

SYLLABUS

Course : USCSS501	TOPICS (Credits : 02 Lectures/Week:03) Project Management
Objectives	
<ul style="list-style-type: none">• Understand the fundamental concepts and characteristics of project management, including project selection, initiation, and project governance.• Develop skills in scope management, time management, cost management, quality management, and risk management to effectively plan and control projects.• Acquire knowledge of human resource management techniques, including team development, conflict resolution, and communication management.• Gain insight into agile project management methodologies and tools, enabling the successful management of iterative and incremental development.• Explore advanced topics such as stakeholder management, project leadership, project governance, and the role of technology in project management.	
Learning Outcomes	
<p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none">• Apply project management principles, processes, and best practices to plan, execute, and control projects effectively.• Develop project charters, define project scopes, and create work breakdown structures (WBS) to establish project objectives and deliverables.• Create project schedules, estimate resource requirements, and monitor project progress using appropriate project management techniques.• Employ quality assurance and control measures to ensure project deliverables meet stakeholder expectations and industry standards.• Demonstrate effective leadership and teamwork skills, as well as the ability to manage stakeholders, resolve conflicts, and make ethical decisions in project management settings.	

Course Contents		
Unit	Details	Lectures
I	<p>Introduction to Project Management</p> <p>Introduction to Project Management : Definition and characteristics of a project, Importance of project management, Project management processes and knowledge areas</p> <p>Project Selection, Initiation and scope Management : Project selection criteria and methods, Project initiation and charter development, Stakeholder identification and analysis, Scope planning and definition, Work Breakdown Structure (WBS) development, Scope verification and change control</p> <p>Project Time & Cost Management : Activity definition and sequencing, Estimating activity durations and resources, Developing the project schedule, Schedule control and monitoring, Cost estimation techniques, Budget development and monitoring, Earned Value Management (EVM), Cost control and analysis</p>	15
II	<p>Project Execution and Control</p> <p>Project Quality & Risk Management: Quality planning and standards, Quality assurance and control, Process improvement and Six Sigma concept, Risk Management-Risk identification and assessment, Risk response planning, Risk monitoring and control</p> <p>Project Resource & Procurement Management: Team development and roles, Staffing, training, and motivation, Conflict resolution and communication management, Procurement planning and contract types, Solicitation, source selection, and contract administration, Vendor management and relationship building</p> <p>Project Integration Management: Project integration processes and activities, Change management and project closure, Lessons learned and knowledge transfer</p>	15
III	<p>Advanced Topics in Project Management</p> <p>Agile Project & Management in the Digital Age: Agile principles and methodologies, Agile project planning and execution, Managing iterative and incremental development, Role of technology in project management, Virtual teams and distributed project management, Tools and software for project planning and collaboration</p> <p>Effective People Management in Projects : Leadership styles and characteristics, Team building and motivation techniques, Emotional intelligence in project management, Stakeholder identification and analysis, Stakeholder engagement and communication strategies, Conflict resolution and negotiation skills</p> <p>Project Governance and Ethics : Project governance structures and accountability, Ethical considerations in project management, Professional responsibility and codes of conduct.</p>	15



Chapter 1 : Introduction to Project Management**1-1 to 1-5**

Introduction to Project Management : Definition and characteristics of a project, Importance of project management, Project management processes and knowledge areas.

1.1	Definition of Project Management	1-1
1.2	Characteristics of Project.....	1-1
1.3	Importance of Project Management.....	1-2
1.4	Project Management Processes.....	1-3
1.4.1	Project Management Knowledge Areas.....	1-4

Chapter 2 : Project Selection, Initiation and Scope Management**2-1 to 2-22**

Project Selection, Initiation and scope Management : Project selection criteria and methods, Project initiation and charter development, Stakeholder identification and analysis, Scope planning and definition, Work Breakdown Structure (WBS) development, Scope verification and change control.

2.1	Project Selection	2-1
2.1.1	Steps in Project Selection	2-1
2.1.2	Project Selection Criteria.....	2-2
2.1.3	Project Selection Method	2-2
2.2	Project Initiation and Charter Development	2-3
2.2.1	Project Initiation	2-3
2.2.2	Project Charter.....	2-4
2.3	Stakeholder Identification and Management.....	2-7
2.3.1	Stakeholder Analysis.....	2-10
2.3.2	Project Scope Management.....	2-10
2.4	Scope Planning.....	2-12
2.4.1	Scope Definition	2-13
2.5	Work Breakdown Structure Development.....	2-15
2.5.1	Construction of WBS	2-17
2.5.2	Validate Scope	2-18
2.6	Scope Verification.....	2-19
2.6.1	Control Scope	2-20

Chapter 3 : Project Time and Cost Management**3-1 to 3-25**

Project Time & Cost Management : Activity definition and sequencing, Estimating activity durations and resources, Developing the project schedule, Schedule control and monitoring, Cost estimation techniques, Budget development and monitoring, Earned Value Management (EVM), Cost control and analysis

3.1	Project Schedule Management	3-1
3.1.1	Plan Schedule Management.....	3-2
3.1.2	Define Activities	3-3
3.1.3	Sequencing Activities.....	3-4

Project Management	2	Table of Contents
3.1.4 Estimate Activity Durations.....	3-6	
3.1.5 Estimate Activity Resources.....	3-8	
3.2 Develop Schedule	3-10	
3.2.1 Control Schedule.....	3-13	
3.3 Project Cost Management.....	3-15	
3.3.1 Plan Cost Management.....	3-17	
3.3.2 Estimate Cost.....	3-18	
3.3.3 Determine Budget	3-20	
3.3.4 Control Cost.....	3-21	
3.4 Earned Value Management	3-23	

Chapter 4 : Project Quality and Risk Management	4-1 to 4-15
--	--------------------

Project Quality & Risk Management : Quality planning and standards, Quality assurance and control, Process improvement and Six Sigma concept, Risk Management-Risk identification and assessment, Risk response planning, Risk monitoring and control

4.1 Project Quality Management.....	4-1
4.1.1 Quality Planning.....	4-2
4.1.2 Quality Assurance.....	4-4
4.1.3 Quality Control.....	4-5
4.2 Process Improvement.....	4-7
4.2.1 Six Sigma Concept.....	4-8
4.3 Project Risk Management	4-9
4.3.1 Risk Identification.....	4-9
4.3.2 Risk Assessment.....	4-10
4.3.3 Risk Response Planning.....	4-12
4.4 Risk Monitoring.....	4-13
4.4.1 Risk Control.....	4-14

Chapter 5 : Project Resource and Procurement Management	5-1 to 5-20
--	--------------------

Project Resource & Procurement Management : Team development and roles, Staffing, training, and motivation, Conflict resolution and communication management, Procurement planning and contract types, Solicitation, source selection, and contract administration, Vendor management and relationship building.

Project Integration Management : Project integration processes and activities, Change management & project closure, Lessons learned and knowledge transfer

5.1 Project Resource Management.....	5-1
5.1.1 Develop Team.....	5-1
5.1.2 Roles	5-2
5.2 Staffing	5-4
5.2.1 Training.....	5-5
5.2.2 Motivation.....	5-5
5.3 Conflict Resolution.....	5-6
5.4 Communication Management.....	5-8

Project Management	3	Table of Contents
5.5 Project Procurement Management.....	5-8	
5.5.1 Procurement Planning.....	5-8	
5.5.2 Contract	5-9	
5.5.3 Solicitation.....	5-10	
5.5.4 Source Selection	5-11	
5.5.5 Contract Administration.....	5-11	
5.6 Vendor Management.....	5-12	
5.6.1 Benefits of Effective Vendor Management.....	5-13	
5.6.2 Relationship Building	5-13	
5.7 Project Integration Management.....	5-14	
5.7.1 Project Integration Process and Activities	5-14	
5.7.2 Change Management.....	5-16	
5.7.3 Project Closure.....	5-17	
5.7.4 Lessons Learned and Knowledge Transfer	5-18	
5.7.5 Knowledge Transfer	5-19	

Chapter 6 : Advanced Topics in Project Management	6-1 to 6-24
--	--------------------

Agile Project & Management in the Digital Age : Agile principles and methodologies, Agile project planning and execution, Managing iterative and incremental development, Role of technology in project management, Virtual teams and distributed project management, Tools and software for project planning and collaboration.

6.1 Agile Project & Management in the Digital Age.....	6-1	
6.1.1 The history of Agile Methodology	6-1	
6.1.2 Agile Methodology	6-3	
6.2 Project Execution.....	6-8	
6.2.1 Defining the Product Vision	6-8	
6.3 Managing Iterative and Incremental Development.....	6-15	
6.4 Role of Technology in Project Management	6-16	
6.5 Virtual Teams and Distributed Project Management	6-17	
6.5.1 Relevance to Agile Principles	6-17	
6.6 Tools and Software for Project Planning and Collaboration	6-18	
6.6.1 Industries that can Benefit from Agile Project Management Techniques	6-18	
6.6.2 Features to : Look for in Agile Project Management Tools.....	6-21	

Chapter 7 : Effective People Management in Projects	7-1 to 7-26
--	--------------------

Effective People Management in Projects : Leadership styles and characteristics, Team building and motivation techniques, Emotional intelligence in project management, Stakeholder identification and analysis, Stakeholder engagement and communication strategies, Conflict resolution and negotiation skills

7.1 Leadership in Project Management.....	7-1	
7.1.1 Leadership Style.....	7-1	
7.1.2 Participative Management.....	7-3	
7.1.3 Teams in Project Management	7-4	

Project Management	4	Table of Contents
7.1.4	High-Performing Teams	7-5
7.1.5	Effective Project Teams	7-7
7.2	The Team Building Approach	7-7
7.2.1	Aspects of Team Building Efforts	7-8
7.2.2	Improving Ongoing Work Teams	7-8
7.2.3	Building New Teams	7-9
7.3	Conflict Resolution and Negotiation Skills	7-13
7.3.1	The Project Life Cycle	7-15
7.3.2	Managing Conflict.....	7-16
7.3.3	Intergroup Conflict Resolution.....	7-19
7.4	Emotional Intelligence in Project Management.....	7-19
7.4.1	Stress in Projects.....	7-20
7.4.2	Stress Management.....	7-21
7.5	Stakeholder Identification and Analysis	7-22
7.6	Stakeholder Engagement.....	7-23
7.7	Communication Strategies	7-25
Chapter 8 : Project Governance and Ethics		8-1 to 8-12
Effective People Management in Projects : Project governance structures and accountability, Ethical considerations in project management, Professional responsibility and codes of conduct		
8.1	Project Governance and Ethics.....	8-1
8.1.1	Accountability	8-1
8.1.2	Programmes Versus Projects	8-3
8.2	The Principles of Effective Project Governance	8-4
8.3	Professional Responsibility.....	8-8
8.3.1	Description of Responsibility	8-8
8.3.2	Regulations and Legal Requirements	8-9
8.4	Codes of Conduct	8-9
8.4.1	RESPECT.....	8-9
8.4.2	FAIRNESS.....	8-10
8.4.3	HONESTY.....	8-11

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1

Introduction to Project Management

Syllabus

Introduction to Project Management : Definition and characteristics of a project, Importance of project management, Project management processes and knowledge areas.

1.1 Definition of Project Management

Project management is the systematic and structured approach to planning, organizing, and controlling a temporary endeavour with a well-defined purpose and specific end-items, deliverables, or results. It involves managing the unique and time-limited nature of projects, collaborating across different functions and organizations, addressing unfamiliarity and risks, and prioritizing stakeholder interests. Project management employs a phased approach, guiding the project through distinct stages in the project life cycle, to ensure effective management, coordination, and successful delivery of the project's objectives within specified constraints.

1.2 Characteristics of Project

Characteristics of Project Management are as follows:

- **Independent Project Organization :** Project management involves a distinct project organization, headed by a project manager, which operates independently of the normal chain of command. This structure reflects the temporary and cross-functional nature of the project.
- **Central Role of Project Manager :** The project manager plays a central role in the project by bringing together efforts from different functional areas or external contractors to achieve project objectives.
- **Utilization of Diverse Skills and Resources :** Projects require a variety of skills and resources, which may be sourced from different functional areas or external contractors.
- **Integration of Resources :** The project manager is responsible for integrating people from various functional areas or contractors to work harmoniously towards project goals.
- **Negotiation with Functional Managers :** The project manager directly negotiates with functional managers, who are responsible for individual work tasks and personnel involved in the project.
- **Conflict Resolution between Project and Functional Managers :** Conflict may arise between project and functional managers, as the project manager aims to meet specific project objectives within a defined time and cost, while functional managers must balance on-going resource allocation for organizational goals.

- **Dual Chains of Command :** Projects may have two chains of command : one functional and one project-oriented. People in the project report to project manager and functional manager, sharing decision-making, accountability, outcomes, and rewards.
- **Temporary Nature of Project Organization :** The project organization is temporary, formed for the duration of the project. After project completion, the organization is disbanded, and individuals return to their permanent functional or subcontracting units.
- **Impact on Supporting Functions :** Project management initiates work in various supporting functions, such as HR, accounting, procurement, and IT, which are essential for successful project execution.

1.3 Importance of Project Management

Project management is of paramount importance in modern day endeavours due to the following reasons:

- **Complexity and Diverse Skills :** Contemporary projects often involve great technical complexity and require diverse skills. Effective project management ensures the coordination of these skills and resources, leading to successful outcomes.
- **Constrained Resources and Time :** Managers face the challenge of assembling and directing large temporary organizations while dealing with limited resources and tight time schedules. Project management helps optimize resource allocation and ensures timely completion.
- **Environmental Uncertainty :** Projects are often undertaken in dynamic and uncertain environments. Project management practices provide adaptability and flexibility to cope with uncertainties, reducing risks and enhancing project success.
- **Technical Advancements :** Projects today explore cutting-edge technologies and scientific frontiers. Project management facilitates systematic research and development, ensuring technical performance requirements is met without compromising quality.
- **Strategic Importance :** Projects like the Manhattan Project and Pathfinder Mission exemplify the strategic significance of project management. It enables organizations to achieve critical goals, such as national security or space exploration, while upholding stringent requirements.
- **Business Competitiveness :** In the corporate world, project management is essential for product development, process improvement, and adaptation to changing market demands. It ensures that innovative ideas are efficiently brought to market, boosting a company's competitive edge.
- **Systematic Development Process :** Project management provides a structured approach to bring concepts into reality. By guiding the project through distinct phases, it ensures that each step is well-planned, executed, and controlled, increasing the likelihood of project success. Projects like the Manhattan Project and the Pathfinder Mission have demonstrated the necessity of precise planning, co-ordination, and adherence to requirements to achieve unprecedented goals successfully.
- **Change Management :** Many projects, like implementing new employee benefit plans or developing websites, are initiated to drive organizational change. Project management aids in smoothly transitioning from existing practices to new ways of doing things.
- **Widespread Application :** Initially limited to specific industries, project management has now become applicable to various sectors. Its versatility makes it valuable in any project-type activity, regardless of size or technology.

- **Enhanced Efficiency and Success :** Ultimately, project management streamlines activities, improves efficiency, and increases the likelihood of project success. It provides a framework to overcome challenges and deliver desired outcomes within the set constraints.

1.4 Project Management Processes

- Project management processes are essential activities that drive the project life cycle. They involve utilizing project management tools and techniques to transform inputs into one or more outputs, which can be deliverables or outcomes.
- Outcomes represent the ultimate results of each process. These processes have a universal applicability across industries, providing a standardized approach to project management.
- They are interconnected and linked logically through the outputs they generate. As one process produces outputs, they can serve as inputs for other processes, ensuring seamless integration and information flow throughout the project.

