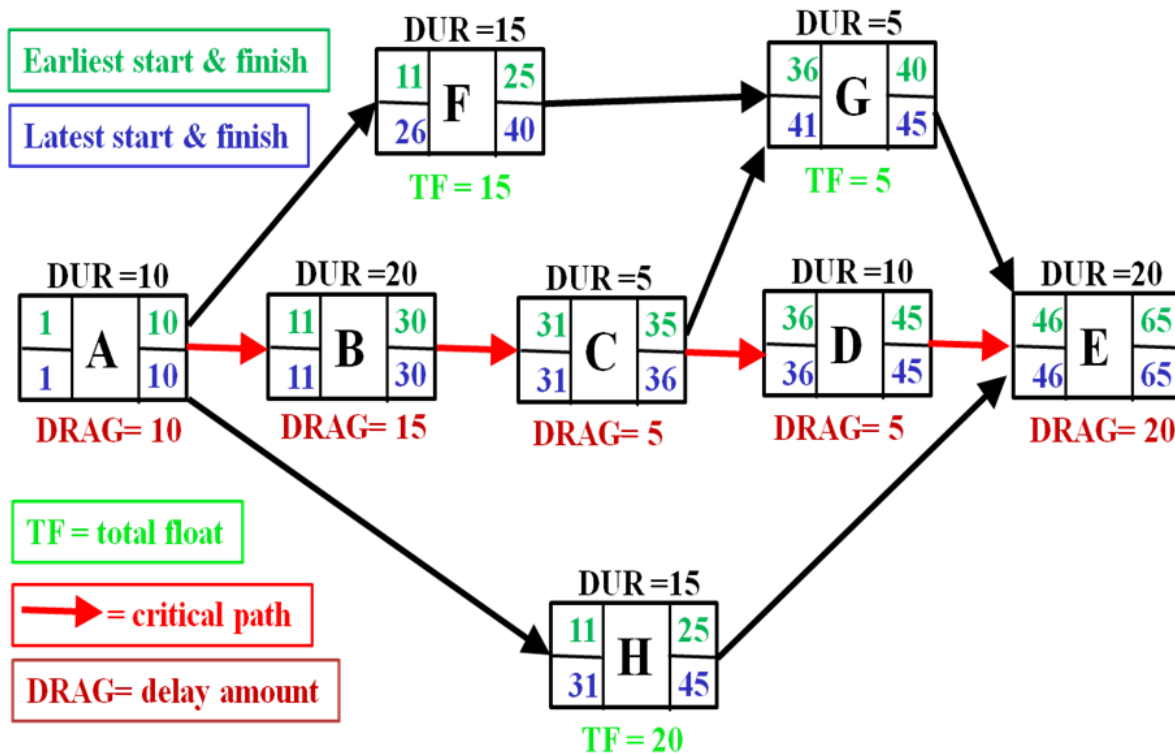
Develop Schedule is the process of analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model. The key benefit of this process is that by entering schedule activities, durations, resources, resource availabilities, and logical relationships into the scheduling tool, it generates a schedule model with planned dates for completing project activities.

Inputs:

1. Schedule management plan
2. Activity list
3. Activity attributes
4. Project schedule network diagrams
5. Activity resource requirements
6. Resource calendars
7. Activity duration estimates
8. Project scope statement
9. Risk register
10. Project staff assignments
11. Resource breakdown structure
12. Enterprise environmental factors
13. Organizational process assets

Tools and Techniques:

1. Schedule network analysis
2. Critical path method - **Critical path** is the sequence of project network activities which add up to the longest overall duration, regardless if that longest duration has float or not. The critical path method is used to calculate the amount of scheduling flexibility on the logical network paths within the schedule model.



3. Critical chain method – The critical chain method (CCM) is a schedule method that allows the project team to place buffers on any project schedule path to account for limited resources and project uncertainties.
- The critical chain method adds duration buffers that are non-work schedule activities to manage uncertainty.
- Project buffer protects the target finish date from slippage along the critical chain. Feeding Buffers protect the critical chain from slippage along the feeding chains.

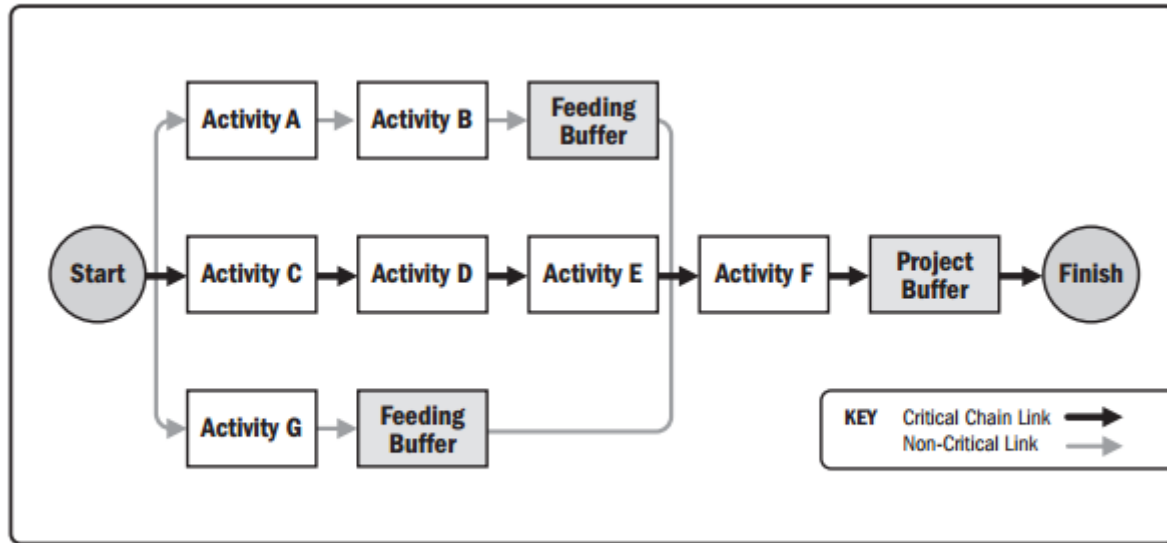


Figure 6-19. Example of Critical Chain Method

4. Resource optimization techniques - **Resource Levelling** - technique in which start and finish dates are adjusted based on resource constraints with the goal of balancing demand for resources with the available supply. Resource leveling can often cause the original critical path to change, usually to increase.

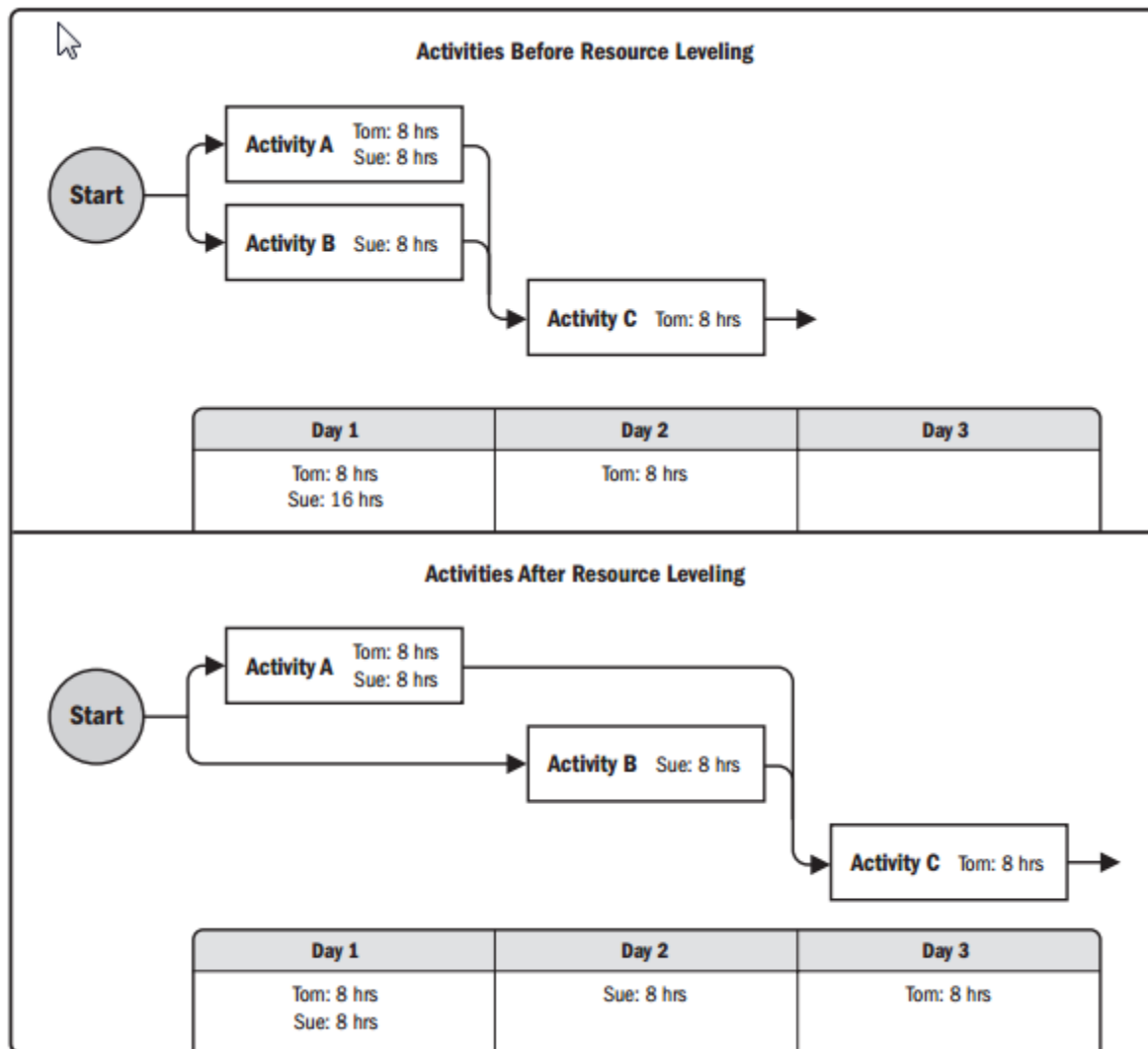


Figure 6-20. Resource Leveling

Resource Smoothing: A technique that adjusts the activities of a schedule model such that the Requirements for resources on the project do not exceed certain predefined resource limits. In resource smoothing, as opposed to resource leveling, the project's critical path is not changed and the completion date may not be delayed. In other words, activities may only be delayed within their free and total float.