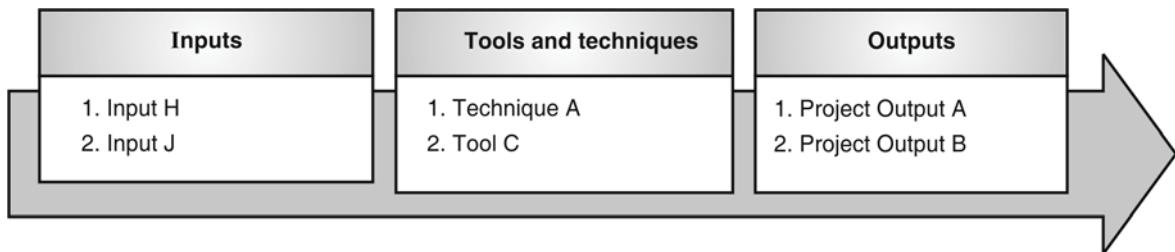


Fig. 1.4.1 : Project Management Process Overview

- Above figure illustrates the relationship between inputs, tools and techniques, and outputs within a process, as well as how they relate to other processes. The interactions and iterations between processes vary based on the project's needs.
- Project management processes fall into three categories:
 - **Processes used once or at Predefined Points :** Examples include Develop Project Charter and Close Project or Phase.
 - **Periodically Performed Processes :** These are executed as needed, like Acquire Resources, performed when resources are required, and Conduct Procurements, performed before the need for procured items arises.
 - **Continuous Processes :** Certain processes are continuously carried out throughout the project.
For instance, Define Activities can occur repeatedly throughout the project life cycle, especially with rolling wave planning or adaptive development approaches. Monitoring and control processes are on-going from the project's start until its closure.
- By effectively managing these project management processes, project managers can ensure the successful execution, monitoring, and control of projects, adapting them to specific project requirements while maintaining consistency and alignment with industry best practices.
- Project management involves effectively applying and integrating logically grouped project management processes. These processes are organized into five distinct categories called Process Groups. Each Process Group serves specific project objectives and is independent of project phases.

- Here are the five Project Management Process Groups :
 1. **Initiating Process Group** : This group includes processes that define a new project or a new phase of an existing project by obtaining authorization to begin the work.
 2. **Planning Process Group** : Processes in this group establish the project scope, refine objectives, and define the necessary course of action to achieve the project's intended goals.
 3. **Executing Process Group** : Processes in this group focus on completing the work outlined in the project management plan to meet project requirements.
 4. **Monitoring and Controlling Process Group** : This group involves processes that monitor, review, and regulate the project's progress and performance, identifying areas where plan adjustments are needed and initiating corresponding changes.
 5. **Closing Process Group** : Processes in this group are performed to formally complete and close the project, phase, or contract.
- By organizing project management processes into these Process Groups, project managers can effectively manage projects, ensuring a systematic and cohesive approach to achieving project objectives throughout the project life cycle.

1.4.1 Project Management Knowledge Areas

- Project management processes are further categorized into Knowledge Areas, which represent specific areas of expertise and knowledge required for project management. Each Knowledge Area is defined based on its unique set of processes, practices, inputs, outputs, tools, and techniques. Although these Knowledge Areas are interconnected, they are distinct from a project management perspective.
- The guide identifies ten essential knowledge Areas used in most projects:
 - **Project Integration Management** : Involves identifying, defining, combining, unifying, and coordinating processes and project management activities across all Process Groups.
 - **Project Scope Management** : Encompasses processes to ensure that the project includes all necessary work and only the necessary work to successfully complete the project.
 - **Project Schedule Management** : Covers processes needed to manage and control the project's timely completion.
 - **Project Cost Management** : Focuses on planning, estimating, budgeting, managing, and controlling costs to complete the project within the approved budget.
 - **Project Quality Management** : Addresses processes related to planning, managing, and controlling project and product quality to meet stakeholders' expectations.
 - **Project Resource Management** : Involves processes to identify, acquire, and manage resources essential for project success.
 - **Project Communications Management** : Encompasses processes necessary for effective planning, collection, distribution, and management of project information.
 - **Project Risk Management** : Includes processes for risk planning, identification, analysis, response planning, response implementation, and risk monitoring on a project.

- **Project Procurement Management :** Encompasses processes to acquire products, services, or results from outside the project team.
- **Project Stakeholder Management :** Addresses processes to identify stakeholders, analyze their expectations, and develop strategies for effectively engaging them in project decisions and execution.
- While these ten Knowledge Areas are commonly used in projects, specific projects may require additional Knowledge Areas tailored to their unique needs. For example, construction projects may involve financial management or safety and health management.

Review Questions

- Q. 1** Define Project Management.
- Q. 2** Explain characteristics of a project.
- Q. 3** Explain different project management processes.
- Q. 4** Write short note on knowledge areas.
- Q. 5** Give importance of project management.



Note

2

Project Selection, Initiation and Scope Management

Syllabus

Project Selection, Initiation and scope Management : Project selection criteria and methods, Project initiation and charter development, Stakeholder identification and analysis, Scope planning and definition, Work Breakdown Structure (WBS) development, Scope verification and change control.

2.1 Project Selection

Project selection involves a systematic evaluation of proposed projects or project groups, followed by the decision to implement a specific set of them, aligning with the parent organization's objectives. This structured process can be adapted and applied to any aspect of the organization's operations, where decisions need to be made between competing alternatives. The goal is to ensure that the chosen projects contribute to the overall success and achievement of the organization's strategic goals.

2.1.1 Steps in Project Selection

Following are the steps in Project Selection :

- **Identify Potential Projects :** The journey begins with identifying potential projects that align closely with the organization's goals and objectives.
- **Evaluate Projects :** Thoroughly assess the feasibility, potential benefits, risks, available resources, stakeholder management, and compliance with regulations for each potential project.
- **Project Prioritization :** Prioritize the evaluated projects based on their significance to the organization and their potential impact on achieving organizational goals.
- **Choose Projects :** Select projects that not only hold the greatest potential to add value to the organization but also align seamlessly with its overarching goals and objectives.
- **Create a Business Case :** Construct a compelling business case outlining the projected benefits, costs, risks, and estimated timeline for the selected projects.
- **Obtain Approval :** Seek approval from senior management or the designated project sponsor for the chosen projects to move forward with their execution.

2.1.2 Project Selection Criteria

While selecting a project, the following project selection criteria should be kept in mind.

- **Realism** : The model should accurately represent how the firm makes decisions, considering the various goals of both the company and its managers. Without a common measurement system, it's hard to directly compare different projects. The model should also consider the firm's limitations, such as available resources, funds, and personnel. It should include factors that account for project risks like performance, cost, time, customer acceptance, and implementation challenges.
- **Capability** : The model should be advanced enough to handle important factors such as multiple time periods and both internal and external project situations (e.g., strikes, changes in interest rates, etc.).
- **Flexibility** : The model should give valid results within the range of conditions that the firm might experience. It should be easy to modify in response to changes in the firm's environment.
For example : Tax law changes, new technological advancements that alter risk levels, and above all, organizational goal changes.
- **Ease of use** : The model should be reasonably convenient, not take a long time to execute, and be easy to use and understand. It should not require special interpretation, data that are difficult to acquire, excessive personnel, or unavailable equipment.
- **Cost** : Data gathering and modelling costs should be low relative to the cost of the project and less than the potential benefits of the project. All costs should be considered, including the costs of data management and of running the model.
- **Easy Computerization** : It should be easy and convenient to gather and store the information in a computer database, and to manipulate data in the model through use of a widely available, standard computer package such as Excel.

2.1.3 Project Selection Method

Modern business organizations utilize various project selection methods, each characterized by its unique features. Consequently, different organizations may find certain selection methods more suitable for their needs. Despite the distinctions among these project selection methods, they often share common underlying concepts and principles.

Project selection techniques can be classified into two categories :

1. Benefit Measurement Methods
2. Constraints Optimization Methods.

These methods serve the purpose of helping organizations select projects that yield maximum profit and align with their business objectives.

1. Benefit Measurement Methods

Benefit measurement methods are widely used project selection techniques that involve evaluating the present value of estimated cash inflows and outflows. By comparing the costs and benefits of potential projects, organizations can make informed decisions.

Some examples of benefit measurement methods include:

- **Benefit/Cost Ratio (BCR)** : Calculates the ratio between the present value of project inflow (cost invested) and outflow (return value). Projects with higher BCRs are preferred.
- **Economic Value Added (EVA)** : Measures the value created for the organization by considering net profit after taxes and capital expenditures. Projects with higher EVA are prioritized.
- **Scoring Model** : Involves assigning scores based on criteria and their importance. The project with the highest overall score is selected.
- **Payback Period** : Determines the time required to recover the project's initial investment. Projects with shorter payback periods are favored.
- **Net Present Value (NPV)** : Compares the current value of cash inflows and outflows. Positive NPV projects are preferable.
- **Internal Rate of Return (IRR)** : Identifies the interest rate at which NPV becomes zero. Projects with higher IRRs are favoured.
- **Opportunity Cost** : Evaluates what is lost by selecting one project over another. Projects with lower opportunity costs are preferred.

2. Constraints Optimization Methods

Constraints optimization methods, also known as mathematical selection models, are used in project management for handling large projects with intricate calculations. These methods aim to find the best solutions that satisfy specific constraints while optimizing project outcomes.

Some examples of constraints optimization methods are:

- **Linear Programming** : This method is used when the project involves linear relationships between variables. It helps in optimizing resource allocation and minimizing costs under given constraints.
- **Non-linear Programming** : When the project involves non-linear relationships between variables, this method is applied to find the optimal solution that maximizes or minimizes a specific objective.
- **Integer Programming** : In projects where certain variables must take integer values (whole numbers), this method is utilized to find the best feasible solution.
- **Dynamic Programming** : This method is suitable for projects with sequential decision making, where the optimal solution depends on decisions made at different stages.

By utilizing these project selection techniques, organizations can effectively identify and prioritize projects that align with their goals, ensuring successful outcomes and efficient resource allocation.

2.2 Project Initiation and Charter Development

2.2.1 Project Initiation

- The project initiation stage marks the beginning of the project management life cycle and comes before the actual project execution starts. Its primary objective is to reduce uncertainty to an acceptable level so that a decision can be made on whether to approve the project or not.

During this stage, two types of risks are considered:

1. **Business Risk :** Assessing whether the project will indeed create the intended value. This risk pertains to product development and must be evaluated and minimized during initiation.
 2. **Project Risk :** Ensuring that the project can deliver the expected outcome within the allocated budget and timeline. Managing this risk is a crucial aspect of project management, and the initiation stage provides a preliminary estimation of project feasibility based on varying levels of accuracy in estimates.
- The level of uncertainty reduction required during initiation depends on the trade-off between the necessary certainty for project approval and the time and resources spent in this stage. The initiation stage aligns closely with the Ideation and Design stage of product development, where the more uncertainty needs removal, the more detailed the design becomes, and more effort is devoted to project initiation.
 - However, excessive time spent on this stage can lead to a low project risk but a high business risk, as customer needs may have changed significantly by the time the project commences. The project initiation stage involves analysing the problem or opportunity, developing a project proposal, conducting stakeholder analysis, defining project rules, and evaluating the project proposal.
 - The start of this stage may be clear and urgent when addressing a specific problem. In contrast, in other cases, the idea for the project gradually takes shape in the minds of a few individuals before transitioning into a more formal and structured initiation stage.
 - Overall, the project initiation stage sets the foundation for successful project execution by carefully assessing risks, aligning with business goals, and establishing the project's framework for subsequent stages.

2.2.2 Project Charter

A Project Charter is a comprehensive document that outlines the objectives and detailed goals of a project, as well as the roles and responsibilities of team members and stakeholders. It serves as a guiding principle for future projects and plays a crucial role in the organization's knowledge management system. The Project Charter is a concise document, typically generated for a new offering request or a request for proposal. It is an essential component of the project management process, required by Initiative for Policy Dialogue (IPD) and Customer Relationship Management (CRM).

1. Roles of a Project Charter

- Documenting the reasons for undertaking the project.
- Defining the project's objectives and constraints.
- Providing solutions to address the identified problem or opportunity.
- Identifying the key stakeholders involved in the project.

2. Benefits of Project Charter

- Enhancing customer relationships and satisfaction.
- Improving project management processes and efficiency.
- Enhancing communication between regional and headquarters teams.
- Securing project sponsorship.

- Recognizing senior management roles.
- Facilitating progress towards industry best practices.

3. Essential Elements of a Project Charter

To be effective, a project charter should address the following key elements :

- Project identification and title.
- Project timeline, including start date and deadline.
- Key team members and stakeholders involved.
- Clear objectives and targets set for the project.
- Business case, explaining the reason for the project.
- Detailed description of the problem or opportunity being addressed.
- Expected return on investment from the project.
- Project performance expectations and outcomes.
- Planned date for achieving the project objectives.
- Well-defined roles and responsibilities of participants.
- Resource requirements for achieving the objectives.
- Identification of barriers and project risks.
- Effective communication plan to ensure informed stakeholders.

By addressing these elements, a well-structured and comprehensive project charter can significantly contribute to the success of the project and streamline project management processes.

4. Project Charter Development

- Develop Project Charter is the process of creating a document that officially approves the project's existence and empowers the project manager to utilize organizational resources for project tasks.
- The primary advantages of this process include establishing a direct connection between the project and the organization's strategic goals, generating a formal record of the project, and demonstrating the organization's dedication to the project's success.

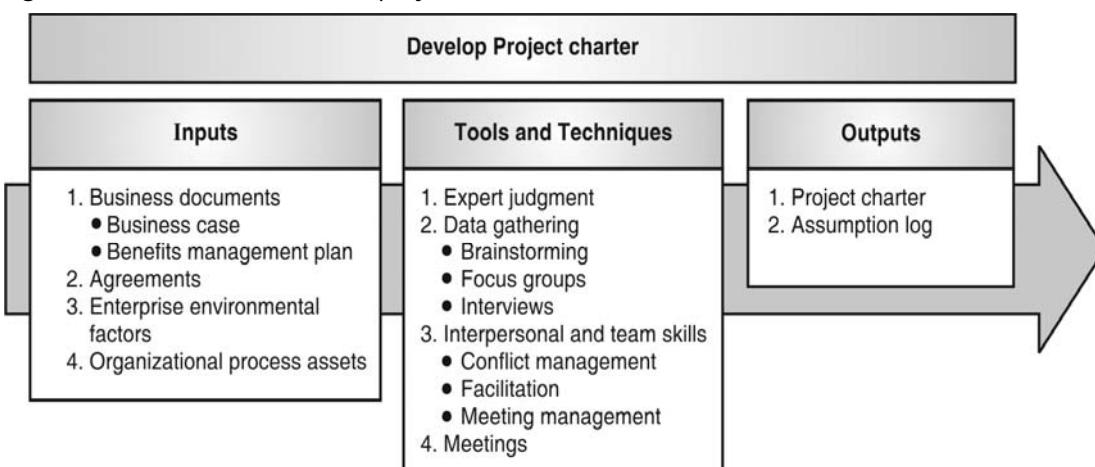


Fig. 2.2.1 : Develop Project Charter

The above diagram shows the inputs, tools and techniques, and outputs of the develop project charter.

i) Inputs

- **Business Documents** : The business case and benefits management plan act as valuable sources of information regarding the project's objectives and its alignment with the organization's business goals. The business case justifies the required investment by presenting necessary business-related details, aiding decision-making by managers and executives. It considers factors like market demand, organizational needs, customer requests, technological advancements, legal requirements, ecological impacts, and social needs.
- **Agreements** : Agreements, such as contracts, memorandums of understanding (MOUs), or service level agreements (SLAs), play a crucial role in defining the initial intentions of the project. Contracts are commonly used for projects involving external customers.
- **Enterprise Environmental Factors** : Various factors in the enterprise environment significantly influence the development of the project charter. These factors encompass government or industry standards, legal and regulatory requirements, marketplace conditions, organizational culture, governance framework, and stakeholder expectations.
- **Organizational Process Assets** : Organizational process assets also contribute significantly to the development of the project charter. These assets consist of standard policies, processes, and procedures used by the organization. The governance framework at the portfolio, program, and project levels provides guidance and direction for decision-making. Additionally, monitoring and reporting methods, templates, and historical information and lessons learned from previous projects offer valuable insights and resources for the process.
- These inputs collectively provide the necessary information and framework for creating a robust project charter that aligns the project with the organization's strategic goals, ensures proper justification for investment, and establishes a strong foundation for successful project execution.

ii) Tools and Techniques

- **Expert Judgment** : Expert judgment is the input of specialized expertise in relevant areas like organizational strategy, benefits management, technical knowledge of the industry, duration and budget estimation, and risk identification. Experts provide valuable insights and knowledge to guide the project charter development process.
- **Data Gathering** : Data gathering techniques, such as brainstorming, focus groups, and interviews, are employed to collect essential information and solutions from stakeholders, subject matter experts, and team members during the project charter development.
- **Interpersonal and Team Skills** : Interpersonal and team skills, including conflict management, facilitation, and meeting management, help align stakeholders on project objectives, success criteria, high-level requirements, and other crucial elements of the charter.
- The tools and techniques utilized in the process, such as expert judgment, data gathering through brainstorming, focus groups, and interviews, and the application of interpersonal and team skills, play a vital role in guiding the project charter development.

iii) Output

- **Project Charter :** The project charter is an official document issued by the project initiator or sponsor, granting the project's existence and empowering the project manager to use organizational resources for project activities. It contains essential high-level information about the project and the intended product, service, or result.
- **Assumption Log :** The assumption log captures high-level strategic and operational assumptions and constraints identified in the business case before project initiation. Throughout the project, lower-level assumptions related to technical specifications, estimates, schedule, risks, and other factors are generated. The assumption log serves as a record of all assumptions and constraints throughout the project life cycle.
- The output of the process comprises the official project charter, authorized by the project initiator or sponsor. This document empowers the project manager with the authority to use organizational resources for project activities.