5. Modeling techniques - a) What-If Scenario Analysis b) Simulation
6. Leads and lags
7. Schedule compression – Schedule compression techniques are used to shorten the schedule duration without reducing the project scope, in order to meet schedule constraints, imposed dates, or other schedule objectives
 - a) Crashing: A technique used to shorten the schedule duration for the least incremental cost by adding resources. Examples of crashing include approving overtime, bringing in additional resources, or paying to expedite delivery to activities on the critical path.

- b) Fast Tracking: A schedule compression technique in which activities or phases normally done in sequence are performed in parallel for at least a portion of their duration. Fast tracking only works if activities can be overlapped to shorten the project duration

- 8. Scheduling tool – a) Bar charts b) Milestone Charts c) Project Schedule network diagram

Outputs:

- 1. Schedule baseline
- 2. Project schedule
- 3. Schedule data
- 4. Project calendars
- 5. Project management plan updates
- 6. Project documents updates

7. Control Schedule:

Control Schedule is the process of monitoring the status of project activities to update project progress and manage changes to the schedule baseline to achieve the plan

Inputs:

- 1. Project management plan
- 2. Project schedule
- 3. Work performance data
- 4. Project calendars
- 5. Schedule data
- 6. Organizational process assets

Tools and Techniques:

- 1. Performance reviews
- 2. Project management software
- 3. Resource optimization techniques
- 4. Modeling techniques
- 5. Leads and lags
- 6. Schedule compression
- 7. Scheduling tool

Outputs:

- 1. Work performance information
- 2. Schedule forecasts
- 3. Change requests
- 4. Project management plan updates
- 5. Project documents updates
- 6. Organizational process Assets updates

Chapter - 7 Project Cost Management



	Inputs	Tools & Techniques	Outputs
Plan Cost Management	<ul style="list-style-type: none"> .1 Project management plan .2 Project charter .3 Enterprise environmental factors .4 Organizational process assets 	<ul style="list-style-type: none"> .1 Expert judgment .2 Meetings .3 Analytical techniques 	Cost Management Plan
Estimate Cost	<ul style="list-style-type: none"> .1 Cost management plan .2 Human resource management plan .3 Scope baseline .4 Project schedule .5 Risk register .6 Enterprise environmental factors .7 Organizational process assets 	<ul style="list-style-type: none"> .1 Expert judgment .2 Analogous estimating .3 Parametric estimating .4 Bottom-up estimating .5 Three-point estimating .6 Reserve analysis .7 Cost of quality .8 Project management software .9 Vendor bid analysis .10 Group decision-making techniques 	<ul style="list-style-type: none"> .1 Activity cost estimates .2 Basis of estimates .3 Project documents updates
Determine Budget	<ul style="list-style-type: none"> .1 Cost management plan .2 Scope baseline .3 Activity cost estimates .4 Basis of estimates .5 Project schedule .6 Resource calendars .7 Risk register .8 Agreements .9 Organizational process assets 	<ul style="list-style-type: none"> .1 Cost aggregation .2 Reserve analysis .3 Expert judgment .4 Historical relationships .5 Funding limit reconciliation 	<ul style="list-style-type: none"> .1 Cost baseline .2 Project funding requirements .3 Project documents updates
Control Costs	<ul style="list-style-type: none"> .1 Project management plan .2 Project funding requirements .3 Work performance data .4 Organizational process assets 	<ul style="list-style-type: none"> .1 Earned value management .2 Forecasting .3 To-complete performance index (TCPI) .4 Performance reviews .5 Project management software .6 Reserve analysis 	<ul style="list-style-type: none"> .1 Work performance information .2 Cost forecasts .3 Change requests .4 Project management plan updates .5 Project documents updates .6 Organizational process

			assets updates
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1. Plan Cost Management Plan:

The key benefit of this process is that it provides guidance and direction on how the project costs will be managed throughout the project..

Inputs:

1. Project management plan
Scope baseline. - The scope baseline includes the project scope statement and the work breakdown Structure (WBS) details used for defining activities, duration estimation, and schedule management.
Schedule baseline. - The schedule baseline defines when the project costs will be incurred.
Other information. - Other cost-related scheduling, risk, and communications decisions from the project management plan.
2. Project charter
3. Enterprise environmental factors
4. Organizational Process assets

Tools and Techniques:

1. Expert judgment
2. Meetings
3. Analytical techniques

Outputs:

1. **Cost Management Plan** - the cost management plan can establish the following:
Units of measure, Level of precision, Units of accuracy, Organizational procedures links, Control thresholds, Rules of performance measurement, Reporting formats, Process descriptions, Additional details.

2. Estimate Costs:

Estimate Costs is the process of developing an approximation of the monetary resources needed to complete project activities. The key benefit of this process is that it determines the amount of cost required to complete project work.

Inputs:

1. Cost management plan
2. Human resource management plan
3. Scope baseline - The scope baseline is comprised of the following: **Project scope statement, Work breakdown structure, WBS dictionary.**

4. Project schedule
5. Risk register
6. Enterprise environmental factors
7. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. **Analogous estimating** - Analogous cost estimating uses the values such as scope, cost, budget, and duration or measures of scale such as size, weight, and complexity from a previous, similar project as the basis for estimating the same parameter or measurement for a current project. Analogous cost estimating is generally less costly and less time consuming than other techniques, but it is also generally less accurate.
3. **Parametric estimating** - Parametric estimating uses a statistical relationship between relevant historical data and other variables (e.g., square footage in construction) to calculate a cost estimate for project work. This technique can produce higher levels of accuracy depending upon the sophistication and underlying data built into the model.
4. **Bottom-up estimating** - The cost of individual work packages or activities is estimated to the greatest level of specified detail. The detailed cost is then summarized or “rolled up” to higher levels for subsequent reporting and tracking purposes. They are more accurate than parametric estimating.
5. **Three-point estimating**
Most Likely, Optimistic and Pessimistic.
6. Reserve analysis
7. Cost of quality
8. Project management software
9. Vendor bid analysis
10. Group decision-making techniques - Team-based approaches, such as brainstorming, the Delphi or nominal group techniques, are useful for engaging team members to improve estimate accuracy and commitment to the emerging estimates.

Outputs:

1. Activity cost estimates
2. Basis of estimates
3. Project documents updates

3. Determine Budget:

Determine Budget is the process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline. The key benefit of this process is that it determines the cost baseline against which project performance can be monitored and controlled.

Inputs:

1. Cost management plan

2. Scope baseline
3. Activity cost estimates
4. Basis of estimates
5. Project schedule
6. Resource calendars
7. Risk register
8. Agreements
9. Organizational process assets

Tools and Techniques:

1. Cost aggregation
2. Reserve analysis
3. Expert judgment
4. Historical relationships
5. Funding limit reconciliation

Outputs:

1. Cost baseline
2. Project funding requirements
3. Project documents updates

4. Control Costs:

Control Costs is the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline. The key benefit of this process is that it provides the means to recognize variance from the plan in order to take corrective action and minimize risk.

Inputs:

1. Project management plan
2. Project funding requirements
3. Work performance data
4. Organizational process assets

Tools and Techniques:

1. Earned value management

Earned value management (EVM) is a methodology that combines scope, schedule, and resource measurements to assess project performance and progress.

Planned Value – Planned value (PV) is the authorized budget assigned to scheduled work. The total planned value for the project is also known as budget at completion (BAC).

Earned Value – It is the budget associated with the authorized work that has been completed. The EV is often used to calculate the percent complete of a project.

Actual Cost - Actual cost (AC) is the realized cost incurred for the work performed on an activity during a specific time period.

Variances from the approved baseline will also be monitored.

Schedule variance – Schedule variance (SV) is a measure of schedule performance expressed as the difference between the earned value and the planned value. It is the amount by which the project is ahead or behind the planned delivery date, at a given point in time.

$$SV = EV - PV$$

Cost variance - Cost variance (CV) is the amount of budget deficit or surplus at a given point in time, expressed as the difference between earned value and the actual cost.

Equation: $CV = EV - AC$.

Schedule performance index - It measures how efficiently the project team is using its time.

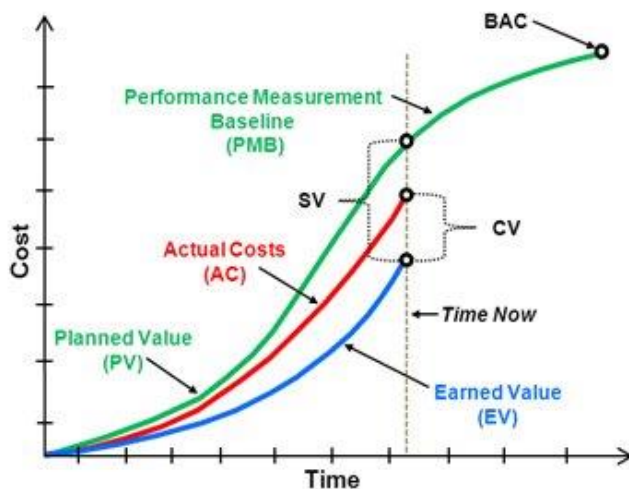
An SPI value less than 1.0 indicates less work was completed than was planned. An SPI greater than 1.0 indicates that more work was completed than was planned.

$$SPI = EV/PV$$

Cost Performance Index: The cost performance index (CPI) is a measure of the cost efficiency of budgeted resources, expressed as a ratio of earned value to actual cost.

A CPI value of less than 1.0 indicates a cost overrun for work completed. A CPI value greater than 1.0 indicates a cost underrun of performance to date.

$$CPI = EV/AC$$



2. Forecasting

EAC forecast for ETC work performed at the budgeted rate

$$EAC = AC + (BAC - EV)$$

EAC forecast for ETC work performed at the present CPI

$$EAC = BAC / CPI$$

EAC forecast for ETC work considering both SPI and CPI factors

$$EAC = AC + [(BAC - EV) / (CPI \times SPI)]$$

3. To-complete performance index (TCPI)

The to-complete performance index (TCPI) is a measure of the cost performance that is required to be achieved with the remaining resources in order to meet a specified management goal, expressed as the ratio of the cost to finish the outstanding work to the remaining budget.

The equation for the TCPI based on the BAC: $(BAC - EV) / (BAC - AC)$.

The equation for the TCPI based on the EAC: $(BAC - EV) / (EAC - AC)$.

4. Performance reviews
5. Project management software
6. Reserve analysis

Outputs:

1. Work performance information
2. Cost forecasts
3. Change requests
4. Project management plan updates
5. Project documents updates
6. Organizational process assets updates

Earned Value Analysis

Abbr Name	Name	Lexicon Def	How used	Equation	Interpretation of result
PV	Planned Value	The authorized budget assigned to scheduled work.	The value of the work planned to be completed to a point in time, usually the data date, or project completion.		
EV	Earned Value	The measure of work performed expressed in terms of the budget authorized for that work.	The planned value of all the work completed (earned) to a point in time, usually the data date, without Reference to actual costs.	EV = sum of the planned value of completed work	
AC	Actual Cost	The realized cost incurred for the work performed on an activity during a specific time period.	The actual cost of all the work completed to a point in time, usually the data date.		
BAC	Budget at Completion	The sum of all budgets established for the work to be performed.	The value of total planned work, the project cost baseline.		
CV	Cost Variance	The amount of budget deficit or surplus at a given point in time, expressed as the difference between the earned value and the actual cost.	The difference between the value of work completed to a point in time, usually the data date, and the actual costs to the same point in time.	CV = EV – AC	Positive = Under planned cost Neutral = On planned cost Negative = Over planned cost
SV	Schedule Variance	The amount by which the project is ahead or behind the planned delivery date, at a	The difference between the work completed to a point in time, usually the data date, and the	SV = EV – PV	Positive = Ahead of Schedule Neutral = On

		given point in time, expressed as the difference between the earned value and the planned value.	work planned to be completed to the same point in time.		schedule Negative = Behind Schedule
VAC	Variance at Completion	A projection of the amount of budget deficit or surplus, expressed as the difference between the budget at completion and the estimate at completion.	The estimated difference in cost at the completion of the project.	VAC = BAC – EAC	Positive = Under planned cost Neutral = On planned cost Negative = Over planned cost
CPI	Cost Performance Index	A measure of the cost efficiency of budgeted resources expressed as the ratio of earned value to actual cost.	A CPI of 1.0 means the project is exactly on budget, that the work actually done so far is exactly the same as the cost so far. Other values show the percentage of how much costs are over or under the budgeted amount for work accomplished.	CPI = EV/AC	Greater than 1.0 = Under planned cost Exactly 1.0 = On planned cost Less than 1.0 = Over planned cost
SPI	Schedule Performance Index	A measure of schedule efficiency expressed as the ratio of earned value to planned value.	An SPI of 1.0 means that the project is exactly on schedule, that the work actually done so far is exactly the same as the work planned to be done so far. Other values show the percentage of how much costs are over or under the budgeted amount for work planned.	SPI = EV/PV	Greater than 1.0 = Ahead of schedule Exactly 1.0 = On schedule Less than 1.0 = Behind schedule
EAC	Estimate At Completion	The expected total cost of completing all work expressed as the sum of the actual cost to date and the estimate to complete.	If the CPI is expected to be the same for the remainder of the project, EAC can be calculated using: If future work will be accomplished at the planned rate, use: If the initial plan is no longer valid, use: If both the CPI and SPI influence the remaining work, use	EAC = BAC/CPI EAC = AC + BAC – EV EAC = AC + Bottom-up ETC EAC = AC + [(BAC – EV)/ (CPI x SPI)]	
ETC	Estimate to Complete	The expected cost to finish all the remaining project work.	Assuming work is proceeding on plan, the cost of completing the remaining authorized work can be calculated using: Reestimate the remaining work from the bottom up.	ETC = EAC – AC ETC = Reestimate	

TCPI	To Complete Performance Index	A measure of the cost performance that must be achieved with the remaining resources in order to meet a specified management goal, expressed as the ratio of the cost to finish the outstanding work to the budget available.	<p>The efficiency that must be maintained in order to complete on plan.</p> <p>The efficiency that must be maintained in order to complete the current EAC.</p>	<p>$TCPI = (BAC - EV) / (BAC - AC)$</p> <p>$TCPI = (BAC - EV) / (EAC - AC)$</p>	<p>Greater than 1.0 = Harder to Complete</p> <p>Exactly 1.0 = Same to complete</p> <p>Less than 1.0 = Easier to complete</p> <p>Greater than 1.0 = Harder to Complete</p> <p>Exactly 1.0 = Same to complete</p> <p>Less than 1.0 = Easier to complete</p>
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Chapter - 8 Project Quality Management

	Inputs	Tools & Techniques	Outputs
Plan Quality Management	.1 Project management plan .2 Stakeholder register .3 Risk register .4 Requirements documentation .5 Enterprise environmental factors .6 Organizational process assets	.1 Cost-benefit analysis .2 Cost of quality .3 Seven basic quality tools .4 Benchmarking .5 Design of experiments .6 Statistical sampling .7 Additional quality planning tools .8 Meetings	.1 Quality management plan .2 Process improvement plan .3 Quality metrics .4 Quality checklists .5 Project documents updates
Perform Quality Assurance	.1 Quality management plan .2 Process improvement plan .3 Quality metrics .4 Quality control measurements .5 Project documents	.1 Quality management and control tools .2 Quality audits .3 Process analysis	.1 Change requests .2 Project management plan updates .3 Project documents updates .4 Organizational process assets updates
Control Quality	.1 Project management plan .2 Quality metrics .3 Quality checklists .4 Work performance data .5 Approved change requests .6 Deliverables .7 Project documents .8 Organizational process assets	.1 Seven basic quality tools .2 Statistical sampling .3 Inspection .4 Approved change requests review	.1 Quality control measurements .2 Validated changes .3 Validated deliverables .4 Work performance information .5 Change requests .6 Project management plan updates .7 Project documents updates .8 Organizational process assets updates

1. Plan Quality Management:

Plan Quality Management is the process of identifying quality requirements and/or standards for the project and its deliverables, and documenting how the project will demonstrate compliance with relevant quality requirements.

The key benefit of this process is that it provides guidance and direction on how quality will be managed and validated throughout the project.

Inputs:

1. Project management plan
The information used for the development of the quality management plan includes, Scope Baseline, Schedule Baseline, Cost Baseline and other management plans.
2. Stakeholder register
3. Risk register
4. Requirements documentation
5. Enterprise environmental factors
6. Organizational process assets

Tools and Techniques:

1. Cost-benefit analysis - A cost-benefit analysis for each quality activity compares the cost of the quality step to the expected benefit.
2. **Cost of quality –**
Cost of Conformance –
Prevention Costs
(Build a quality product)
 - Training
 - Document processes
 - Equipment
 - Time to do it right*Appraisal Costs*
(Assess the quality)
 - Testing
 - Destructive testing loss
 - Inspections

Money spent during the project to avoid failures

Cost of Nonconformance:

Internal Failure Costs

(Failures found by the project)

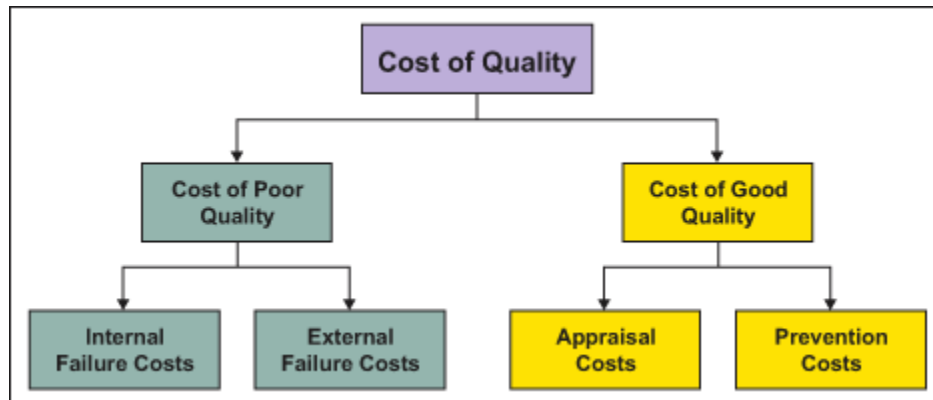
- Rework
- Scrap

External Failure Costs

(Failures found by the customer)

- Liabilities
- Warranty work
- Lost business

Money spent during and after the project because of failures.



3. Seven basic quality tools –

- a) **Cause-and-effect diagrams** - which are also known as fishbone diagrams or as Ishikawa diagrams. The problem statement placed at the head of the fishbone is used as a starting point to trace the problem's source back to its actionable root cause.
- b) **Flowcharts** - which are also referred to as process maps because they display the sequence of steps and the branching possibilities that exist for a process that transforms one or more inputs into one or more outputs.
- c) **Checksheets** - which are also known as tally sheets and may be used as a checklist when gathering data.
- d) **Pareto diagrams** - exist as a special form of vertical bar chart and are used to identify the vital few sources that are responsible for causing most of a problem's effects.
- e) **Histograms** - are a special form of bar chart and are used to describe the central tendency, dispersion, and shape of a statistical distribution.
- f) **Control charts** - are used to determine whether or not a process is stable or has predictable performance. Upper and lower specification limits are based on requirements of the agreement.
- g) **Scatter diagrams** - plot ordered pairs (X, Y) and are sometimes called correlation charts because they seek to explain a change in the dependent variable, Y, in relationship to a change observed in the corresponding independent variable, X.