2.3 Stakeholder Identification and Management

- Identify Stakeholders is a continuous process in which project stakeholders are regularly identified and their interests, involvement, influence, interdependencies, and potential impact on project success are analysed and documented. The main advantage of this process is that it helps the project team determine the best approach to engage with each stakeholder or stakeholder group effectively. This process is conducted at various intervals throughout the project as required.

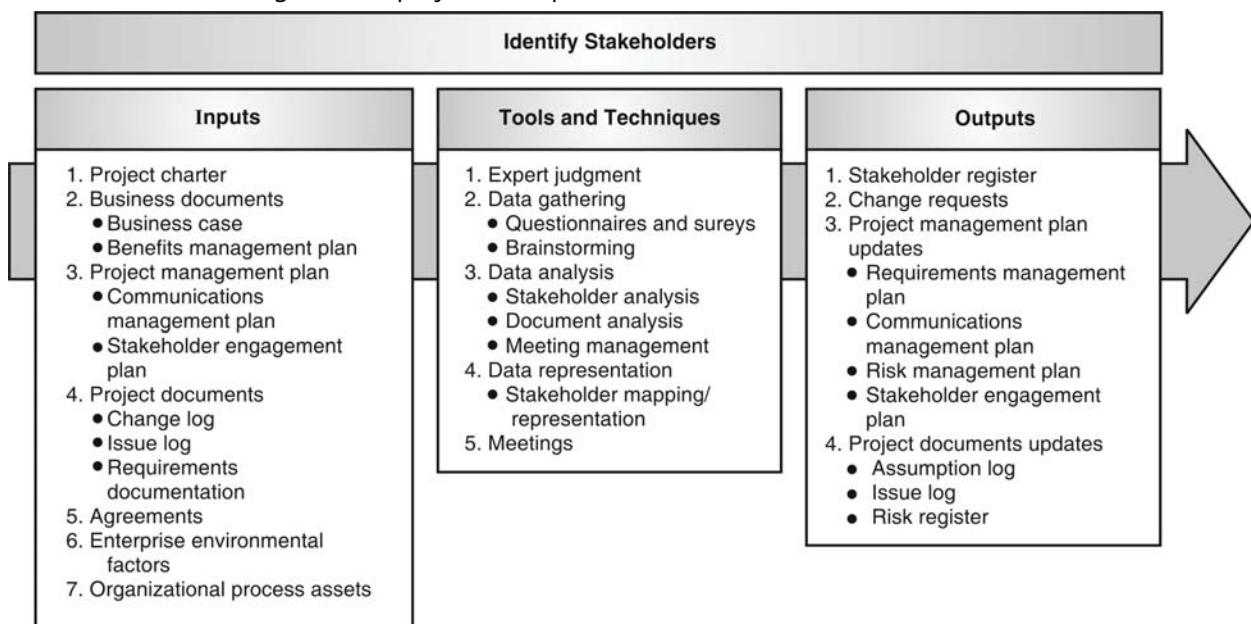


Fig. 2.3.1 : Identify Stakeholders: Inputs, Tools & Techniques, and Outputs

- This process is typically first conducted either before or at the same time as the project charter is developed and approved. It is a recurring activity and should be performed at the beginning of each project phase and whenever a significant change occurs in the project or the organization. During each iteration of the identification process, the project management plan components and project documents should be referred to in order to identify the relevant project stakeholders.

i) Inputs

- 1) **Project charter** : The project charter identifies the key stakeholder list. It may also contain information about the responsibilities of the stakeholders.
- 2) **Business documents** : In the first iteration of the Identify Stakeholders process, the business case and the benefits management plan are sources of information about the project's stakeholders.
 - o **Business case** : The business case identifies the project objectives and identifies an initial list of stakeholders affected by the project.
 - o **Benefits management plan** : The benefits management plan describes the expected plan for realizing the benefits claimed in the business case. It may identify the individuals and groups that will benefit from the delivery of the outcomes of the project and are thus considered as stakeholders
- 3) **Project Management Plan** : The project management plan is not available when initially identifying stakeholders; however, once it has been developed, project management plan components include but are not limited to.
 - o **Communications management plan** : Communications and stakeholder engagement are strongly linked. Information included in the communications management plan is a source of knowledge about the project's stakeholders.
 - o **Stakeholder engagement plan** : The stakeholder engagement plan identifies the management strategies and actions required to effectively engage stakeholders.
- 4) **Project Document** : It is unlikely that any project documents will be an input for the initial stakeholder identification. However, stakeholder identification occurs throughout the project. Once the project is past the start-up phase, more documents become available and are used throughout the project.

Project documents that can be considered as inputs for this process include but are not limited to:

- o **Change log** : The change log may introduce a new stakeholder or change the nature of an existing stakeholder's relationship to the project.
 - o **Issue log** : The issue log records issues that may introduce new stakeholders to the project or change the type of participation of existing stakeholders.
 - o **Requirements documentation** : Requirements can provide information on potential stakeholders.
- 5) **Agreement** : The parties of an agreement are project stakeholders. The agreement can contain references to additional stakeholders.
 - 6) **Enterprise environmental factors** : The enterprise environmental factors that can influence the Identify Stakeholders process include but are not limited to :
 - o Organizational culture, political climate, and governance framework
 - o Government or industry standards (regulations, product standards, and codes of conduct)
 - o Global, regional, or local trends and practices or habits
 - o Geographic distribution of facilities and resources.

- 7) **Organizational process assets** : The organizational process assets that can influence the Identify Stakeholders process include but are not limited to:

- o Stakeholder registers templates and instructions
- o Stakeholder registers from previous projects
- o Lessons learned repository with information about the preferences, actions, and involvement of stakeholders.

Overall, these inputs work in synergy to help project managers comprehensively identify stakeholders, understand their roles, and develop effective engagement strategies to ensure project success.

ii) Tools and Techniques

- **Expert judgment** : Expertise from individuals or groups with specialized knowledge in areas such as organizational strategy, environmental knowledge, industry expertise, and team member contributions is considered to identify stakeholders.
- **Data gathering** : Techniques like questionnaires, surveys, brainstorming, and document analysis are used to collect information from stakeholders and subject matter experts.
- **Data analysis** : Data analysis techniques like stakeholder analysis and document analysis help create a list of stakeholders with their positions, roles, expectations, and interest in the project.
- **Data representation** : Stakeholder mapping methods like power/interest grid, salience model, and directions of influence are used to categorize stakeholders for effective engagement.
- **Meetings** : Meetings, including workshops and group discussions, are held to develop an understanding of significant project stakeholders.
- By utilizing these tools and techniques in a well-coordinated manner, project managers can identify and engage with stakeholders proactively. This enhances stakeholder support and involvement throughout the project lifecycle, ultimately contributing to the project's success and the achievement of its objectives.

iii) Outputs

- **Stakeholder register** : The stakeholder register contains information about identified stakeholders, including their names, positions, contact details, roles on the project, and assessment information like requirements and potential influence.
- **Change requests** : As stakeholder identification continues, new stakeholders or additional information about stakeholders may lead to change requests in the project documents or management plan.
- **Project management plan updates** : Updates to the project management plan may be required in areas like requirements management, communications management, risk management, and stakeholder engagement due to newly identified stakeholders.
- **Project documents updates** : Project documents like the assumption log, issue log, and risk register may be updated with new information from the stakeholder identification process.

- Overall, the outputs of the Identify Stakeholders process enable project managers to maintain a clear understanding of the project's stakeholder landscape and foster positive relationships with stakeholders. By continuously updating project documents and management plans based on stakeholder information, project managers can adapt to changing circumstances and ensure that the project remains aligned with stakeholder needs and expectations throughout its lifecycle. Effective stakeholder identification and management contribute significantly to project success and the achievement of desired project outcomes.

2.3.1 Stakeholder Analysis

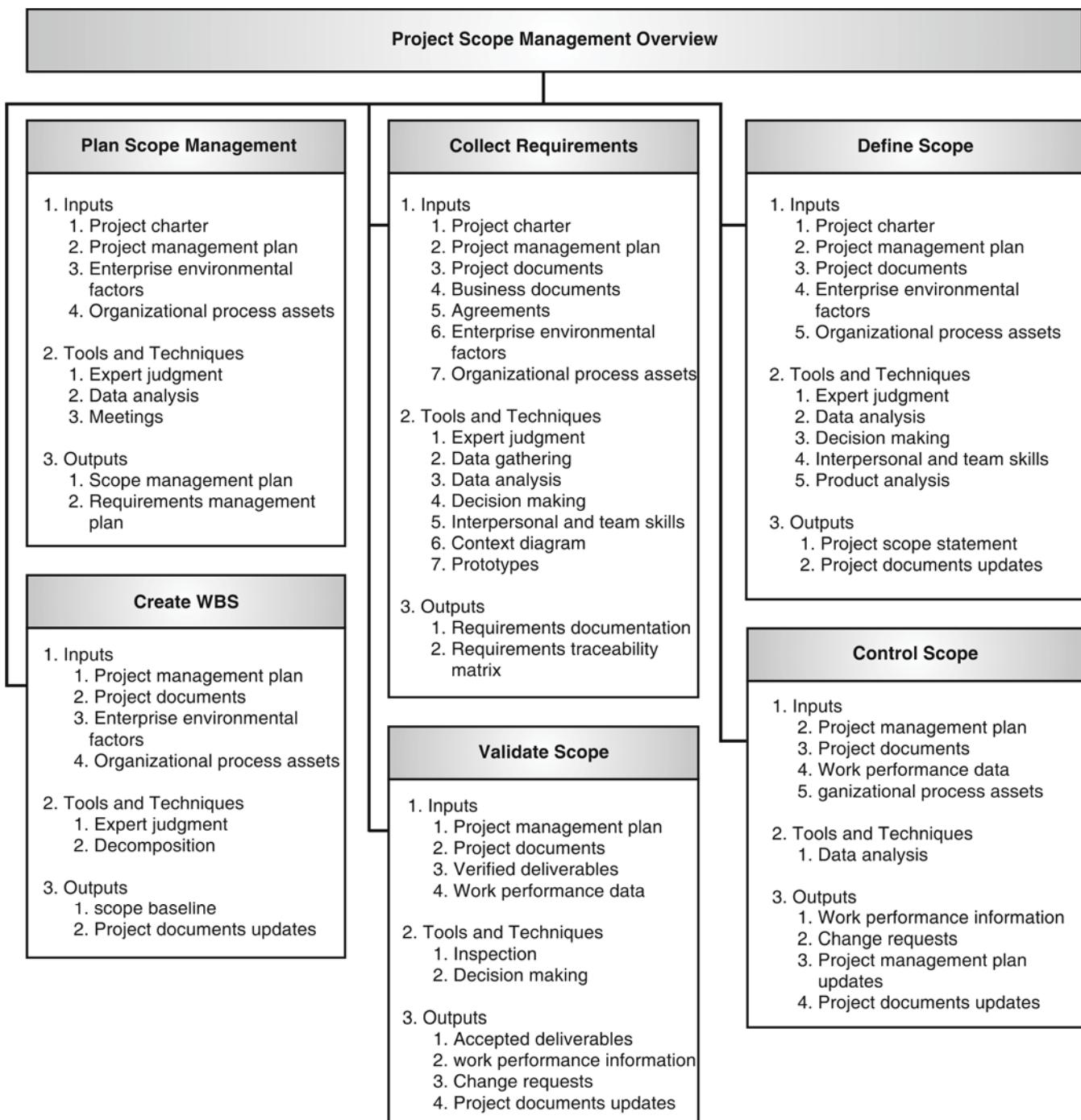
- Stakeholder analysis is the process of collecting information about any person that will be impacted by (or can impact) your project. Conducting a stakeholder analysis will enable you to identify all your stakeholders as well as their needs and expectations.

Here is a step-by-step guide for conducting a stakeholder analysis :

- Develop a stakeholder list :** Identify all individuals, groups, and organizations that provide resources to the project or have a vested interest in its success or failure.
 - Assess stakeholder interest :** Assign a value of "1" for positive interest, "-1" for negative interest, "0" for neutral, and "?" for uncertain stakeholders.
 - Evaluate stakeholder influence :** Use a scale of 0 to 5 to determine the level of influence each stakeholder has on the project, where 0 means no influence, and 5 implies the ability to terminate the project.
 - Define stakeholder roles :** Assign specific roles to each stakeholder, such as project champion, project owner, consultant, decision-maker, advocate, rival, etc. Use descriptive adjectives or metaphors to clarify their roles.
 - Set objectives for stakeholders :** Determine what each stakeholder can contribute to the project, whether it's resources, expertise, or guidance through organizational politics. For adversarial stakeholders, seek their acceptance or approval for specific project aspects.
 - Identify strategies for engagement :** Develop strategies for building, maintaining, improving, or re-establishing relationships with each stakeholder to achieve the set objectives.
- It's important to note that the stakeholder analysis is an exercise rather than a formal document for public use. By following these steps, the project manager and team can better navigate the informal organization and ensure effective engagement with stakeholders to support project success.

2.3.2 Project Scope Management

- The term "scope" refers to setting clear boundaries and identifying the deliverables of a project, ensuring that all necessary tasks are accomplished while avoiding unnecessary work. It is crucial to define not only what is included in the project but also what is excluded from it. Any work that falls outside the defined project boundaries is considered beyond the project's scope.

**Fig. 2.3.2 : Project Scope Management Overview**

- The scope management plan consists of following processes :
 - **Plan Scope Management** : The process of creating a scope management plan that documents how the project and product scope will be defined, validated, and controlled.
 - **Collect Requirements** : The process of determining, documenting, and managing stakeholder needs and requirements to meet project objectives.
 - **Define Scope** : The process of developing a detailed description of the project and product.

- **Create WBS** : The process of subdividing project deliverables and project work into smaller, more manageable components.
- **Validate Scope** : The process of formalizing acceptance of the completed project deliverables.
- **Control Scope** : The process of monitoring the status of the project and product scope and managing changes to the scope baseline.

2.4 Scope Planning

Plan Scope Management is a crucial process that involves developing a comprehensive scope management plan, outlining the strategies for defining, validating, and controlling both the project and product scope. The primary advantage of this process lies in the provision of clear guidance and direction on how scope-related activities will be managed throughout the entire project lifecycle. By creating a well-defined scope management plan, the project team gains a structured approach to effectively handle scope-related challenges, ensuring that the project stays on track and meets its objectives.

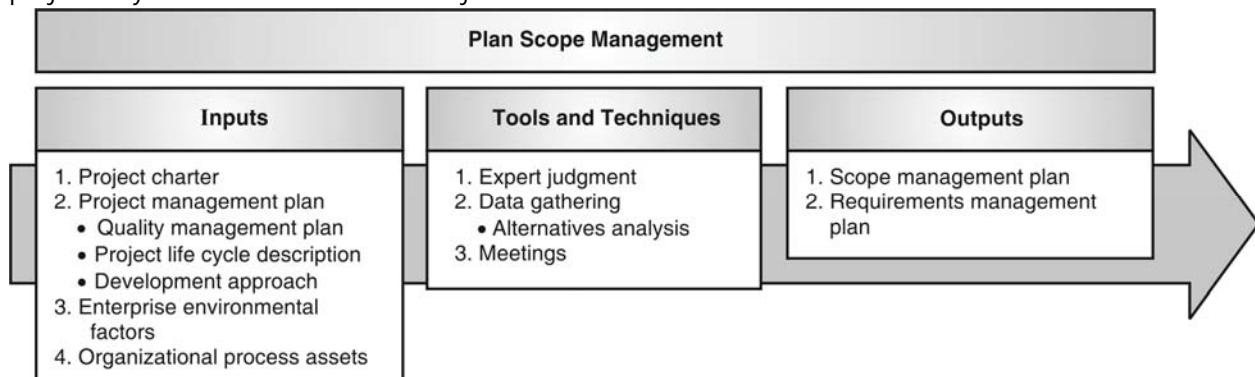


Fig. 2.4.1 : Plan Scope Management: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Charter** : The project charter serves as a fundamental input, containing vital details about the project's purpose, high-level description, assumptions, constraints, and high-level requirements. It provides the initial foundation for defining the project's scope.
- **Project Management Plan** : The project management plan is another crucial input, encompassing various components that influence scope management. This plan includes the quality management plan, which defines how organizational quality policies, methodologies, and standards impact scope management. Additionally, the project life cycle description and development approach are considered, determining the project's phases and approach.
- **Enterprise Environmental Factors** : The enterprise environmental factors play a significant role in the Plan Scope Management process. These factors include the organization's culture, infrastructure, personnel administration, and marketplace conditions, which can influence how scope management is executed.
- **Organizational Process Assets** : Organizational process assets also influence the Plan Scope Management process. These assets comprise policies, procedures, and historical information, including lessons learned from previous projects, which provide valuable insights and guidance for scope management activities.

ii) Tools and Techniques

- **Expert Judgment :** In this technique, input is sought from individuals or groups with specialized knowledge or training in specific topics such as previous similar projects, and industry, discipline, and application area information. Their expertise provides valuable insights and guidance for scope management activities.
- **Data Analysis :** Data analysis techniques, including alternatives analysis, are employed in this process. Various methods of collecting requirements, elaborating project and product scope, creating the product, validating the scope, and controlling the scope are evaluated to make informed decisions.
- **Meetings :** Project teams hold meetings to develop the scope management plan. Attendees may include the project manager, project sponsor, selected project team members, stakeholders, and those responsible for scope management processes. These meetings facilitate collaboration and alignment among team members and stakeholders.

ii) Outputs

- **Scope Management Plan :** The scope management plan, a component of the project management plan, outlines how the scope will be defined, developed, monitored, controlled, and validated. It includes processes for preparing a project scope statement, creating the Work Breakdown Structure (WBS), establishing scope baseline approval and maintenance, and defining the formal acceptance process for completed project deliverables. The scope management plan can be formal or informal, tailored to the specific needs of the project.
- **Requirements Management Plan :** The requirements management plan, also a component of the project management plan, details how project and product requirements will be analyzed, documented, and managed. It may be referred to as a business analysis plan in some organizations. Components of the requirements management plan include the planning, tracking, and reporting of requirements activities, configuration management procedures for handling changes and impacts, requirements prioritization process, metrics for measuring progress, and a traceability structure that captures requirement attributes in the traceability matrix.
- By using these inputs, tools, and outputs effectively, project teams can ensure that scope management is well-planned, controlled, and aligned with project objectives, ultimately leading to successful project execution and deliverables that meet stakeholder expectations.

2.4.1 Scope Definition

- Scope definition is an essential project management process that involves creating a comprehensive and detailed description of the project and its intended outcomes. The primary advantage of this process is that it establishes clear boundaries and acceptance criteria for the project's deliverables, services, or results.
- While all the requirements gathered during the "Collect Requirements" process may not be included in the final project, the "Define Scope" process aids in selecting the most pertinent and essential requirements from the requirements documentation.
- The preparation of a detailed project scope statement builds upon the major deliverables, assumptions, and constraints documented during the project initiation phase. As the project progresses through the planning

phase, the project scope is further defined and refined with greater specificity as more information becomes available.

- This process involves analysing existing risks, assumptions, and constraints to ensure they are comprehensive and updated as needed.
- It is important to note that the "Define Scope" process can be iterative in nature, especially in projects following an iterative life cycle approach. In such cases, a high-level vision is initially established for the overall project, and the detailed scope is determined incrementally, one iteration at a time.
- The detailed planning for each iteration is carried out as work progresses on the current project scope and deliverables. This iterative approach allows for flexibility and adaptability throughout the project's lifecycle.

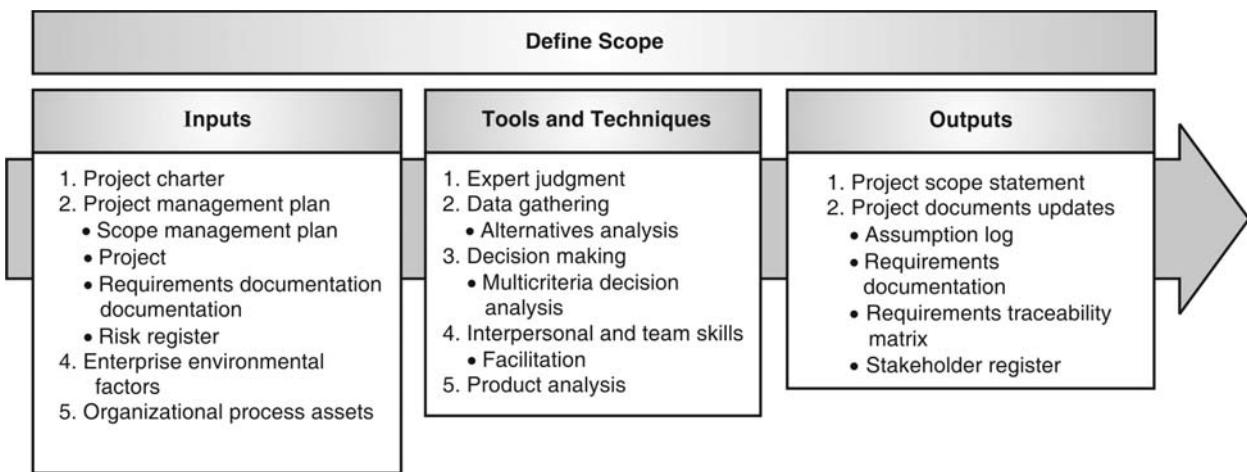


Fig. 2.4.2 : Define Scope: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Charter** : The project charter provides a high-level description of the project, product characteristics, and approval requirements.
- **Project Management Plan** : The project management plan includes the scope management plan, which documents how the project scope will be defined, validated, and controlled.
- **Project Documents** : Various project documents serve as inputs, including the assumption log (identifying assumptions and constraints), requirements documentation (identifying project requirements), and risk register (containing response strategies that may impact the project scope).
- **Enterprise Environmental Factors** : External factors that can influence the Define Scope process, such as the organization's culture, infrastructure, personnel administration, and marketplace conditions.
- **Organizational Process Assets** : Internal assets that can influence the Define Scope process, such as policies, procedures, templates for a project scope statement, project files from previous projects, and lessons learned from previous phases or projects.

ii) Tools and Techniques

- **Expert Judgment** : Seeking expertise from individuals or groups with knowledge or experience in similar projects.
- **Data Analysis** : Using techniques like alternatives analysis to evaluate ways to meet project requirements and objectives.

- **Decision Making :** Applying techniques like multicriteria decision analysis, which uses a decision matrix to establish criteria (requirements, schedule, budget, resources) and refine the project and product scope.
- **Interpersonal and Team Skills:** Utilizing techniques like facilitation to reach a common understanding of project deliverables and boundaries with key stakeholders.
- **Product Analysis :** Employing methods such as product breakdown, requirements analysis, systems analysis, systems engineering, value analysis, and value engineering to define products and services and capture high-level requirements.

ii) Outputs

- **Project Scope Statement :** This document describes the project scope, major deliverables, assumptions, and constraints. It provides a detailed description of the project's deliverables, acceptance criteria, and any project exclusions. The project scope statement serves as a baseline for evaluating changes and additional work requests.
- **Project Documents Updates :** Project documents such as the assumption log, requirements documentation, requirements traceability matrix, and stakeholder register may be updated based on the outcomes of the Define Scope process.
- Overall, the Define Scope process involves gathering inputs, using tools and techniques to define the project's detailed scope, and producing outputs like the project scope statement and updated project documents. This process helps establish clear boundaries and acceptance criteria, enabling effective project planning and execution.

2.5 Work Breakdown Structure Development

Create WBS (Work Breakdown Structure) is a crucial project management process that involves breaking down project deliverables and work into smaller, manageable components. The primary benefit of this process is that it provides a clear framework of what needs to be delivered throughout the project. The WBS is a hierarchical decomposition of the entire scope of work required to achieve project objectives and produce the necessary deliverables. It is based on the current approved project scope statement.

Here are several reasons why creating a WBS is beneficial for a project :

- Provides an accurate and clear project organization.
- Enables precise assignment of responsibilities to the project team.
- Highlights project milestones and control points.
- Facilitates cost, time, and risk estimation.
- Illustrates the project scope, enhancing stakeholders' understanding of the project.
- There are many design goals for WBS. Some important goals are as follows:
 - Giving visibility to important work efforts.
 - Giving visibility to risky work efforts.
 - Illustrate the correlation between the activities and deliverables.
 - Show clear ownership by task leaders.

Different Types of Work Breakdown Structures :

- **WBS Spread Sheet :** This type of WBS is organized efficiently in a spread sheet format, with phases, tasks, or deliverables listed in columns and rows. It allows for easy tracking and management of project elements.
- **WBS Flowchart :** The WBS is presented as a diagrammatic workflow, using flowcharts to illustrate the hierarchy of tasks and deliverables. Flowcharts provide a visual representation of the project structure and relationships.
- **WBS List :** This is a simple and straightforward approach, where the WBS is presented as a list of tasks and deliverables, along with their subtasks. It offers a clear and concise overview of the project components.
- **WBS Gantt Chart :** In this type of WBS, the structure is represented as a Gantt chart, combining elements of both a spread sheet and a timeline. It allows for linking task dependencies and displaying project milestones for better project planning and tracking.

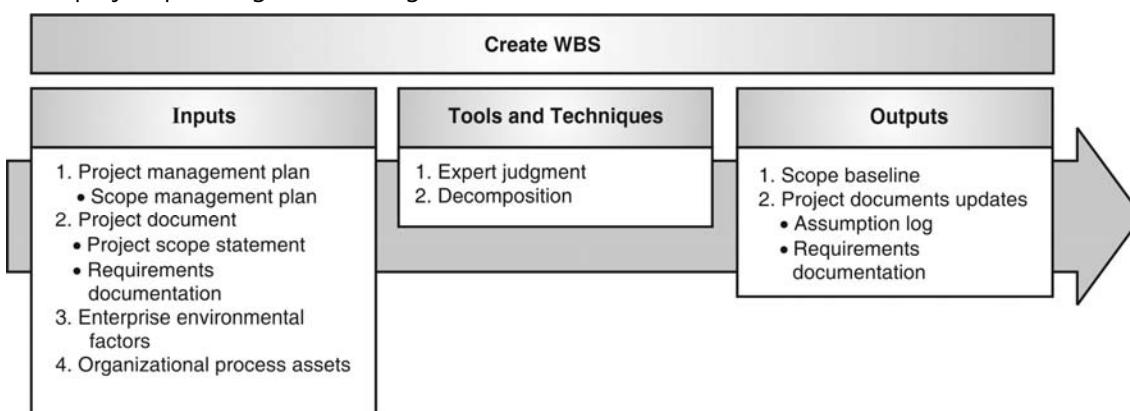


Fig. 2.5.1 : Create WBS: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Management Plan :** The project management plan, including the scope management plan, outlines how the WBS will be created based on the project scope statement.
- **Project Documents :** Relevant project documents that serve as inputs include the project scope statement, describing the work to be performed and excluded, and requirements documentation, detailing how individual requirements fulfil the project's business needs.
- **Enterprise Environmental Factors :** External factors like industry-specific WBS standards that align with the project's nature can influence the WBS creation process.
- **Organizational Process Assets :** Internal assets, such as policies, procedures, templates for the WBS, project files from previous projects, and lessons learned, can also influence the WBS development process.

ii) Tools and Techniques

- **Expert Judgment :** Input from individuals or groups with knowledge and experience in similar projects can guide the WBS development process.
- **Decomposition :** Decomposition is used to divide the project scope and deliverables into smaller, manageable parts. This involves identifying, organizing, and breaking down the work into work packages that can be estimated, managed, and controlled. The level of decomposition is determined by the need for effective project management.

iii) Outputs

- **Scope Baseline :** The scope baseline is the approved version of the scope statement, WBS, and its associated WBS dictionary. It serves as a basis for comparison and can be changed only through formal change control procedures. The scope baseline includes the project scope statement (Section 2.4.1), WBS, work packages, and planning packages. It also incorporates the WBS dictionary, which provides detailed information about each WBS component, including descriptions, assumptions, responsible organizations, schedules, resources, cost estimates, quality requirements, and more.
- **Project Documents Updates :** As a result of the Create WBS process, project documents like the assumption log and requirements documentation may be updated to reflect additional assumptions, constraints, or approved changes.
- Overall, the Create WBS process is essential for effectively defining and organizing the project scope, facilitating project planning and execution, and ensuring a clear understanding of the deliverables and associated work packages.

2.5.1 Construction of WBS

- The initial step in creating a Work Breakdown Structure (WBS) involves identifying the main deliverables of the project. This task is typically carried out by project managers and subject matter experts (SMEs) who are involved in the project. Once the main deliverables are determined, the SMEs proceed to break down the high-level tasks into smaller, manageable work components.
- During this breakdown process, tasks can be subdivided into varying levels of detail. Some tasks may be broken down into ten sub-tasks, while others may be divided into 20 sub-tasks. The level of breakdown is influenced by the project type and the management style adopted for the project, without any strict rules dictating the specific level of detail.
- However, there are some commonly followed guidelines. For example, the "two weeks" rule suggests that no task should be smaller than two weeks' worth of work. In the "8/80" rule, tasks should neither be shorter than 8 hours nor longer than 80 hours of work.
- The representation of the WBS can take different forms. Some use a tree structure, while others prefer lists and tables. Outlining is a straightforward method to present a WBS. Ultimately, the chosen format should effectively illustrate the breakdown of tasks and help in project management.