4. **Benchmarking** - Benchmarking involves comparing actual or planned project practices to those of comparable projects to identify best practices, generate ideas for improvement, and provide a basis for measuring performance.
5. **Design of experiments** - Design of experiments (DOE) is a statistical method for identifying which factors may influence specific variables of a product or process under development or in production.
6. **Statistical sampling** - Statistical sampling involves choosing part of a population of interest for inspection.
7. **Additional quality planning tools**
 - a) **Brainstorming.** This technique is used to generate ideas.
 - b) **Force field analysis.** These are diagrams of the forces for and against change.
 - c) **Nominal group technique.** This technique is used to allow ideas to be brainstormed in small groups and then reviewed by a larger group.
 - d) **Quality management and control tools.** These tools are used to link and sequence the activities identified
8. **Meetings**

Outputs:

1. Quality management plan
2. Process improvement plan - Areas to consider in process improvement plan. **Process boundaries, Process configuration, Process metrics, Targets for improved performance.**
3. Quality metrics
4. Quality checklists
5. Project documents updates

2 Perform Quality Assurance:

Perform Quality Assurance is the process of auditing the quality requirements and the results from quality control measurements to ensure that appropriate quality standards and operational definitions are used. The key benefit of this process is that it facilitates the improvement of quality processes.

Inputs:

1. Quality management plan
2. Process improvement plan
3. Quality metrics
4. Quality control measurements
5. Project documents

Tools and Techniques:

1. Quality management and control tools
 - a. **Affinity diagrams.** The affinity diagram is similar to mind-mapping techniques in that they are used to generate ideas that can be linked to form organized patterns of thought about a problem.
 - b. **Process decision program charts (PDPC).** The PDPC is useful as a method for contingency planning because it aids teams in anticipating intermediate steps that could derail achievement of the goal.
 - c. **Interrelationship digraphs.** The interrelationship digraphs provide a process for creative problem solving in moderately complex scenarios that possess intertwined logical relationships for up to 50 relevant items.
 - d. **Tree diagrams.** Also known as systematic diagrams and may be used to represent decomposition hierarchies such as the WBS, RBS (risk breakdown structure), and OBS (organizational breakdown structure).
 - e. **Prioritization matrices.** Identify the key issues and the suitable alternatives to be prioritized as a set of decisions for implementation. Criteria are prioritized and weighted before being applied to all available alternatives to obtain a mathematical score that ranks the options.
 - f. **Activity network diagrams.** Previously known as arrow diagrams. They include both the AOA (Activity on Arrow) and, most commonly used, AON (Activity on Node) formats of a network diagram. Activity network diagrams are used with project scheduling methodologies such as program evaluation and review technique (PERT), critical path method (CPM), and precedence diagramming method (PDM).

- g. **Matrix diagrams.** A quality management and control tool used to perform data analysis within the organizational structure created in the matrix. The matrix diagram seeks to show the strength of relationships between factors, causes, and objectives that exist between the rows and columns that form the matrix.

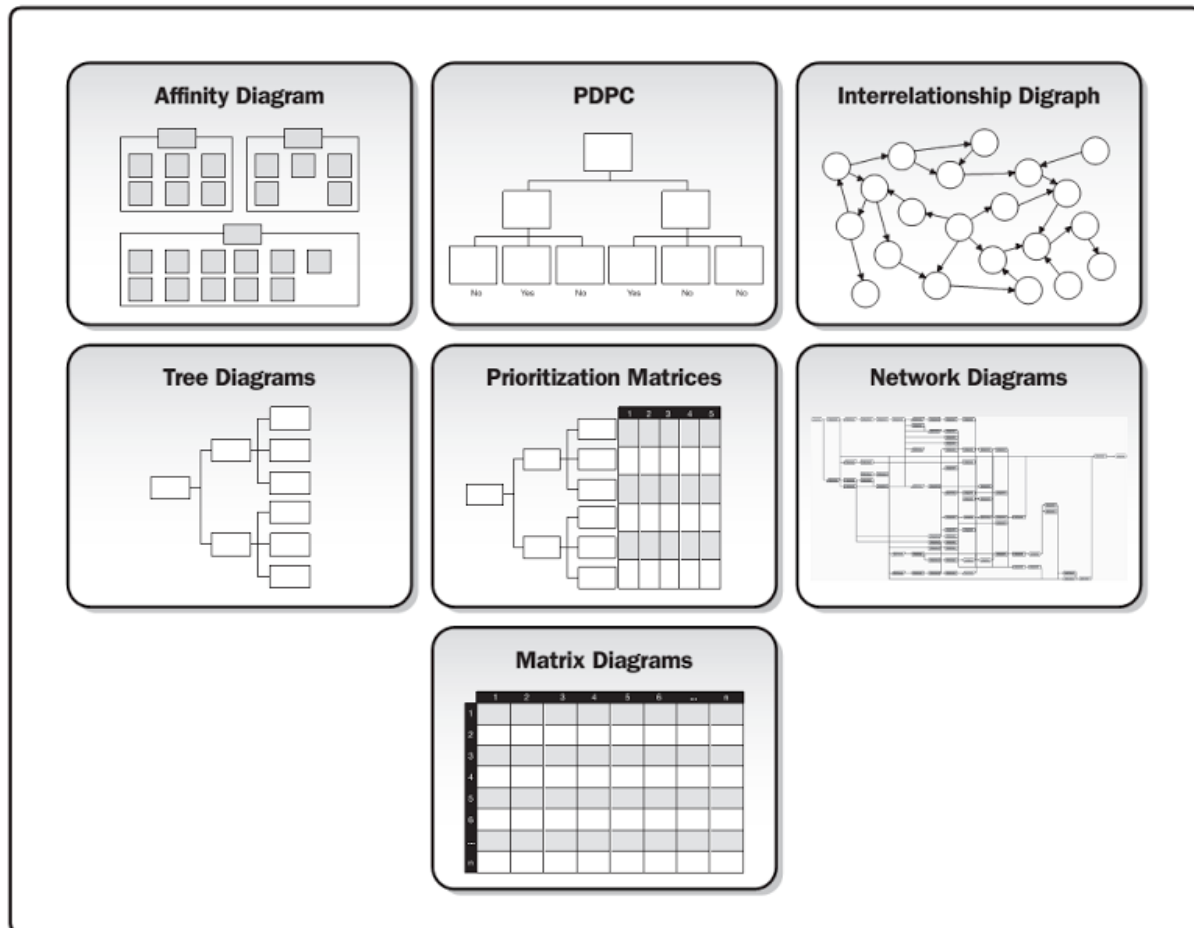


Figure 8-10. Storyboard Illustrating the Seven Quality Management and Control Tools

2. Quality audits
3. Process analysis

Outputs:

1. Change requests
2. Project management plan updates
3. Project documents updates
4. Organizational process assets updates

3. Control Quality:

Control Quality is the process of monitoring and recording results of executing the quality activities to assess performance and recommend necessary changes. The key benefits of this process include: (1) identifying the causes of poor process or product quality and recommending and/or taking action to eliminate them; and (2) validating that project deliverables and work meet the requirements specified by key stakeholders necessary for final acceptance.

Inputs:

1. Project management plan
2. Quality metrics
3. Quality checklists
4. Work performance data
5. Approved change requests
6. Deliverables
7. Project documents
8. Organizational process assets

Tools and Techniques:

1. Seven basic quality tools
2. Statistical sampling
3. Inspection
4. Approved change requests review

Outputs:

1. Quality control measurements
2. Validated changes
3. Verified deliverables
4. Work performance information
5. Change requests
6. Project management plan updates
7. Project documents updates
8. Organizational process assets updates

Chapter – 9 Project Human Resource Management



	Inputs	Tools & Techniques	Outputs
Plan Human resource Management	.1 Project management plan .2 Activity resource requirements .3 Enterprise environmental factors .4 Organizational process assets	.1 Organization charts and position descriptions .2 Networking .3 Organizational theory .4 Expert judgment .5 Meetings	.1 Human resource management plan
Acquire Project Team	.1 Human resource management plan .2 Enterprise environmental factors .3 Organizational process assets	.1 Pre-assignment .2 Negotiation .3 Acquisition .4 Virtual teams .5 Multi-criteria decision analysis	.1 Project staff assignments .2 Resource calendars .3 Project management plan updates
Develop Project Team	.1 Human resource management plan .2 Project staff assignments .3 Resource calendars	.1 Interpersonal skills .2 Training .3 Team-building activities .4 Ground rules .5 Colocation .6 Recognition and rewards .7 Personnel assessment tools	.1 Team performance assessments .2 Enterprise environmental factors updates
Manage Project Team	.1 Human resource management plan .2 Project staff assignments .3 Team performance assessments .4 Issue log .5 Work performance reports .6 Organizational process assets	.1 Observation and conversation .2 Project performance appraisals .3 Conflict management .4 Interpersonal skills	.1 Change requests .2 Project management plan updates .3 Project documents updates .4 Enterprise environmental factors updates .5 Organizational process assets updates

1. Plan Human Resource Management:

Plan Human Resource Management is the process of identifying and documenting project roles, responsibilities, required skills, reporting relationships, and creating a staffing management plan. The

key benefit of this process is that it establishes project roles and responsibilities, project organization charts, and the staffing management plan including the timetable for staff acquisition and release

Inputs:

1. Project management plan
2. Activity resource requirements
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Organization charts and position descriptions - Various formats exist to document team member roles and responsibilities.
 - a) Hierarchical-type charts
 - b) Matrix-based charts
 - c) Text-oriented formats

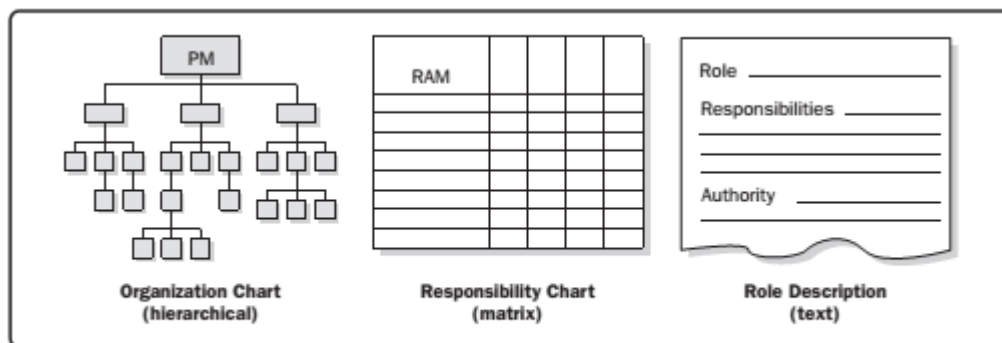


Figure 9-4. Roles and Responsibility Definition Formats

2. Networking
3. Organizational theory
4. Expert judgment
5. Meetings

Outputs:

1. Human resource management plan - The human resource management plan includes
 - a) **Roles and responsibilities**
 - b) **Project organization charts**
 - c) **Staffing management plan** - *Staff acquisition, Resource calendars, Staff release plan, Training needs, Recognition and rewards, Compliance and Safety.*

2. Acquire Project Team

Acquire Project Team is the process of confirming human resource availability and obtaining the team necessary to complete project activities. The key benefit of this process consists of outlining and guiding the team selection and responsibility assignment to obtain a successful team.