Following example is an outlined WBS:

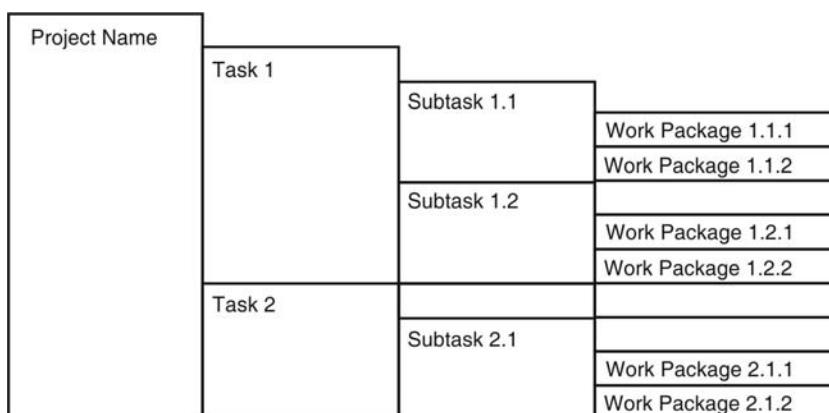


Fig. 2.5.2

2.5.2 Validate Scope

- Validate Scope is a process that focuses on formalizing the acceptance of completed project deliverables. The main benefit of this process is to bring objectivity to the acceptance process, increasing the likelihood of final product, service, or result acceptance by validating each deliverable.
- During the Validate Scope process, the deliverables, which have been verified through the Control Quality process, are reviewed with the customer or sponsor to ensure they have been completed satisfactorily.
- The formal acceptance of these deliverables by the customer or sponsor is obtained through this process. The outputs generated during the Planning processes in the Project Scope Management Knowledge Area, such as requirements documentation or the scope baseline, serve as the basis for performing the validation and obtaining final acceptance.
- It's important to note that the Validate Scope process differs from the Control Quality process in its primary focus. While Validate Scope is concerned with the acceptance of the deliverables,
- Control Quality primarily focuses on ensuring the correctness of the deliverables and meeting the specified quality requirements. Generally, Control Quality is performed before Validate Scope, although the two processes may run in parallel.
- Overall, the Validate Scope process plays a crucial role in confirming the completeness and satisfaction of the deliverables by involving stakeholders and obtaining their formal approval, which is essential for successful project closure.

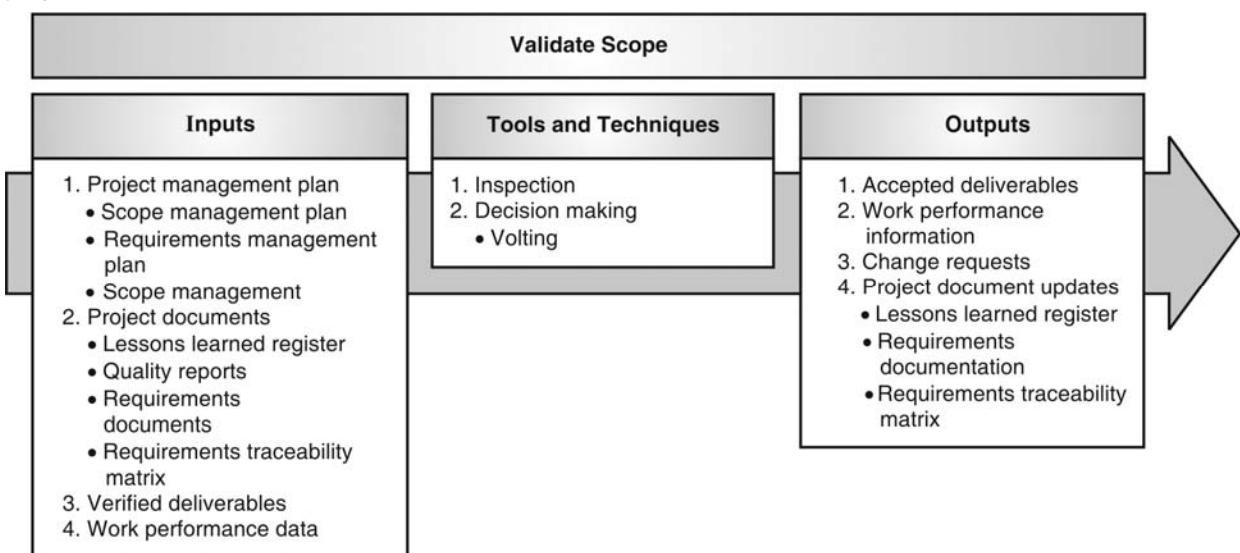


Fig. 2.5.3 : Validate Scope: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Management Plan** : The scope management plan, requirements management plan, and scope baseline are included in the project management plan, providing guidance on how to obtain formal acceptance of the completed project deliverables and validating project requirements.
- **Project Documents** : Lessons learned register, quality reports, requirements documentation, and requirements traceability matrix serve as valuable inputs for the validation process, allowing for comparison of requirements to actual results and identifying areas for improvement.

- **Verified Deliverables :** These are project deliverables that have undergone the Control Quality process and have been checked for correctness and compliance.
- **Work Performance Data :** Work performance data, which includes metrics such as compliance level with requirements and nonconformities, is utilized to assess the validation progress and performance.

ii) Tools and Techniques

- **Inspection :** Activities such as measurement, examination, and validation are conducted to determine if work and deliverables meet requirements and acceptance criteria. Inspections, also known as reviews or walkthroughs, are employed for this purpose.
- **Decision Making :** Decision-making techniques, such as voting, are used when validating deliverables involving the project team and stakeholders.

iii) Outputs

- **Accepted Deliverables :** Deliverables that meet acceptance criteria are formally signed off and approved by the customer or sponsor. Formal documentation of stakeholder acceptance is forwarded to the Close Project or Phase process.
- **Work Performance Information :** Information about project progress, including accepted and non-accepted deliverables and reasons for non-acceptance, is recorded and communicated to stakeholders.
- **Change Requests :** Deliverables not formally accepted and requiring defect repair may lead to change requests for review and disposition through the Perform Integrated Change Control process.

Project Document Updates :

- **Lessons Learned Register:** Updated with information on challenges encountered and successful approaches for validating deliverables.
- **Requirements Documentation:** May be updated with the actual results of validation activity, including instances where results surpass requirements or where requirements were waived.
- **Requirements Traceability Matrix:** Updated with the results of validation, including the method used and the outcome.
- Overall, the Validate Scope process facilitates a transparent and thorough evaluation of project deliverables, increasing the likelihood of successful project closure and customer satisfaction. By ensuring that the completed deliverables align with the specified requirements and acceptance criteria, the project can proceed smoothly towards its final phases and successful delivery.

2.6 Scope Verification

- Project scope verification is a vital process in scope management, ensuring that the project deliverables are completed according to the defined standards in the deliverable definition table (DDT). To verify the scope, a checklist inspired by Gray and Larson (2000) is commonly used, incorporating the concept of the Measure of Value (MOV).The Measure of Value (MOV) refers to the project's defined objectives and goals.

- It is essential to have a clear and agreed-upon MOV by all stakeholders, as it helps prevent scope changes that could negatively impact the project's schedule and budget.

The checklist includes the following key elements :

- **Deliverables :** The project deliverables should be tangible and verifiable items that contribute directly to achieving the project's MOV. Ensuring that the deliverables align with the project's objectives is essential to its success.
- **Quality Standards :** Controls should be in place to ensure that the deliverables are completed to meet specific quality standards. This ensures that the work produced is of high quality and meets the project's requirements.
- **Milestones :** For each deliverable, milestones are set to mark significant events, indicating that the deliverable has been completed and reviewed. Milestones provide the project manager and team with approval to proceed to the next phase, indicating progress in the project.
- **Review and Acceptance :** The project's scope must be reviewed and formally accepted by all stakeholders, including the project sponsor and project team. This mutual understanding and acceptance of the project's scope and objectives help prevent misunderstandings and ensure a clear path for project execution.
- By using this scope verification checklist, the project team ensures that the project's scope is well-defined, agreed upon, and aligned with the project's objectives. This verification process minimizes the risk of scope changes, ensures quality work, and improves the chances of successful project outcomes.

2.6.1 Control Scope

- Control Scope is a vital process that involves continuously monitoring the status of the project and product scope while effectively managing any changes to the scope baseline. The main benefit of this process is the maintenance of the scope baseline throughout the project's lifecycle. It is performed continuously and integrated with other control processes.
- The primary objective of controlling the project scope is to ensure that all requested changes and recommended corrective or preventive actions go through the Perform Integrated Change Control process, as described in Section 2.6 of the project management plan. By following this approach, the project team can manage actual changes effectively when they occur.
- One significant challenge in project management is scope creep, which refers to the uncontrolled expansion of the product or project scope without appropriate adjustments to time, cost, and resources. To address this issue, Control Scope is crucial in identifying and managing changes in scope to prevent scope creep and its potential negative impact on the project's success.
- Change is a natural part of any project, and having a well-defined change control process becomes mandatory to handle and accommodate changes effectively. By implementing a robust Control Scope process, project managers can maintain control over the project's scope, ensuring that changes are carefully evaluated, approved, and incorporated while maintaining alignment with the scope baseline and project objectives. This helps in delivering a successful project that meets stakeholders' expectations and achieves its desired outcomes.

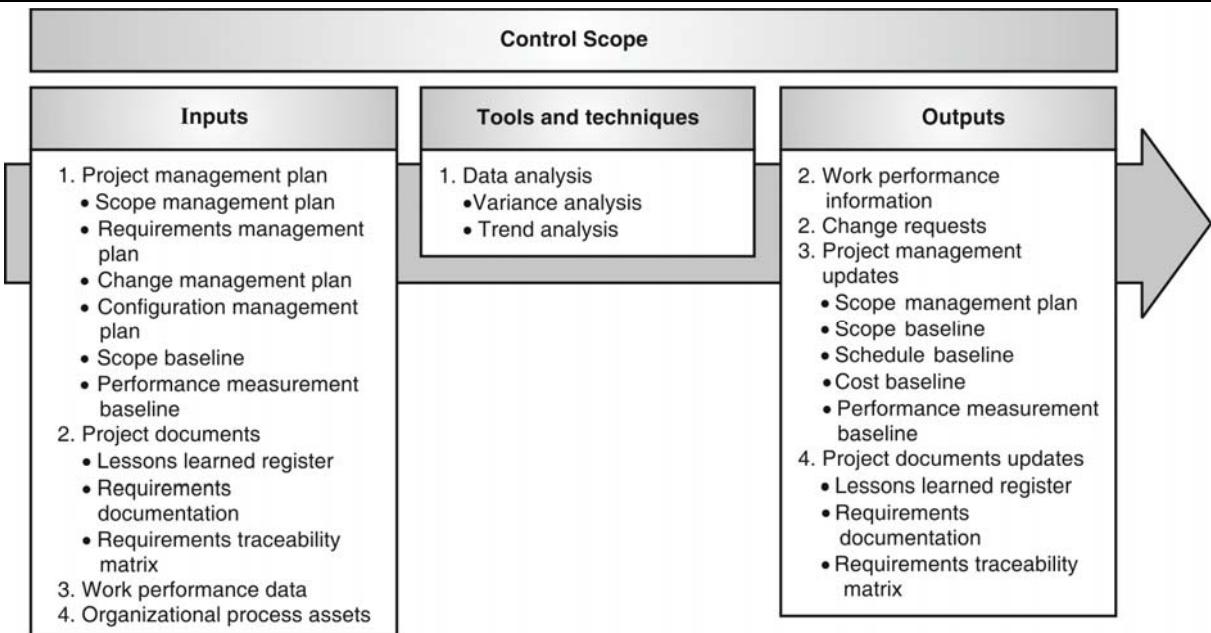


Fig. 2.6.1 : Control Scope : Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Management Plan** : The scope management plan, requirements management plan, change management plan, configuration management plan, scope baseline, and performance measurement baseline are all components of the project management plan that influence how scope is controlled.
- **Project Documents** : The lessons learned register, requirements documentation, and requirements traceability matrix are essential project documents used to detect deviations in scope and manage changes effectively.
- **Work Performance Data** : This data provides information on change requests received, accepted, and the status of deliverables.
- **Organizational Process Assets** : Existing scope control-related policies, procedures, guidelines, and monitoring and reporting methods can influence the Control Scope process.

ii) Tools and Techniques

Data Analysis : Variance analysis and trend analysis are employed to compare the baseline with actual results, determine variances, and assess if corrective or preventive action is necessary.

iii) Outputs

- **Work Performance Information** : This output provides correlated and contextualized information on how the project and product scope are performing compared to the scope baseline, including scope variances, their causes, and their impact on schedule or cost.
- **Change Requests** : Analysis of project performance may result in change requests to the scope and schedule baselines or other components of the project management plan.
- **Project Management Plan Updates** : Changes to the project management plan components, such as the scope management plan, scope baseline, schedule baseline, cost baseline, and performance measurement baseline, are incorporated in response to approved changes in scope, schedule, or cost estimates.

- **Project Documents Updates :** Project documents, including the lessons learned register, requirements documentation, and requirements traceability matrix, may be updated to reflect changes and updates in requirement documentation.

The Control Scope process ensures that the project scope is effectively managed and controlled throughout the project's lifecycle, helping to prevent scope creep and maintain alignment with project objectives. By diligently monitoring and managing scope changes, project managers can enhance project success and meet stakeholder expectations.

Review Questions

- Q. 1** Give steps in Project Selection.
- Q. 2** Explain different Project Selection Methods.
- Q. 3** Explain Project Scope Management in detail.
- Q. 4** Write short note on Work Breakdown Structure Development.



3

Project Time and Cost Management

Syllabus

Project Time & Cost Management : Activity definition and sequencing, Estimating activity durations and resources, Developing the project schedule, Schedule control and monitoring, Cost estimation techniques, Budget development and monitoring, Earned Value Management (EVM), Cost control and analysis

3.1 Project Schedule Management

Project Schedule Management is a critical knowledge area in project management that encompasses the processes required to ensure the timely completion of a project. It involves planning, defining, sequencing, estimating, developing, and controlling the project schedule to effectively manage project timelines and meet project objectives.

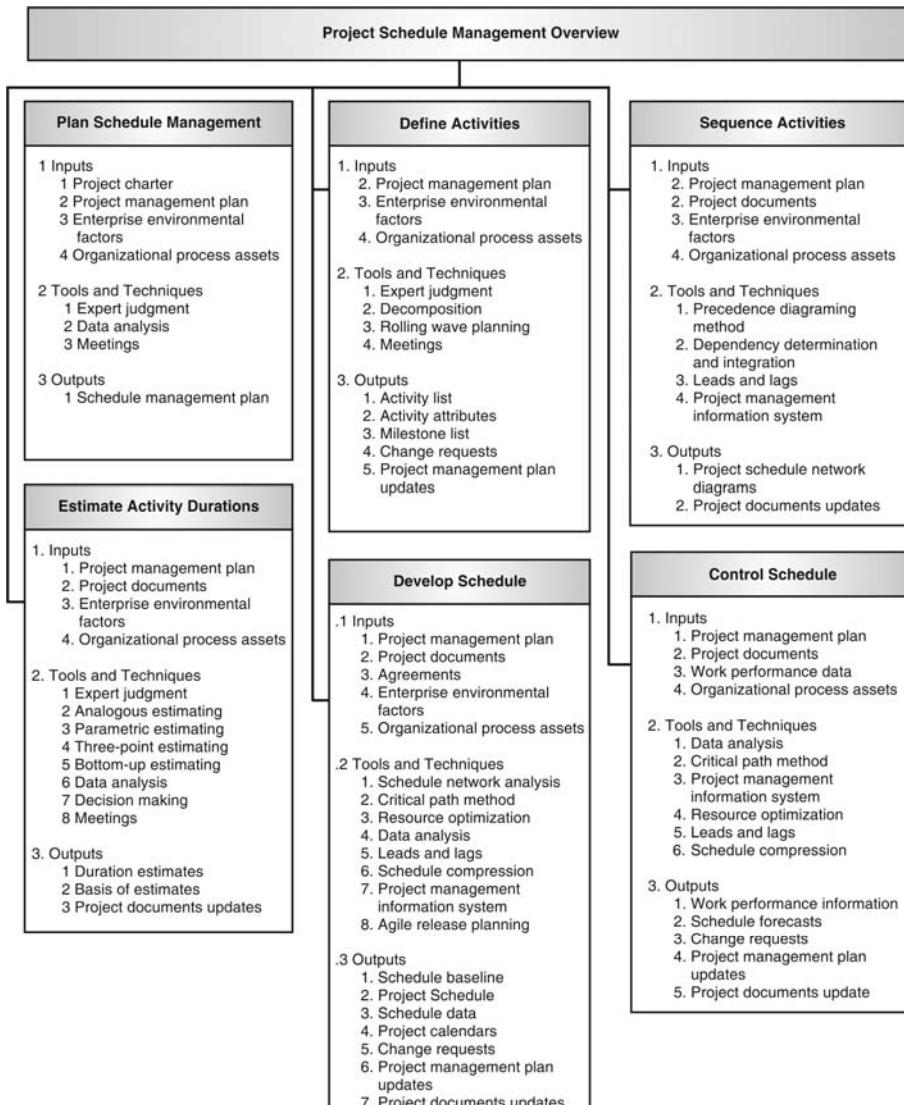


Fig. 3.1.1 : Process of Project Schedule Management

The Project Schedule Management processes are as follows:

- **Plan Schedule Management :** This process involves establishing policies, procedures, and documentation for planning, developing, managing, executing, and controlling the project schedule. It includes defining how the schedule will be created, updated, and monitored throughout the project lifecycle.
- **Define Activities :** In this process, specific actions required to produce the project deliverables are identified and documented. These activities are the building blocks of the project schedule and serve as the basis for further planning and resource allocation.
- **Sequence Activities :** This process entails identifying and documenting the relationships among the project activities. By determining the logical order in which activities should be performed, dependencies are established, ensuring a smooth flow of work and minimizing potential conflicts.
- **Estimate Activity Durations :** Here, the number of work periods needed to complete individual activities with the estimated resources is estimated. The goal is to provide realistic and accurate estimates of the time required to complete each activity.
- **Develop Schedule :** This process involves analysing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule model. The resulting schedule represents the project timeline for execution and serves as the basis for monitoring and controlling the project's progress.
- **Control Schedule :** In this process, the status of the project is monitored to update the project schedule and manage changes to the schedule baseline. By comparing actual progress against the planned schedule, project managers can take corrective actions to keep the project on track.
- Effective Project Schedule Management ensures that the project progresses according to the planned timeline, resources are optimally utilized, and any deviations are addressed promptly. It facilitates communication among project stakeholders and supports decision-making processes, ultimately contributing to the successful completion of the project within the established time constraints.

3.1.1 Plan Schedule Management

Plan Schedule Management is the fundamental process of defining the policies, procedures, and documentation necessary for effectively planning, developing, managing, executing, and controlling the project schedule. The primary advantage of this process is the provision of clear guidance and direction on how the project schedule will be handled throughout the project's lifecycle. It is typically carried out once during the project initiation phase or at predefined milestones to ensure a structured and well-managed approach to scheduling activities.

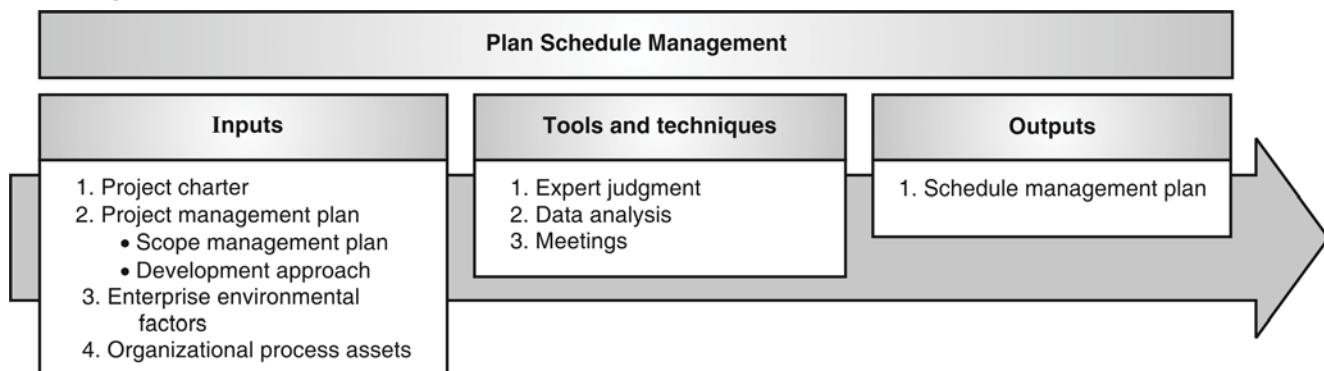


Fig. 3.1.2 : Plan Schedule Management

i) Inputs

- **Project Charter** : It provides the summary milestone schedule that influences the project schedule management.
- **Project Management Plan** : Components such as the scope management plan and the development approach contribute to how the schedule will be planned and executed.
- **Enterprise Environmental Factors** : Factors like organizational culture, resource availability, scheduling software, and commercial databases influence schedule management.
- **Organizational Process Assets** : Historical information, existing policies, templates, and monitoring tools from previous projects impact the planning of schedule management.

ii) Tools and Techniques

- **Expert Judgment** : Input from individuals or groups with expertise in schedule development, methodologies, scheduling software, and the specific industry relevant to the project.
- **Data Analysis** : Techniques like alternatives analysis help determine the appropriate scheduling methodology, level of detail, duration of waves for rolling wave planning, and frequency of review and updates.
- **Meetings** : Project teams hold planning meetings involving project managers, sponsors, team members, stakeholders, and others responsible for schedule planning or execution.

iii) Outputs

- **Schedule Management Plan** : This component of the project management plan outlines the criteria and activities for developing, monitoring, and controlling the schedule. It specifies the scheduling methodology, release and iteration lengths, level of accuracy for estimates, units of measure, organizational procedures links, schedule model maintenance, control thresholds, rules of performance measurement (e.g., Earned Value Management), and reporting formats.
- The inputs, tools and techniques, and outputs of schedule management play a crucial role in ensuring effective planning, monitoring, and control of project schedules.

3.1.2 Define Activities

Define Activities is a crucial process that involves identifying and documenting the precise actions required to produce the project deliverables. The primary advantage of this process is its ability to break down work packages into schedule activities, serving as a foundation for estimating, scheduling, executing, monitoring, and controlling the project work. This process is continuously performed throughout the project to ensure that activities are well-defined and aligned with the project's objectives, enabling effective project management and successful project completion.

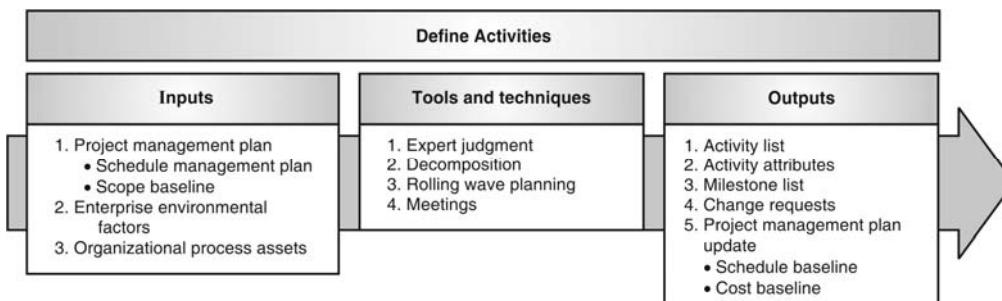


Fig. 3.1.3 : Define Activities

i) Inputs

- **Project Management Plan** : Provides the schedule management plan, defining the schedule methodology and level of detail required for work management. It also includes the scope baseline, specifying deliverables, constraints, and assumptions.
- **Enterprise Environmental Factors** : Influence activity definition and encompass organizational cultures, published commercial information, and the Project Management Information System (PMIS).
- **Organizational Process Assets** : Impact the Define Activities process and include historical activity lists, standardized processes, templates, and activity planning-related policies and guidelines.

ii) Tools and Techniques

- **Expert Judgment** : Gains insights from individuals or groups with expertise in similar projects and current work.
- **Decomposition** : Divides project scope and deliverables into manageable parts, defining activities as the effort needed to complete work packages.
- **Rolling Wave Planning** : Iterative planning for near-term work in detail and higher-level planning for future work, allowing adjustments based on project progress.
- **Meetings** : Involves team members or experts to define activities needed for work completion.

iii) Outputs

- **Activity List** : Contains all schedule activities required for the project, with periodic updates in projects using rolling wave planning or agile approaches.
- **Activity Attributes** : Provides additional details for each activity, including descriptions, logical relationships, resource requirements, imposed dates, constraints, and assumptions.
- **Milestone List** : Identifies project milestones, indicating whether they are mandatory or optional, representing significant points or events with zero duration.
- **Change Requests** : May arise due to the progressive elaboration of deliverables into activities, processed through Perform Integrated Change Control.
- **Project Management Plan Updates** : Changes to the plan, like updates to the schedule baseline and cost baseline, may be required as work packages evolve into activities, subject to the organization's change control process.
- Overall, the Define Activities process ensures that project deliverables are broken down into manageable activities, aligned with project objectives, and executed efficiently. By employing the appropriate inputs, tools, and techniques, project managers can enhance project planning, control, and execution, ultimately leading to successful project outcomes.

3.1.3 Sequencing Activities

- Sequence Activities is a critical process that involves identifying and documenting the relationships among project activities. Its primary purpose is to establish a logical sequence of work that optimizes efficiency while considering project constraints. This continuous process is carried out throughout the project lifecycle to ensure that activities are logically connected, promoting a smooth and well-organized project execution.

- In this process, each activity, except the first and last, is connected to at least one predecessor and one successor activity through appropriate logical relationships. These logical relationships are designed to create a realistic project schedule. Sometimes, using lead or lag time between activities becomes necessary to support a practical and achievable project timeline.
- Sequencing can be accomplished using project management software or manual and automated techniques. The Sequence Activities process emphasizes converting the project activities from a list into a diagram, serving as the initial step in establishing the schedule baseline. This diagram becomes a powerful tool for managing the project schedule effectively and ensuring successful project delivery.

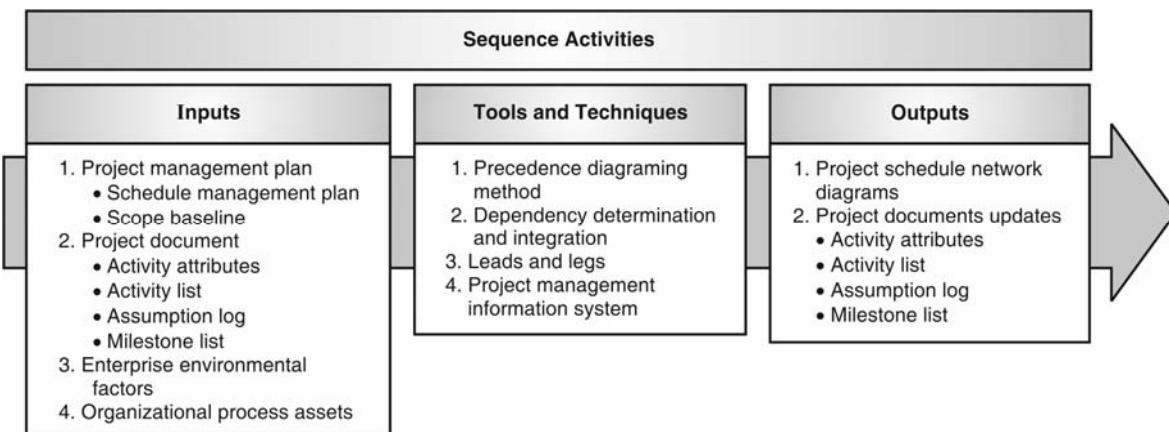


Fig. 3.1.4 : Sequence Activities

i) Inputs

- Project Management Plan** : Provides the schedule management plan, defining the method and criteria required for activity sequencing, and the scope baseline, including deliverables, constraints, and assumptions for explicit consideration.
- Project Documents** : Include activity attributes, activity list, assumption log, and milestone list, providing essential details about relationships, dependencies, leads, lags, and risks affecting activity sequencing.
- Enterprise Environmental Factors** : Influence sequencing and include government or industry standards, project management information system (PMIS), scheduling tools, and organization work authorization systems.
- Organizational Process Assets** : Influence sequencing and include portfolio and program plans, project dependencies and relationships, activity planning-related policies, templates, and historical information aiding in optimization.

ii) Tools and Techniques

- Precedence Diagramming Method (PDM)** : Represents activities as nodes connected by logical relationships (Finish-to-Start, Finish-to-Finish, Start-to-Start, and Start-to-Finish) to show the sequence of work.
- Dependency Determination and Integration** : Characterizes dependencies as mandatory or discretionary, and internal or external, enabling project teams to determine logical relationships effectively.

- **Leads and Lags** : Allow advancing (leads) or delaying (lags) successor activities concerning predecessor activities to accommodate realistic scheduling and avoid logic conflicts.
- **Project Management Information System (PMIS)** : Utilizes scheduling software to plan, organize, adjust activity sequences, and insert logical relationships, leads, and lags.

iii) Outputs

- **Project Schedule Network Diagrams** : Graphically represents logical relationships among project activities, including path convergence and divergence, aiding in visualizing the project's activity sequence.
- **Project Documents Updates** : May include revised activity attributes, activity list, assumption log, and milestone list, reflecting changes in relationships, dependencies, leads, lags, and potential risks influencing the project schedule.
- Overall, the Sequence Activities process is instrumental in creating a logical and optimized project schedule. By utilizing the appropriate inputs, tools, and techniques, project managers can efficiently establish the sequence of work, enhancing project execution, and ultimately leading to successful project delivery.

3.1.4 Estimate Activity Durations

- Estimate Activity Durations is a crucial process that involves estimating the number of work periods required to complete individual activities with the allocated resources. The primary advantage of this process is to determine the time needed for each activity to reach completion. It is a continuous process conducted throughout the project lifecycle to ensure accurate planning and scheduling.
- During this process, the project team analyses the resources, constraints, and scope of each activity to arrive at reliable duration estimates. These estimates form the foundation for creating a realistic project schedule, ensuring efficient resource allocation and successful project execution.
- By performing Estimate Activity Durations iteratively, the project team can continuously refine and improve the accuracy of their duration estimates, contributing to the overall success of the project.