Inputs:

1. Human resource management plan
2. Enterprise environmental factors
3. Organizational process assets

Tools and Techniques:

1. **Pre-assignment** - When project team members are selected in advance, they are considered pre assigned.
2. Negotiation
3. **Acquisition** - When the performing organization is unable to provide the staff needed to complete a project, the required services may be acquired from outside sources. This can involve hiring individual consultants or subcontracting work to another organization
4. Virtual teams
5. **Multi-criteria decision analysis** – Availability, Cost, Experience, Ability, Knowledge, Skills, Attitude and International factors.

Outputs:

1. Project staff assignments
2. Resource calendars
3. Project management plan updates

.2 Develop Project Team:

Develop Project Team is the process of improving competencies, team member interaction, and overall team environment to enhance project performance. The key benefit of this process is that it results in improved teamwork, enhanced people skills and competencies, motivated employees, reduced staff turnover rates, and improved overall project performance.

Inputs:

1. Human resource management plan
2. Project staff assignments
3. Resource calendars

Tools and Techniques:

1. Interpersonal skills
2. Training
3. **Team-building activities** - The objective of team-building activities is to help individual team members work together effectively. One of the models used to describe team development is

the Tuckman ladder (Tuckman, 1965; Tuckman & Jensen, 1977), which includes five stages of development that teams may go through.

- a) **Forming** - This phase is where the team meets and learns about the project and their formal roles and responsibilities. Team members tend to be independent and not as open in this phase.
 - b) **Storming** - During this phase, the team begins to address the project work, technical decisions, and the project management approach.
 - c) **Norming** - In the norming phase, team members begin to work together and adjust their work habits and behaviors to support the team. The team learns to trust each other.
 - d) **Performing** - Teams that reach the performing stage function as a well-organized unit. They are interdependent and work through issues smoothly and effectively.
 - e) **Adjourning** - Teams that reach the performing stage function as a well-organized unit. They are interdependent and work through issues smoothly and effectively.
4. **Ground rules** - Ground rules establish clear expectations regarding acceptable behavior by project team members. All project team members share responsibility for enforcing the rules once they are established.
 5. **Colocation** - Colocation, also referred to as “tight matrix,” involves placing many or all of the most active project team members in the same physical location to enhance their ability to perform as a team. Colocation strategies can include a team meeting room (sometimes called “war room”), places to post schedules, and other conveniences that enhance communication and a sense of community.
 6. Recognition and rewards
 7. Personnel assessment tools

Outputs:

1. Team performance assessments
2. Enterprise environmental factors updates

Manage Project Team:

Manage Project Team is the process of tracking team member performance, providing feedback, resolving issues, and managing team changes to optimize project performance. The key benefit of this process is that it influences team behavior, manages conflict, resolves issues, and appraises team member performance.

Inputs:

1. Human resource management plan
2. Project staff assignments
3. Team performance assessments
4. Issue log
5. Work performance reports
6. Organizational process assets

Tools and Techniques:

1. **Observation and conversation** - Observation and conversation are used to stay in touch with the work and attitudes of project team members.
2. Project performance appraisals
3. **Conflict management** - Conflict is inevitable in a project environment. If the differences become a negative factor, project team members are initially responsible for their resolution. If conflict escalates, the project manager should help facilitate a satisfactory resolution. Conflict should be addressed early and usually in private, using a direct, collaborative approach. If disruptive conflict continues, formal procedures may be used, including disciplinary action. There are five general techniques for resolving conflict. *a) Withdraw/Avoid b) Smooth/Accommodate c) Compromise/Reconcile d) Force/Direct e) Collaborate/Problem Solve*
4. **Interpersonal skills** - Project managers use a combination of technical, personal, and conceptual skills to analyze situations and interact appropriately with team members. Leadership, Influencing, Effective Decision Making

Outputs:

1. Change requests
2. Project management plan updates
3. Project documents updates
4. Enterprise environmental factors updates
5. Organizational process assets updates

Chapter - 10 Project Communication Management

	Inputs	Tools & Techniques	Outputs
Plan Communication Management	.1 Project management plan .2 Stakeholder register .3 Enterprise environmental factors .4 Organizational process assets	.1 Communication requirements analysis .2 Communication technology .3 Communication models .4 Communication methods .5 Meetings	.1 Communications management plan .2 Project documents updates
Manage Communications	.1 Communications management plan .2 Work performance reports .3 Enterprise environmental factors .4 Organizational process assets	.1 Communication technology .2 Communication models .3 Communication methods .4 Information management systems .5 Performance reporting	.1 Project communications .2 Project management plan updates .3 Project documents updates .4 Organizational process assets updates
Control Communications	.1 Project management plan .2 Project communications .3 Issue log .4 Work performance data .5 Organizational process assets	.1 Information management systems .2 Expert judgment .3 Meetings	.1 Work performance information .2 Change requests .3 Project management plan updates .4 Project documents updates .5 Organizational process assets updates

.1 Plan Communications Management:

Plan Communications Management is the process of developing an appropriate approach and plan for project communications based on stakeholder's information needs and requirements, and available organizational assets. The key benefit of this process is that it identifies and documents the approach to communicate most effectively and efficiently with stakeholders.

Effective communication means that the information is provided in the right format, at the right time, to the right audience, and with the right impact. Efficient communication means providing only the information that is needed.

Inputs:

1. Project management plan
2. Stakeholder register
3. Enterprise environmental factors

4. Organizational process Assets

Tools and Techniques:

1. Communication requirements analysis - The project manager should also consider the number of potential communication channels or paths as an indicator of the complexity of a project's communications. The total number of potential communication channels is $n(n-1)/2$, where n represents the number of stakeholders.
2. Communication technology
Factors that can affect the choice of communication technology include:
a). Urgency of the need for information b) Availability of technology c) Ease of use d) Project environment d) Sensitivity and Confidentiality of the information
3. Communication models - The communication models used to facilitate communications and the exchange of information may vary from project to project and also within different stages of the same project.
a) Encode b Transmit Message c) Decode d) Acknowledge e) Feedback and Response
4. Communication methods
 - a) **Interactive Communication** - Between two or more parties performing a multidirectional exchange of information. It is the most efficient way to ensure a common understanding by all participants on specified topics, and includes meetings, phone calls, instant messaging, video conferencing, etc.
 - b) **Push Communication** - Sent to specific recipients who need to receive the information. This ensures that the information is distributed but does not ensure that it actually reached or was understood by the intended audience. Push communications include letters, memos, reports, emails, faxes, voice mails, blogs, press releases, etc.
 - c) **Pull Communications** - Used for very large volumes of information, or for very large audiences, and requires the recipients to access the communication content at their own discretion. These methods include intranet sites, e-learning, lessons learned databases, knowledge repositories, etc.
5. Meetings

Outputs:

1. Communications management plan
2. Project documents updates

.2 Manage Communications:

Manage Communications is the process of creating, collecting, distributing, storing, retrieving, and the ultimate disposition of project information in accordance to the communications management plan. The key benefit of this process is that it enables an efficient and effective communications flow between project stakeholders.

Inputs:

1. Communications management plan
2. Work performance reports
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Communication technology
2. Communication models
3. Communication methods
4. Information management systems
5. Performance reporting –
 - a) Analysis of past performance,
 - b) Analysis of project forecasts (including time and cost),
 - c) Current status of risks and issues,
 - d) Work completed during the period,
 - e) Work to be completed in the next period,
 - f) Summary of changes approved in the period, and
 - g) Other relevant information, which is reviewed and discussed

Outputs:

1. Project communications
2. Project management plan updates
3. Project documents updates
4. Organizational process assets updates

3. Control Communications:

Control Communications is the process of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met. The key benefit of this process is that it ensures an optimal information flow among all communication participants, at any moment in time.

Inputs:

1. Project management plan
2. Project communications
3. Issue log
4. Work performance data
5. Organizational process assets

Tools and Techniques:

1. Information management systems
2. Expert judgment
3. Meetings

Outputs:

1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates
5. Organizational process assets updates

Chapter - 11 Project Risk Management



	Inputs	Tools & Techniques	Outputs
Plan Risk Management	.1 Project management plan .2 Project charter .3 Stakeholder register .4 Enterprise environmental factors .5 Organizational process assets	.1 Analytical techniques .2 Expert judgment .3 Meetings	.1 Risk management plan
Identify Risks	.1 Risk management plan .2 Cost management plan .3 Schedule management plan .4 Quality management plan .5 Human resource management plan .6 Scope baseline .7 Activity cost estimates .8 Activity duration estimates .9 Stakeholder register .10 Project documents .11 Procurement documents .12 Enterprise environmental factors .13 Organizational process assets	.1 Documentation reviews .2 Information gathering techniques .3 Checklist analysis .4 Assumptions analysis .5 Diagramming techniques .6 SWOT analysis .7 Expert judgment	.1 Risk register
Perform Qualitative Risk Analysis	.1 Risk management plan .2 Scope baseline .3 Risk register .4 Enterprise environmental factors .5 Organizational process assets	.1 Risk probability and impact assessment .2 Probability and impact matrix .3 Risk data quality assessment .4 Risk categorization .5 Risk urgency assessment .6 Expert judgment	.1 Project documents updates

Perform Quantitative Risk Analysis	.1 Risk management plan .2 Cost management plan .3 Schedule management plan .4 Risk register .5 Enterprise environmental factors .6 Organizational process assets	.1 Data gathering and representation techniques .2 Quantitative risk analysis and modeling techniques .3 Expert judgment	.1 Project documents updates
Plan Risk Responses	.1 Risk management plan .2 Risk register	.1 Strategies for negative risks or threats .2 Strategies for positive risks or opportunities .3 Contingent response strategies .4 Expert judgment	.1 Project management plan updates .2 Project documents updates

.1 Plan Risk Management:

Plan Risk Management is the process of defining how to conduct risk management activities for a project. The key benefit of this process is it ensures that the degree, type, and visibility of risk management are commensurate with both the risks and the importance of the project to the organization. The risk management plan is vital to communicate with and obtain agreement and support from all stakeholders to ensure the risk management process is supported and performed effectively over the project life cycle.

Inputs:

1. Project management plan
2. Project charter
3. Stakeholder register
4. Enterprise environmental factors
5. Organizational process assets
 - a) Risk categories,
 - b) Common definitions of concepts and terms,
 - c) Risk statement formats,
 - d) Standard templates,
 - e) Roles and responsibilities,
 - f) Authority levels for decision making, and
 - g) Lessons learned

Tools and Techniques:

1. Analytical techniques
2. Expert judgment
3. Meetings

Outputs:

1. Risk management plan: It includes following things.
 - a) Methodology
 - b) Roles and Responsibilities
 - c) Budgeting
 - d) Timing
 - e) Risk Categories
 - f) Definitions of risk probability and impact
 - g) Probability and impact matrix
 - h) Revised stakeholder tolerances
 - i) Reporting formats
 - j) Tracking

.2 Identify Risks:

Identify Risks is the process of determining which risks may affect the project and documenting their Characteristics. The key benefit of this process is the documentation of existing risks and the knowledge and ability provides to the project team to anticipate events.

Identify risks is an iterative process, because new risks may evolve or become known as the project progresses through its life cycle.

Inputs:

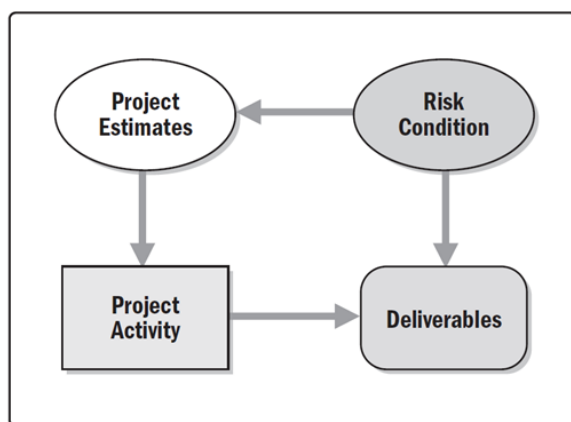
1. Risk management plan
2. Cost management plan
3. Schedule management plan
4. Quality management plan
5. Human resource management plan
6. Scope baseline
7. Activity cost estimates
8. Activity duration estimates
9. Stakeholder register
10. Project documents
11. Procurement documents
12. Enterprise environmental factors
13. Organizational process assets

Tools and Techniques:

1. Documentation reviews
2. Information gathering techniques - Examples of information gathering techniques used in identifying risks can include:
 - a) **Brainstorming** - The goal of brainstorming is to obtain a comprehensive list of project risks. The Project team usually performs brainstorming, often with a multidisciplinary set of experts who are not part of the team. Ideas about project risk are generated

under the leadership of a facilitator, either in a traditional free-form brainstorm session or structured mass interviewing techniques.

- b) **Delphi technique** - The Delphi technique is a way to reach a consensus of experts. Project risk experts participate in this technique anonymously. A facilitator uses a questionnaire to solicit ideas about the important project risks. The responses are summarized and are then recirculated to the experts for further comment. Consensus may be reached in a few rounds of this process. The Delphi technique helps reduce bias in the data and keeps any one person from having undue influence on the outcome.
 - c) **Interviewing** - Interviewing experienced project participants, stakeholders, and subject matter experts helps to identify risks.
 - d) **Root cause analysis** - Root-cause analysis is a specific technique used to identify a problem, discover the underlying causes that lead to it, and develop preventive action
3. Checklist analysis
 4. Assumptions analysis
 5. Diagramming techniques - Risk diagramming techniques may include:
 - a) **Cause and effect diagrams**. These are also known as Ishikawa or fishbone diagrams and are useful for identifying causes of risks.
 - b) **System or process flow charts**. These show how various elements of a system interrelate and the mechanism of causation.
 - c) **Influence diagrams**. These are graphical representations of situations showing causal influences, time ordering of events, and other relationships among variables and outcomes.



6. **SWOT analysis** - This technique examines the project from each of the strengths, weaknesses, opportunities, and threats (SWOT) perspectives to increase the breadth of identified risks by including internally generated risks.
7. Expert judgment

Outputs:

1. Risk register - The primary output from Identify Risks is the initial entry into the risk register. The risk register is a document in which the results of risk analysis and risk response planning are recorded.
 - a) List of identified risks.
 - b) List of potential responses.

.3 Perform Qualitative Risk Analysis:


Perform Qualitative Risk Analysis is the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact. The key benefit of this process is that it enables project managers to reduce the level of uncertainty and to focus on high-priority risks

Inputs:

1. Risk management plan
2. Scope baseline
3. Risk register
4. Enterprise environmental factors
5. Organizational process assets

Tools and Techniques:

1. **Risk probability and impact assessment** - Risk probability assessment investigates the likelihood that each specific risk will occur. Risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including both negative effects for threats and positive effects for opportunities.
2. **Probability and impact matrix** - Each risk is rated on its probability of occurrence and impact on an objective if it does occur. The organization should determine which combinations of probability and impact result in a classification of high risk, moderate risk, and low risk.



Probability and Impact Matrix

		Threats					Opportunities				
		Very Low	Low	Medium	High	Very High	Very High	High	Medium	Low	Very Low
*Impact	Probability	0.05	0.10	0.20	0.40	0.80	0.80	0.40	0.20	0.10	0.05
Very High 71-90%	0.90	0.05	0.09	0.18	0.36	0.72	0.72	0.36	0.18	0.09	0.05
High 51-70%	0.70	0.04	0.07	0.14	0.28	0.56	0.56	0.28	0.14	0.07	0.04
Medium 31-50%	0.50	0.03	0.05	0.10	0.20	0.40	0.40	0.20	0.10	0.05	0.03
Low 11-30%	0.30	0.02	0.03	0.06	0.12	0.24	0.24	0.12	0.06	0.03	0.02
Very Low up to 10%	0.10	0.01	0.01	0.02	0.04	0.08	0.08	0.04	0.02	0.01	0.01

Each risk is rated on its probability of occurring and impact on an objective (e.g., cost, time, scope or quality) if it does occur. The organization's thresholds for low, moderate or high risks are shown in the matrix and determine whether the risk is scored as high, moderate or low for that objective.

3. **Risk data quality assessment** - Risk data quality assessment is a technique to evaluate the degree to which the data about risks is useful for risk management.
4. Risk categorization
5. Risk urgency assessment
6. Expert judgment

Outcomes:

1. Project documents updates – Below document will be updated.
 - a) Risk Register Updates
 - b) Assumptions log updates

.4 Perform Quantitative Risk Analysis:

Perform Quantitative Risk Analysis is the process of numerically analyzing the effect of identified risks on overall project objectives. The key benefit of this process is that it produces quantitative risk information to support decision making in order to reduce project uncertainty.

Perform Quantitative Risk Analysis is performed on risks that have been prioritized by the Perform Qualitative Risk Analysis process as potentially and substantially impacting the project's competing demands.

Inputs:

1. Risk management plan
2. Cost management plan
3. Schedule management plan
4. Risk register
5. Enterprise environmental factors
6. Organizational process assets

Tools and Techniques:

1. Data gathering and representation techniques

- a) **Interviewing:** Interviewing techniques draw on experience and historical data to quantify the probability and impact of risks on project objectives.
- b) **Probability Distributions:** Continuous probability distributions, which are used extensively in modeling and simulation, represent the uncertainty in values such as durations of schedule activities and costs of project components.

2. Quantitative risk analysis and modeling techniques

- a. **Sensitivity analysis:** Sensitivity analysis helps to determine which risks have the most potential impact on the project.
- b. **Expected monetary value analysis:** Expected monetary value (EMV) analysis is a statistical concept that calculates the average outcome when the future includes scenarios that may or may not happen (i.e., analysis under uncertainty).
- c. **Modelling and simulation:** A project simulation uses a model that translates the specified detailed uncertainties of the project into their potential impact on project objectives. Simulations are typically performed using the Monte Carlo technique

3. Expert judgment

Outputs:

1. Project documents updates – Risk Register document updates include following things. Probabilistic analysis of the project, Probability of achieving cost and time objectives, Prioritized list of quantified risks, Trends in quantitative risk analysis results.

.5 Plan Risk Responses:

Plan Risk Responses is the process of developing options and actions to enhance opportunities and to reduce threats to project objectives. The key benefit of this process is that it addresses the risks by their priority, inserting resources and activities into the budget, schedule and project management plan as needed.

Inputs:

1. Risk management plan
2. Risk register

Tools and Techniques:

1. Strategies for negative risks or threats - Three strategies, which typically deal with threats or risks that may have **negative impacts on project objectives if they occur**, are: **avoid, transfer, and mitigate**. The fourth strategy, *accept*, can be used for negative risks or threats as well as positive risks or opportunities.
 - a) **Avoid**. - Risk avoidance is a risk response strategy whereby the project team acts to eliminate the threat or protect the project from its impact.
 - b) **Transfer**. - Risk transference is a risk response strategy whereby the project team shifts the impact of a threat to a third party, together with ownership of the response.
 - c) **Mitigate**. - Risk mitigation is a risk response strategy whereby the project team acts to reduce the probability of occurrence or impact of a risk. It implies a reduction in the probability and/or impact of an adverse risk to be within acceptable threshold limits.
 - d) **Accept**. - Risk acceptance is a risk response strategy whereby the project team decides to acknowledge the risk and not take any action unless the risk occurs.
2. **Strategies for positive risks or opportunities** - Three of the four responses are suggested to deal with risks with **potentially positive impacts on project objectives**. The fourth strategy, *accept*, can be used for negative risks or threats as well as positive risks or opportunities
 - a) **Exploit** - The exploit strategy may be selected for risks with positive impacts where the organization wishes to ensure that the opportunity is realized.
 - b) **Enhance** - The enhance strategy is used to increase the probability and/or the positive impacts of an opportunity.
 - c) **Share** - Sharing a positive risk involves allocating some or all of the ownership of the opportunity to a third party who is best able to capture the opportunity for the benefit of the project.
 - d) **Accept** - Accepting an opportunity is being willing to take advantage of the opportunity if it arises, but not actively pursuing it.
3. Contingent response strategies
4. Expert judgment

Outputs:

1. Project management plan updates
2. Project documents updates

.6 Control Risks:

Control Risks is the process of implementing risk response plans, tracking identified risks, monitoring residual risks, identifying new risks, and evaluating risk process effectiveness throughout the project.