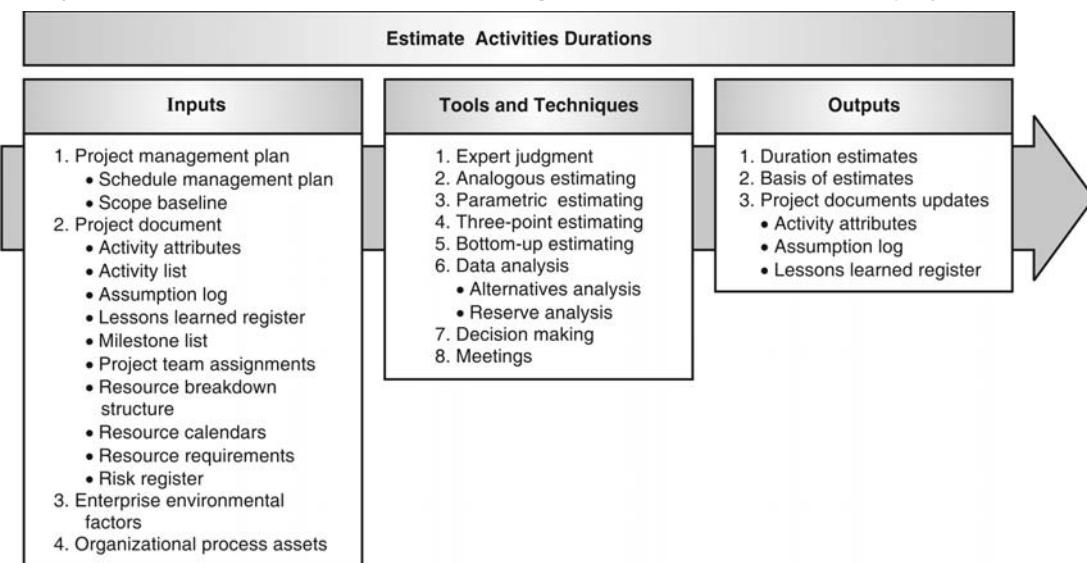


Fig. 3.1.5 : Estimate Activity Duration

- Estimating activity durations involves using information from the scope of work, resource requirements, and resource calendars. Constraints, effort, and resource types can influence the duration estimates. The process requires data from team members familiar with the activity.
- As more detailed data becomes available, the accuracy of estimates improves. Factors like the law of diminishing returns, the number of resources, technology advancements, and staff motivation impact duration estimates. All data and assumptions supporting the estimates are documented for each activity.

i) Input

- **Project Management Plan** : Contains the schedule management plan and scope baseline, influencing activity duration estimates.
- **Project Documents** : Includes activity attributes, activity list, assumption log, lessons learned register, milestone list, project team assignments, resource breakdown structure, resource calendars, resource requirements, and risk register, all providing essential data for duration estimation.
- **Enterprise Environmental Factors** : External factors like databases, productivity metrics, commercial information, and team locations affecting duration estimates.
- **Organizational Process Assets** : Historical data, project calendars, policies, methodology, and lessons learned influencing the estimation process.

ii) Tools and Techniques

- **Expert Judgment** : Input from experts in scheduling, estimation, and domain-specific knowledge.
- **Analogous Estimating** : Uses historical data from similar projects to estimate duration or cost.
- **Parametric Estimating** : Employs algorithms and statistical relationships based on historical data and project parameters.
- **Three-Point Estimating** : Considers optimistic, pessimistic, and most likely scenarios to provide a realistic range of durations.
- **Bottom-Up Estimating** : Aggregates estimates of lower-level components in the WBS for total project duration estimation.
- **Data Analysis** : Techniques like alternatives analysis and reserve analysis to weigh resource, cost, and duration variables.
- **Decision Making** : Techniques like voting or the fist-of-five method to achieve consensus within the project team.

iii) Output

- **Duration Estimates** : Quantitative assessments of the likely time periods for activities, phases, or the entire project.
- **Basis of Estimates** : Supporting documentation explaining the derivation of duration estimates, including assumptions, constraints, and risk considerations.
- **Project Documents Updates** : Updates to project documents, such as activity attributes, assumption log, and lessons learned register, to improve future projects.

- In conclusion, the Estimate Activity Durations process is essential for developing an accurate and well-structured project schedule. By utilizing the appropriate inputs, tools, and techniques, project managers can ensure that duration estimates are reliable, leading to effective resource allocation, realistic planning, and successful project delivery.

3.1.5 Estimate Activity Resources

- The Estimate Activity Resources process is a fundamental and essential part of project management. Its primary purpose is to determine the resources required for project activities, including team resources, materials, equipment, and supplies. By accurately estimating these resources, the project manager can make informed decisions regarding resource allocation, budgeting, and scheduling.
- The process's key benefit lies in its ability to identify the specific type, quantity, and characteristics of resources needed for successful project completion. It ensures that the right resources are available at the right time, preventing delays and cost overruns. Additionally, it allows project teams to proactively address any resource shortages or constraints, fostering a smoother project execution and ultimately leading to successful project outcomes.
- The Estimate Activity Resources process is closely coordinated with other project management processes, such as the Estimate Costs process. This coordination enhances the overall project performance and contributes to the project's successful delivery within schedule and budget constraints.

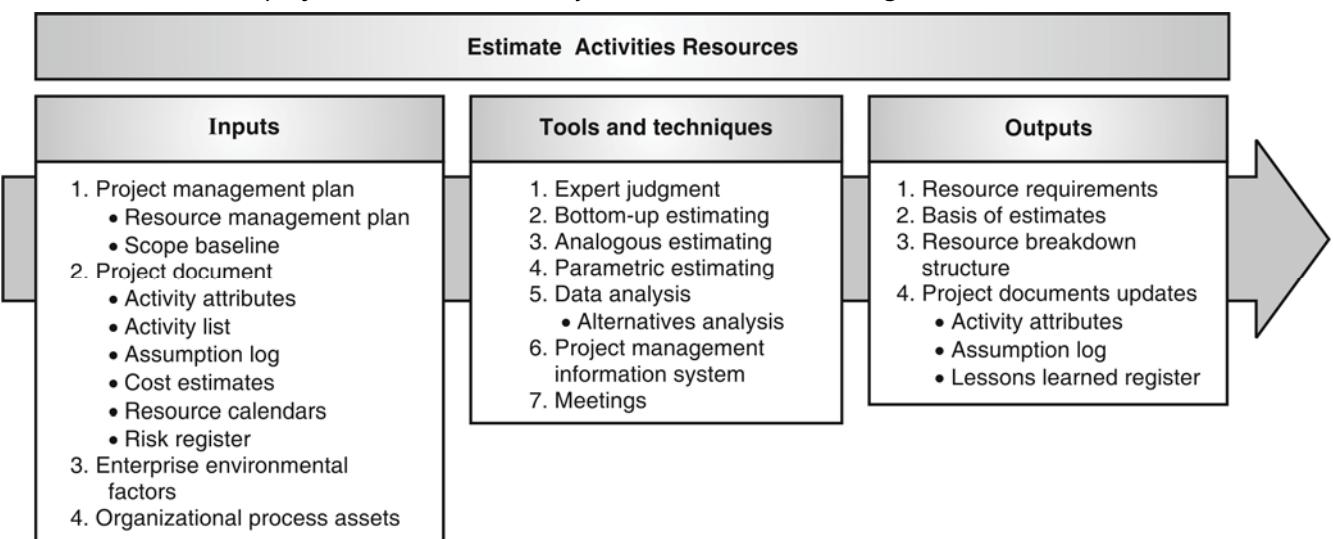


Fig. 3.1.6 : Estimate Activity Resources: Inputs, Tools & Techniques, and Outputs

I) Inputs

(a) Project Management Plan

- Resource management plan :** Defines the approach to identify different resources needed for the project and methods to quantify them.
- Scope baseline :** Identifies the project and product scope necessary for meeting project objectives, driving the needs for team and physical resources.

(b) Project Documents

- **Activity attributes** : Provide primary data for estimating team and physical resources required for each activity, including resource requirements, imposed dates, assumptions, and constraints.
- **Activity list** : Identifies the activities that will need resources.
- **Assumption log** : Contains information on productivity factors, availability, cost estimates, and approaches to work influencing resource needs.
- **Cost estimates** : Impact resource selection from quantity and skill level perspectives.
- **Resource calendars** : Identify working days, shifts, start and end of normal business hours, weekends, and public holidays when specific resources are available.
- **Risk register** : Describes individual risks that can impact resource selection and availability.

(c) Enterprise Environmental Factors

- Resource location
- Resource availability
- Team resource skills
- Organizational culture
- Published estimating data
- Marketplace conditions

(d) Organizational Process Assets

- Policies and procedures regarding staffing
- Policies and procedures relating to supplies and equipment
- Historical information regarding types of resources used for similar work on previous projects

ii) Tools and Techniques for Estimate Activity Resources Process

- **Expert Judgment** : Consider input from individuals or groups with specialized knowledge or training in team and physical resource planning and estimating.
- **Bottom-Up Estimating** : Estimate team and physical resources at the activity level and aggregate them to higher levels.
- **Analogous Estimating** : Use information from previous similar projects as the basis for estimating resources for future projects.
- **Parametric Estimating** : Use an algorithm or statistical relationship between historical data and other variables to calculate resource quantities for an activity based on historical data and project parameters.
- **Data Analysis** : Use alternatives analysis to evaluate identified options for executing project activities within defined constraints.
- **Project Management Information System (PMIS)** : Utilize resource management software to plan, organize, and manage resource pools and develop resource estimates.
- **Meetings** : Hold planning meetings with functional managers to estimate the resources needed per activity, level of effort, skill level of team resources, and quantity of materials required.

iii) Outputs

- **Resource Requirements :** Identify types and quantities of resources required for each work package or activity in a work package, and aggregate to determine estimated resources for each WBS branch and the project as a whole.
- **Basis of Estimates :** Provide supporting documentation for resource estimates, including methods used, resources considered, assumptions, constraints, range of estimates, confidence level, and documented risks influencing the estimate.
- **Resource Breakdown Structure :** Present a hierarchical representation of resources by category and type.
- **Project Documents Updates :** Activity attributes, assumption log, and lessons learned register may be updated to reflect resource requirements and related information.

In conclusion, the Estimate Activity Resources process is a fundamental and dynamic aspect of project management, relying on inputs, utilizing tools and techniques, and producing valuable outputs. It significantly contributes to effective resource planning, allocation, and control, ultimately leading to the successful delivery of projects within schedule, budget, and quality constraints.

3.2 Develop Schedule

Develop Schedule is a crucial process that involves analyzing activity sequences, durations, resource requirements, and schedule constraints to create a schedule model for project execution, monitoring, and control. The main advantage of this process is its ability to generate a schedule model with planned dates for completing project activities.

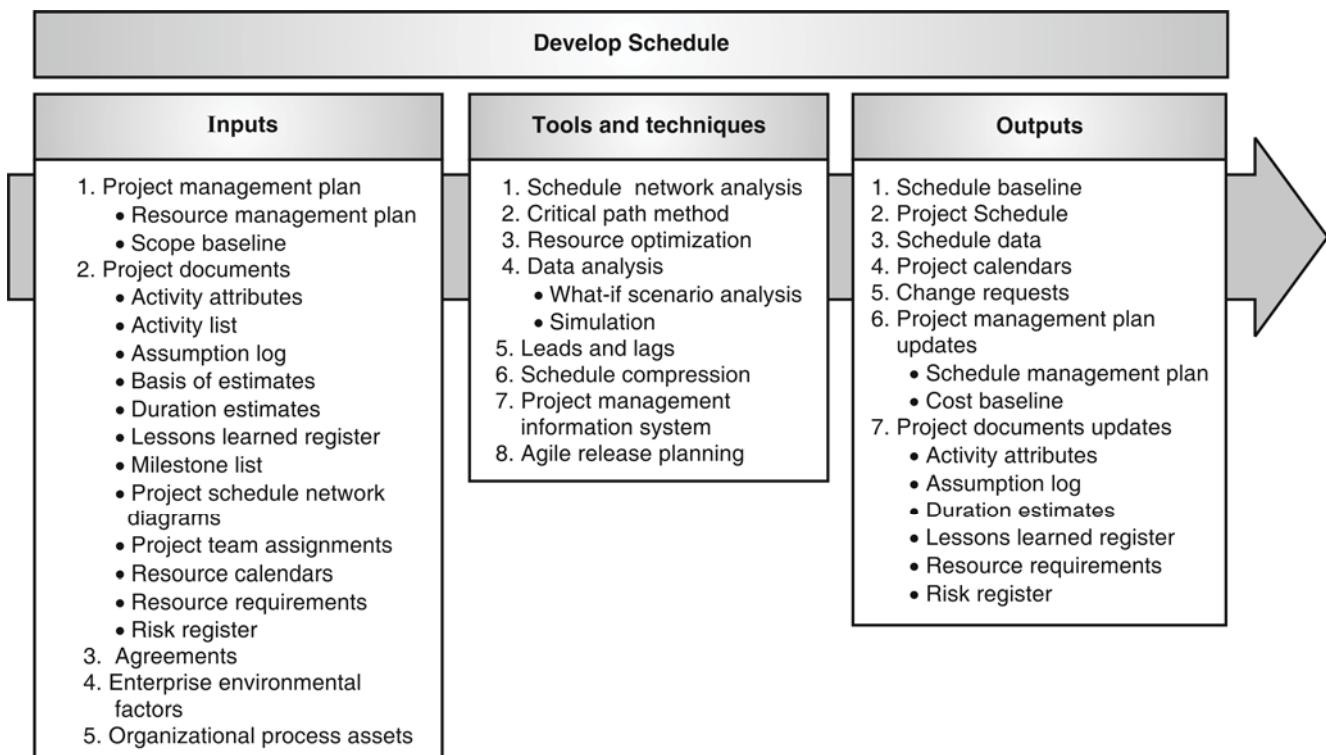


Fig. 3.2.1 : Develop Schedule: Inputs, Tools & Techniques, and Outputs

i) Input**(a) Project Management Plan**

This plan component includes but is not limited to:

- **Schedule management plan :** This plan defines the scheduling method, the tools utilized for creating the schedule, and the approach for schedule calculation.
- **Scope baseline :** It includes the scope statement, Work Breakdown Structure (WBS), and WBS dictionary, providing crucial details about project deliverables necessary for constructing the schedule model.

(b) The Project Documents

The Project Documents serving as inputs to this process include, but are not limited to:

- **Activity attributes :** Providing details used to build the schedule model.
- **Activity list :** Identifying the activities to be included in the schedule model.
- **Assumption log :** Recording assumptions and constraints that may impact the project schedule.
- **Basis of estimate :** Supporting documentation explaining how the duration estimates were derived.
- **Duration estimates :** Quantitative assessments of work periods required to complete each activity, used for schedule calculation.
- **Lessons learned :** Applying previous schedule model development insights to enhance schedule validity in later project phases.
- **Milestone list :** Scheduled dates for specific milestones.
- **Project schedule network diagrams :** Depicting logical relationships of predecessors and successors used for schedule calculation.
- **Project team assignments :** Specifying resource assignments for each activity.
- **Resource calendars :** Information on resource availability during the project.
- **Resource requirements :** Identifying types and quantities of resources required for each activity in the schedule model.
- **Risk register :** Providing details of identified risks and their characteristics that influence the schedule model. Risk information is used to determine schedule reserves.
- **Agreement :** As vendors develop the specifics of how they will execute the project work to fulfill contractual commitments, they can provide valuable inputs to the project schedule.
- **A Enterprise Environmental Factor :** The Develop Schedule process can be influenced by various enterprise environmental factors, including but not limited to:
 - Government or industry standards
 - Communication channels
- **Organizational Process Asset :** The organizational process assets that can influence the Develop Schedule process include but are not limited to:
 - Scheduling methodology containing the policies governing schedule model development and maintenance
 - Project calendar(s).

ii) Tools and Techniques

- **Schedule Network Analysis :** Schedule network analysis is the primary technique for generating the project schedule model. It involves using various methods, including the critical path method, resource optimization techniques, and modeling techniques. This analysis also includes the following:
 - Assessing the need to aggregate schedule reserves to minimize schedule slip when multiple paths converge or diverge.
 - Reviewing the network for high-risk activities or long lead items on the critical path, which may require schedule reserves or risk response planning?
 - It is an iterative process employed until a viable schedule model is developed.
- **Critical Path Method :** The critical path method estimates the minimum project duration and identifies the schedule flexibility on network paths in the schedule model. It calculates early start, early finish, late start, and late finish dates for all activities without considering resource constraints. The critical path represents the longest path through the project, determining the shortest project duration. Total float or schedule flexibility on network paths is measured by the amount of time an activity can be delayed without impacting the project finish date or violating constraints.
- **Resource Optimization :** Resource optimization adjusts activity start and finish dates to match planned resource use with resource availability. Techniques like resource levelling and resource smoothing are used to balance resource demand with available supply and prevent resource over allocation.
- **Data Analysis :** Data analysis techniques include "what-if" scenario analysis, where different scenarios are evaluated to predict their effects on project objectives. Simulation, particularly using Monte Carlo analysis, models the combined impact of risks and uncertainties on achieving project objectives.
- **Leads and Lags :** Leads and lags are refinements used during network analysis to adjust the start time of successor activities to develop a feasible schedule. Leads advance a successor activity concerning the predecessor activity, while lags introduce a time delay between predecessors and successors.
- **Schedule Compression :** Schedule compression techniques are employed to shorten the schedule duration without altering the project scope. Crashing and fast tracking are two schedule compression techniques. Crashing adds resources to shorten critical path activities, while fast tracking involves performing activities in parallel that were initially planned in sequence.
- **Project Management Information System (Pmis) :** Project management information systems, including scheduling software, expedite the process of building a schedule model by generating start and finish dates based on activity inputs, network diagrams, resources, and durations.
- **Agile Release Planning :** Agile release planning provides a high-level summary timeline (typically 3 to 6 months) based on the product roadmap and vision for the product's evolution. It determines the number of iterations or sprints and helps prioritize features based on business goals and dependencies. Agile release planning enables the team to deliver value to customers in smaller increments, aligning with the product vision.

iii) Output

Outputs of the Develop Schedule process include :

- **Schedule Baseline** : An approved version of the schedule model used as a basis for comparison with actual results.
- **Project Schedule** : A presentation of linked activities with planned dates, durations, milestones, and resources.
- **Schedule Data** : Information describing and controlling the schedule, including milestones, activities, and assumptions.
- **Project Calendars** : Identifying working days and shifts available for scheduled activities.
- **Change Requests** : Modifications to the scope or schedule that require review and approval.
- **Project Management Plan Updates** : Revisions to the schedule management plan and cost baseline.
- **Project Documents Updates** : Updates to activity attributes, assumption log, duration estimates, lessons learned, resource requirements, and risk register.