The key benefit of this process is that it improves efficiency of the risk approach throughout the project life cycle to continuously optimize risk responses.

Inputs:

1. Project management plan
2. Risk register
3. Work performance data
4. Work performance reports

Tools and Techniques:

1. Risk reassessment
2. Risk audits
3. Variance and trend analysis
4. Technical performance measurement
5. Reserve analysis
6. Meetings

Outputs:

1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates
5. Organizational process assets updates

Chapter - 12 Project Procurement Management



	Inputs	Tools & Techniques	Outputs
Plan Procurement Management	.1 Project management plan .2 Requirements documentation .3 Risk register .4 Activity resource requirements .5 Project schedule .6 Activity cost estimates .7 Stakeholder register .8 Enterprise environmental factors .9 Organizational process assets	.1 Make-or-buy analysis .2 Expert judgment .3 Market research .4 Meetings	.1 Procurement management plan .2 Procurement statement of work .3 Procurement documents .4 Source selection criteria .5 Make-or-buy decisions .6 Change requests .7 Project documents updates
Conduct Procurements	.1 Procurement management Plan .2 Procurement statement of work .3 Procurement documents .4 Source selection criteria .5 Make-or-buy decisions .6 Seller proposals .7 Project documents .8 Make-or-buy decisions .9 Organizational process assets	.1 Bidder conference .2 Proposal evaluation techniques .3 Independent estimates .4 Expert judgment .5 Advertising .6 Analytical techniques .7 Procurement negotiations	.1 Selected sellers .2 Agreements .3 Resource calendars .4 Change requests .5 Project management plan updates .6 Project documents updates
Control Procurements	.1 Project management plan .2 Procurement documents .3 Agreements .4 Approved change requests .5 Work performance reports .6 Work performance data	.1 Contract change control system .2 Procurement performance reviews .3 Inspections and audits .4 Performance reporting .5 Payment systems .6 Claims administration .7 Records management system	.1 Work performance information .2 Change requests .3 Project management plan updates .4 Project documents updates .5 Organizational process assets updates
Close Procurements	.1 Project management plan .2 Procurement documents	.1 Procurement audits .2 Procurement negotiations .3 Records management system	.1 Closed procurements .2 Organizational process assets updates

1. Plan Procurement Management:

Plan Procurement Management is the process of documenting project procurement decisions, specifying the approach, and identifying potential sellers. The key benefit of this process is that it determines whether to acquire outside support, and if so, what to acquire, how to acquire it, how much is needed, and when to acquire it

Inputs:

1. Project management plan - The project management plan describes the need, justification, requirements, and current boundaries for the project. It includes, but is not limited to, the scope baseline contents. Project Scope Statement, WBS and WBS Dictionary.
2. Requirements documentation
3. Risk register
4. Activity resource requirements
5. Project schedule
6. Activity cost estimates
7. Stakeholder register
8. Enterprise environmental factors
9. **Organizational process assets** – All legal contractual relationships generally fall into one of two broad families: either fixed-price or cost reimbursable.
 - A) **Fixed Price Contracts:** This category of contracts involves setting a fixed total price for a defined product, service, or result to be provided.
 - **Firm Fixed Price Contracts (FFP):** Price for goods is set at the outset and not subject to change unless the scope of work changes. Any cost increase due to adverse performance is the responsibility of the seller, who is obligated to complete the effort.
 - **Fixed Price Incentive Fee Contracts (FPIF):** Performance targets are established at the outset, and the final contract price is determined after completion of all work based on the seller ' s performance. Under FPIF contracts, a price ceiling is set, and all costs above the price ceiling are the responsibility of the seller, who is obligated to complete the work.
 - **Fixed Price with Economic Price Adjustment Contracts (FP-EPA):** It is a fixed-price contract, but with a special provision allowing for pre defined final adjustments to the contract price due to changed conditions, such as inflation changes, or cost increases (or decreases) for specific commodities
 - B) **Cost-reimbursable contracts:** This category of contract involves payments (cost reimbursements) to the seller for all legitimate actual costs incurred for completed work, plus a fee representing seller profit. Cost-reimbursable contracts may also include financial incentive clauses whenever the seller exceeds, or falls below, defined objectives such as costs, schedule, or technical performance targets.
 - **Cost Plus Fixed Fee Contracts (CPFF).** - The seller is reimbursed for all allowable costs for performing the contract work, and receives a fixed-fee payment calculated as a

percentage of the initial estimated project costs. A fee is paid only for completed work and does not change due to seller performance.

- **Cost Plus Incentive Fee Contracts (CPIF).** - In CPIF contracts, if the final costs are less or greater than the original estimated costs, then both the buyer and seller share costs from the departures based upon a prenegotiated cost-sharing formula, for example, an 80/20 split over/under target costs based on the actual performance of the seller.
- **Cost Plus Award Fee Contracts (CPAF).** - The seller is reimbursed for all legitimate costs, but the majority of the fee is earned only based on the satisfaction of certain broad subjective performance criteria defined and incorporated into the contract.

- C) **Time and Material Contracts:** Time and material contracts are a hybrid type of contractual arrangement that contain aspects of both cost-reimbursable and fixed-price contracts. **They are often used for staff augmentation**, acquisition of experts, and any outside support when a precise statement of work cannot be quickly prescribed.

Tools and Techniques:

1. **Make-or-buy analysis** - A make-or-buy analysis is a general management technique used to determine whether particular work can best be accomplished by the project team or should be purchased from outside sources.
2. Expert judgment
3. Market research
4. Meetings

Outputs:

1. Procurement management plan
2. Procurement statement of work -
3. Procurement documents
4. Source selection criteria - Some possible source selection criteria are:
Understanding of need, Overall or Life cycle cost, Technical Capability, Risk, Management Approach, Technical approach, Warranty, Financial capacity, production capacity and interest, Business size and type, past performance of sellers, References, Intellectual property rights, Proprietary rights .
5. Make-or-buy decisions - A make-or-buy analysis results in a decision of whether particular work can best be accomplished by the project team or needs to be purchased from outside sources.
6. Change requests
7. Project documents updates

2. Conduct Procurements:

Conduct Procurements is the process of obtaining seller responses, selecting a seller, and awarding a contract. The key benefit of this process is that it provides alignment of internal and external stakeholder expectations through established agreements.

Inputs:

1. Procurement management plan
2. Procurement documents

3. Source selection criteria
4. Seller proposals
5. Project documents
6. Make-or-buy decisions
7. Procurement statement of work
8. Organizational process assets

Tools and Techniques:

1. **Bidder conference** - Bidder conferences (sometimes called contractor conferences, vendor conferences, and pre-bid conferences) are meetings between the buyer and all prospective sellers prior to submittal of a bid or proposal. They are used to ensure that all prospective sellers have a clear and common understanding of the procurement requirements), and that no bidders receive preferential treatment.
2. Proposal evaluation techniques
3. Independent estimates
4. Expert judgment
5. Advertising
6. Analytical techniques
7. Procurement negotiations

Outputs:

1. Selected sellers
2. Agreements
3. Resource calendars
4. Change requests
5. Project management plan updates
6. Project documents updates

3. Control Procurements:

Control Procurements is the process of managing procurement relationships, monitoring contract performance, and making changes and corrections to contracts as appropriate. The key benefit of this process is that it ensures that both the seller's and buyer's performance meets procurement requirements according to the terms of the legal agreement.

Inputs:

1. Project management plan
2. Procurement documents
3. Agreements
4. Approved change requests
5. Work performance reports
6. Work performance data

Tools and Techniques:

1. Contract change control system
2. Procurement performance reviews
3. Inspections and audits
4. Performance reporting
5. Payment systems
6. Claims administration
7. Records management system

Outputs:

1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates
5. Organizational process assets updates

4. Close Procurements:

Close Procurements is the process of completing each procurement. The key benefit of this process is that it documents agreements and related documentation for future reference.

Inputs:

1. Project management plan
2. Procurement documents

Tools and Techniques:

1. Procurement audits
2. Procurement negotiations
3. Records management system

Outputs:

1. Closed procurements
2. Organizational process assets updates - Elements of the organizational process assets that may be updated include, but are not limited to:
 - a) **Procurement file.**
 - b) **Deliverable acceptance**
 - c) **Lessons learned documentation**

Project – 13 Project Stakeholder Management



	Inputs	Tools & Techniques	Outputs
Identify Stakeholder	.1 Project charter .2 Procurement documents .3 Enterprise environmental factors .4 Organizational process assets	.1 Stakeholder analysis .2 Expert judgment .3 Meetings	.1 Stakeholder register
Plan Stakeholder Management	.1 Project management plan .2 Stakeholder register .3 Enterprise environmental factors .4 Organizational process assets	.1 Expert judgment .2 Meetings .3 Analytical techniques	.1 Stakeholder management plan .2 Project documents updates
Manage Stakeholder Engagement	.1 Stakeholder management plan .2 Communications management plan .3 Change log .4 Organizational process assets	.1 Communication methods .2 Interpersonal skills .3 Management skills	.1 Issue log .2 Change requests .3 Project management plan updates .4 Project documents updates .5 Organizational process assets updates
Control Stakeholder Engagement	.1 Project management plan .2 Issue log .3 Work performance data .4 Project documents	.1 Information management systems .2 Expert judgment .3 Meetings	.1 Work performance information .2 Change requests .3 Project management plan updates .4 Project documents updates .5 Organizational process assets updates

1. Identify Stakeholder:

Identify Stakeholders is the process of identifying the people, groups, or organizations that could impact or be impacted by a decision, activity, or outcome of the project, analyzing and documenting relevant information regarding their interests, involvement, interdependencies, influence, and potential impact

on project success. The key benefit of this process is that it allows the project manager to identify the appropriate focus for each stakeholder or group of stakeholders.

Inputs:

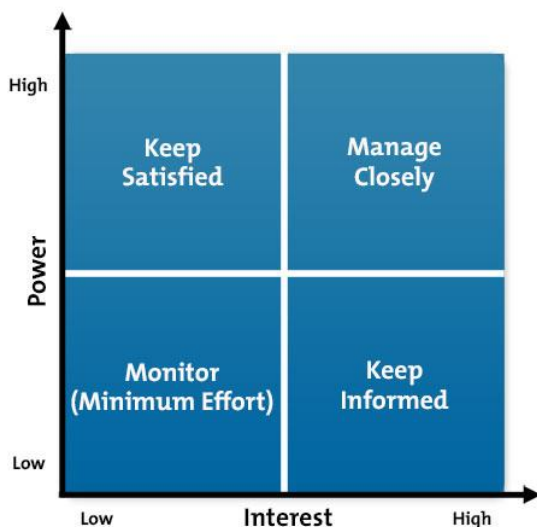
1. Project charter
2. Procurement documents
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Stakeholder analysis - Stakeholder analysis is a technique of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be taken into account throughout the project.

There are multiple classification models used for stakeholders analysis, such as:

- a) **Power/interest grid**, grouping the stakeholders based on their level of authority (“power”) and their level of concern (“interest”) regarding the project outcomes;
- b) **Power/influence grid**, grouping the stakeholders based on their level of authority (“power”) and their active involvement (“influence”) in the project;
- c) **Influence/impact grid**, grouping the stakeholders based on their active involvement (“influence”) in the project and their ability to effect changes to the project’ s planning or execution (“impact”); and
- d) **Salience model**, describing classes of stakeholders based on their power (ability to impose their will), urgency (need for immediate attention), and legitimacy (their involvement is appropriate).



2. Expert judgment
3. Meetings

Outputs:

1. Stakeholder register - The main output of the Identify Stakeholders process is the stakeholder register. Identification Information - Name, organizational position, location, role in the project, contact information; Assessment Information - Major requirements, main expectations, potential influence in the project, phase in the life cycle with the most interest; and Stakeholder Classification - Internal/external, supporter/neutral/resistor, etc.

2. Plan Stakeholder Management:

Plan Stakeholder Management is the process of developing appropriate management strategies to effectively engage stakeholders throughout the project life cycle, based on the analysis of their needs, interests, and potential impact on project success. The key benefit of this process is that it provides a clear, actionable plan to interact with project stakeholders to support the project's interests.

Inputs:

1. Project management plan
2. Stakeholder register
3. Enterprise environmental factors
4. Organizational process assets

Tools and Techniques:

1. Expert judgment
2. Meetings
3. Analytical techniques - current engagement level of all stakeholders needs to be compared to the planned engagement levels required for successful project completion. The engagement level of the stakeholders can be classified as follows:
 - a) **Unaware.** Unaware of project and potential impacts.
 - b) **Resistant.** Aware of project and potential impacts and resistant to change.
 - c) **Neutral.** Aware of project yet neither supportive nor resistant.
 - d) **Supportive.** Aware of project and potential impacts and supportive to change.
 - e) **Leading.** Aware of project and potential impacts and actively engaged in ensuring the project is a success.

In below figure, C indicates the current engagement, and D indicates the desired engagement.

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Stakeholder 1	C			D	
Stakeholder 2			C	D	
Stakeholder 3				D C	

Figure 13-7. Stakeholders Engagement Assessment Matrix

Outputs:

1. Stakeholder management plan
2. Project documents updates – Documents which will be updated 1) Project schedule b) Stakeholder register

3. Manage Stakeholder Engagement:

Manage Stakeholder Engagement is the process of communicating and working with stakeholders to meet their needs/expectations, address issues as they occur, and foster appropriate stakeholder engagement in project activities throughout the project life cycle. The key benefit of this process is that it allows the project manager to increase support and minimize resistance from stakeholders, significantly increasing the chances to achieve project success.

Inputs:

1. Stakeholder management plan
2. Communications management plan – Below communication plan should include below things.
 - a) Stakeholder communications requirements;
 - b) Information to be communicated, including language, format, content, and level of detail;
 - c) Reason for distribution of information;
 - d) Person or groups who will receive information; and
 - e) Escalation process
3. Change log
4. Organizational process assets

Tools and Techniques:

1. Communication methods
2. Interpersonal skills
3. Management skills

Outputs:

1. Issue log
2. Change requests
3. Project management plan updates
4. Project documents updates

5. Organizational process assets updates – below document will be updated as part of Organization process assets. Stakeholder notifications, Project reports, Project Presentations, Project records, Feedback from Stakeholder, Lessons Learned document.

4. Control Stakeholder Engagement:

Control Stakeholder Engagement is the process of monitoring overall project stakeholder relationships and adjusting strategies and plans for engaging stakeholders. The key benefit of this process is that it will maintain or increase the efficiency and effectiveness of stakeholder engagement activities as the project evolves and its environment changes.

Inputs:

1. Project management plan
2. Issue log
3. Work performance data
4. Project documents

Tools and Techniques:

1. Information management systems
2. Expert judgment
3. Meetings

Outputs:

1. Work performance information
2. Change requests
3. Project management plan updates
4. Project documents updates – Stakeholder register updates and Issue log.
5. Organizational process assets updates - The organizational process assets, which may be updated.
 - a) Stakeholder notifications
 - b) Project reports
 - c) Project presentations
 - d) Project records
 - e) Feedback from stakeholders.
 - f) Lessons learned documentation

Chapter – 14 Professional Roles and Responsibility

Topic – Vision and Applicability

Vision and Purpose:

As practitioners of project management, we are committed to doing what is right and honorable. We set high standards for ourselves and we aspire to meet these standards in all aspects of our lives—at work, at home, and in service to our profession.

Persons to Whom the Code Applies

1. All PMI members
2. Individuals who are not members of PMI but meet one or more of the following criteria:
 - a) Non-members who hold a PMI certification
 - b) Non-members who apply to commence a PMI certification process
 - c) Non-members who serve PMI in a volunteer capacity.

Values that Support this Code

The values that the global project management community defined as most important were: responsibility, respect, fairness, and honesty. This Code affirms these four values as its foundation.

Topic – Responsibility

Responsibility:

Responsibility is our duty to take ownership for the decisions we make or fail to make, the actions we take or fail to take, and the consequences that result.

Aspirational Standards:

1. We make decisions and take actions based on the best interests of society, public safety, and the environment.
2. We accept only those assignments that are consistent with our background, experience, skills, and qualifications.
3. We fulfill the commitments that we undertake
4. When we make errors or omissions, we take ownership and make corrections promptly. When we discover errors or omissions caused by others, we communicate them to the appropriate body as soon as they are discovered. We accept accountability for any issues resulting from our errors or omissions and any resulting consequences.
5. We protect proprietary or confidential information that has been entrusted to us.
6. We uphold this Code and hold each other accountable to it.

Mandatory Standards:

1. Regulations and Legal Requirements
 - a) We inform ourselves and uphold the policies, rules, regulations and laws that govern our work, professional, and volunteer activities.

- b) We report unethical or illegal conduct to appropriate management and, if necessary, to those affected by the conduct.

2. Ethics Complaints

- a) We bring violations of this Code to the attention of the appropriate body for resolution.
- b) We only file ethics complaints when they are substantiated by facts.
- c) We pursue disciplinary action against an individual who retaliates against a person raising ethics concerns.

Topic - Respect:

Respect:

Respect is our duty to show a high regard for ourselves, others, and the resources entrusted to us. Resources entrusted to us may include people, money, reputation, the safety of others, and natural or environmental resources.

Aspirational Standards:

- 1. We inform ourselves about the norms and customs of others and avoid engaging in behaviors they might consider disrespectful.
- 2. We listen to others' points of view, seeking to understand them.
- 3. We approach directly those persons with whom we have a conflict or disagreement.
- 4. We conduct ourselves in a professional manner, even when it is not reciprocated.

Mandatory Standards:

- 1. We negotiate in good faith.
- 2. We do not exercise the power of our expertise or position to influence the decisions or actions of others in order to benefit personally at their expense.
- 3. We do not act in an abusive manner toward others.
- 4. We respect the property rights of others

Topic – Fairness:

Fairness:

Fairness is our duty to make decisions and act impartially and objectively. Our conduct must be free from competing self-interest, prejudice, and favoritism.

Aspirational Standards

- 1. We demonstrate transparency in our decision-making process.
- 2. We constantly reexamine our impartiality and objectivity, taking corrective action as appropriate. We provide equal access to information to those who are authorized to have that information.
- 3. We make opportunities equally available to qualified candidates.

Mandatory Standards

Conflict of Interest Situations

1. We proactively and fully disclose any real or potential conflicts of interest to the appropriate stakeholders.
2. When we realize that we have a real or potential conflict of interest, we refrain from engaging in the decision-making process or otherwise attempting to influence outcomes, unless or until: we have made full disclosure to the affected stakeholders; we have an approved mitigation plan; and we have obtained the consent of the stakeholders to proceed.

Comment: A conflict of interest occurs when we are in a position to influence decisions or other outcomes on behalf of one party when such decisions or outcomes could affect one or more other parties with which we have competing loyalties. For example, when we are acting as an employee, we have a duty of loyalty to our employer. When we are acting as a PMI volunteer, we have a duty of loyalty to the Project Management Institute. We must recognize these divergent interests and refrain from influencing decisions when we have a conflict of interest.

Further, even if we believe that we can set aside our divided loyalties and make decisions impartially, we treat the appearance of a conflict of interest as a conflict of interest and follow the provisions described in the Code.

Favoritism and Discrimination

- a) We do not hire or fire, reward or punish, or award or deny contracts based on personal considerations, including but not limited to, favoritism, nepotism, or bribery.
- b) We do not discriminate against others based on, but not limited to, gender, race, age, religion, disability, nationality, or sexual orientation.
- c) We apply the rules of the organization (employer, Project Management Institute, or other group) without favoritism or prejudice.

Ethical Decision-Making Framework:

Assessment Make sure you have all the facts about the ethical dilemma

Alternatives Consider your choices

Analysis Identify your candidate decision and test its validity

Application Apply ethical principles to your candidate decision

Action Make a decision