In conclusion, the Develop Schedule process is essential for creating a well-organized and realistic project schedule. By leveraging the appropriate inputs, tools, and techniques, project managers can establish a strong foundation for effective project execution, monitoring, and control, leading to the successful completion of the project within schedule constraints.

3.2.1 Control Schedule

- Control Schedule involves continuously monitoring the project's progress, updating the project schedule, and effectively managing any changes to the schedule baseline. The main advantage of this process is the consistent maintenance of the schedule baseline throughout the entire project.
- This crucial process is carried out at various stages during the project's lifecycle. It requires various inputs, tools, and techniques to ensure effective schedule control and alignment with the project management plan.
- Let's break down the key elements of the process:

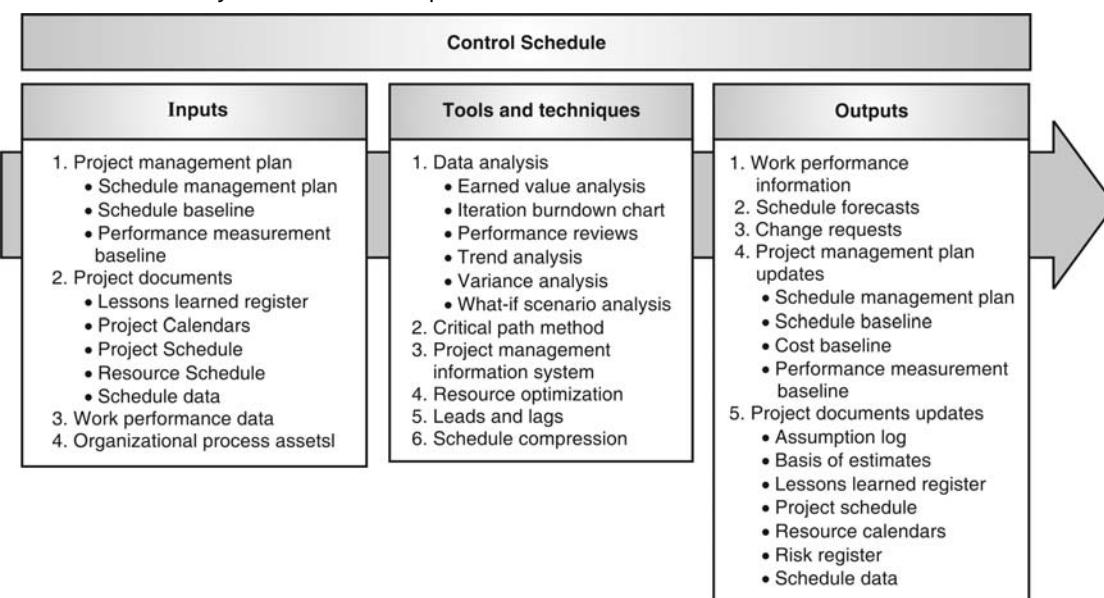


Fig. 3.2.2 : Control Schedule: Inputs, Tools & Techniques and Outputs

i) Inputs

- **Project Management Plan** : Contains the Schedule Management Plan (frequency of updates, reserve usage, and control methods), Schedule Baseline (compared to actual results for change assessment), Scope Baseline (for considering scope-related factors), and Performance Measurement Baseline (for earned value analysis)
- **Project Documents** : Including Lessons Learned Register (improve schedule control based on past lessons), Project Calendars (for schedule forecasts), Project Schedule (most recent version with updates), Resource Calendars (availability of resources), and Schedule Data (to be reviewed and updated).
- **Work Performance Data** : Contains project status data like activity start/finish dates, actual durations, and percent complete, essential for performance measurement.
- **Organizational Process Assets** : Include policies, procedures, guidelines, schedule control tools, and reporting methods that can influence the Control Schedule process.

ii) Tools and Techniques

- **Data Analysis** : Utilizes techniques like Earned Value Analysis, Iteration Burndown Chart (in Agile projects), Performance Reviews, Trend Analysis, Variance Analysis, and What-If Scenario Analysis.
- **Critical Path Method** : Helps determine schedule status and identify schedule risks by evaluating the progress of activities on the critical and near-critical paths.
- **Project Management Information System (PMIS)** : Scheduling software used to track planned vs. actual dates, report variances, and forecast effects of changes.
- **Resource Optimization** : Involves scheduling activities and resources considering resource availability and project time.
- **Leads and Lags** : Adjusting leads and lags in network analysis to bring behind-schedule activities into alignment with the plan.
- **Schedule Compression** : Techniques like fast-tracking or crashing the schedule to align with the plan.

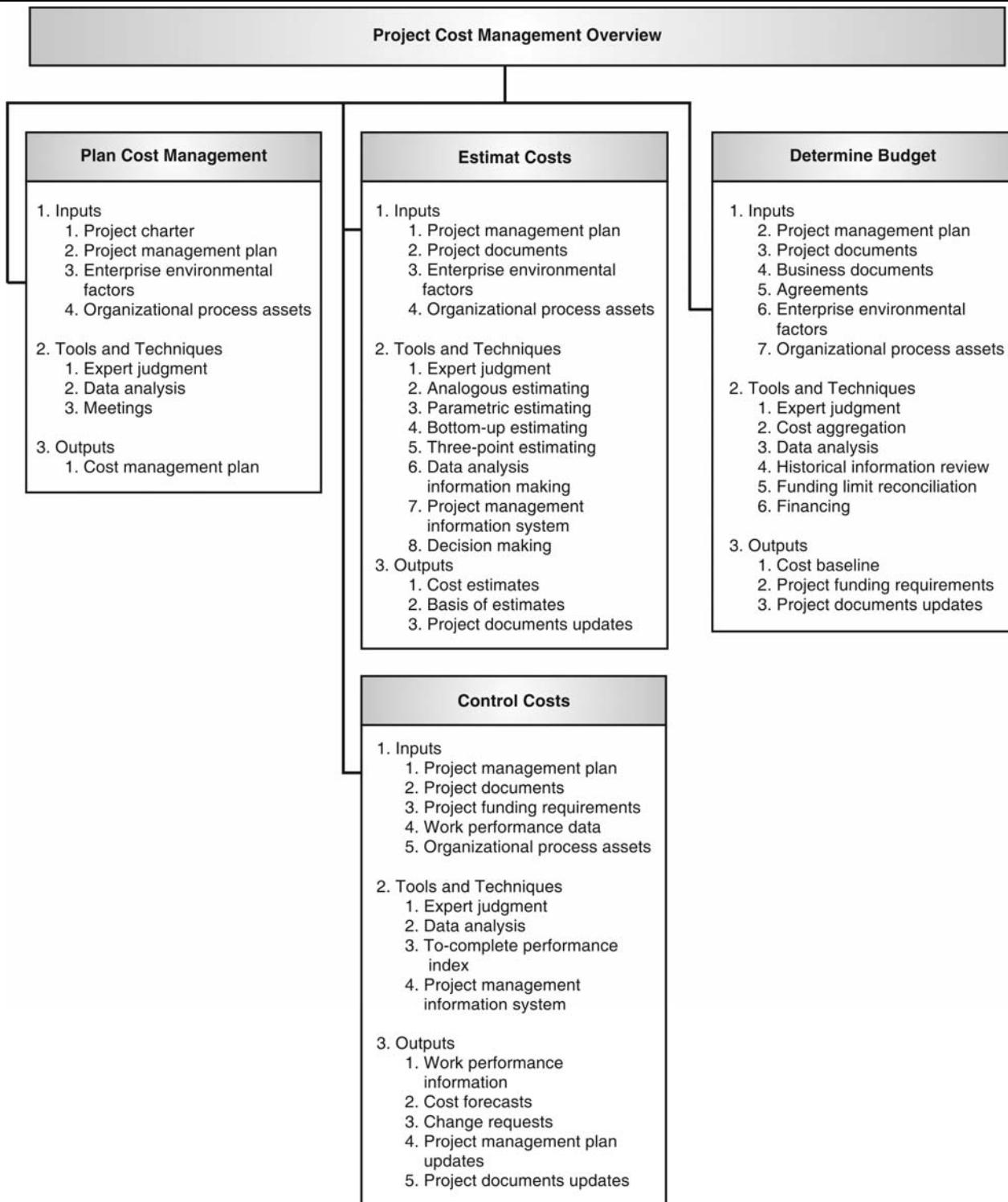
iii) Outputs

- **Work Performance Information** : Includes performance data compared to the schedule baseline, variances at work package and control account levels, and earned value indicators.
- **Schedule Forecasts** : Updates and predictions of future project conditions and events based on past performance, corrective actions, and earned value performance indicators.
- **Change Requests** : Resulting from schedule variance analysis, progress reports, and modifications to project scope or schedule, submitted for review and disposition through Perform Integrated Change Control.
- **Project Management Plan Updates** : Changes to components such as the Schedule Management Plan, Schedule Baseline, Cost Baseline, and Performance Measurement Baseline.
- **Project Documents Updates** : Including the Assumption Log, Basis of Estimates, Lessons Learned Register, Project Schedule, Resource Calendars, Risk Register, and Schedule Data.

- In conclusion, the Control Schedule process is essential for ensuring that the project stays on track and that deviation from the schedule baseline are promptly identified and managed. By leveraging the appropriate tools and techniques and considering the inputs from the Project Management Plan and Project Documents, project managers can effectively control the project schedule, make informed decisions, and take corrective actions to ensure the successful and timely completion of the project
- Control Schedule ensures that the project stays on track by effectively managing schedule changes and continuously updating the project schedule to meet project objectives.
- In the context of traditional project management, Control Schedule is concerned with the following aspects :
 - Determining the current status of the project schedule.
 - Identifying and influencing factors that may cause schedule changes.
 - Reconsidering necessary schedule reserves.
 - Assessing if the project schedule has been altered.
 - Managing any actual changes to the schedule as they occur.
- When an agile approach is employed, Control Schedule focuses on specific actions that align with the agile principles:
 - Determining the current status of the project schedule by comparing the total work delivered and accepted against the estimated work completed for the elapsed time cycle.
 - Conducting retrospectives, which are scheduled reviews aimed at recording lessons learned, correcting processes, and making improvements if required.
 - Reprioritizing the remaining work plan (backlog) based on changing requirements and priorities.
 - Evaluating the rate at which deliverables are produced, validated, and accepted (velocity) within the agreed-upon work cycle duration, typically 2 weeks or 1 month.
 - Identifying and managing changes to the project schedule as they occur.
- When work is contracted to external parties, ensuring schedule control involves receiving regular updates and milestone status reports from contractors and suppliers. These updates serve as a means of verifying that the work progresses as agreed upon and that the schedule remains on track. Scheduled status reviews and walkthroughs should be conducted to ensure the accuracy and completeness of contractor reports.

3.3 Project Cost Management

Project Cost Management includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so that the project can be completed within the approved budget.

**Fig. 3.3.1 : Project Cost Management**

The Project Cost Management processes are:

- **Plan Cost Management** : The process of defining how the project costs will be estimated, budgeted, managed, monitored, and controlled.
- **Estimate Costs** : The process of developing an approximation of the monetary resources needed to complete project work.

- **Determine Budget :** The process of aggregating the estimated costs of individual activities or work packages to establish an authorized cost baseline.
- **Control Costs :** The process of monitoring the status of the project to update the project costs and manage changes to the cost baseline.

3.3.1 Plan Cost Management

- Plan Cost Management involves defining the approach for estimating, budgeting, managing, monitoring, and controlling project costs. The main advantage of this process is that it provides clear guidance and direction on how the project's financial aspects will be handled throughout its duration. This process is typically performed once during project initiation or at predefined milestones.
- The cost management planning phase takes place early in project planning, establishing a framework for each cost management process to ensure their efficient and coordinated performance.
- The cost management plan documents the specific cost management processes and their associated tools and techniques. This plan is an integral part of the overall project management plan, providing essential guidance for effective cost control and financial management throughout the project's lifecycle.

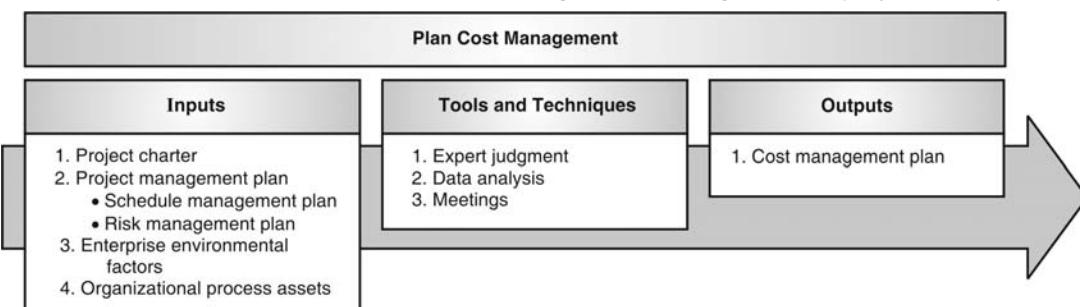


Fig. 3.3.2 : Plan Cost Management: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Charter :** Provides preapproved financial resources for developing detailed project costs and defines project approval requirements influencing cost management.
- **Project Management Plan :** Includes the Schedule Management Plan (impacting cost estimation and management) and Risk Management Plan (processes and controls affecting cost estimation and management).
- **Enterprise Environmental Factors :** Influence cost management, including organizational culture and structure, market conditions, currency exchange rates, published commercial information, project management information system, and productivity differences in different regions.
- **Organizational Process Assets :** Influence the Plan Cost Management process and consist of financial controls procedures, historical information, financial databases, and existing cost estimating and budgeting-related policies, procedures, and guidelines.

ii) Tools and Techniques

- **Expert Judgment :** Leveraging expertise from individuals or groups with specialized knowledge in previous similar projects, industry, discipline, application area, cost estimating, and budgeting, and earned value management.

- **Data Analysis :** Includes alternatives analysis, reviewing funding options (self-funding, equity, or debt), and considering ways to acquire project resources (make, purchase, rent, or lease).
- **Meetings :** Planning meetings involving the project manager, project sponsor, selected project team members, stakeholders, and those responsible for project costs.

iii) Output

- **Cost Management Plan :** A component of the project management plan describing how project costs will be planned, structured, and controlled. It documents the cost management processes and associated tools and techniques. The cost management plan specifies units of measure, level of precision, level of accuracy, and organizational procedures, among other aspects, for realistic cost estimation and management.
- Overall, the Plan Cost Management process sets the foundation for successful cost management, ensuring financial discipline, efficient resource allocation, and adherence to project objectives. With a well-defined Cost Management Plan in place, project teams can proactively address cost-related challenges, track cost performance effectively, and make strategic decisions to achieve project success and deliver value to stakeholders.

3.3.2 Estimate Cost

- Estimate Costs is the process of approximating the financial resources needed for project activities. It determines the project's monetary requirements and is performed periodically throughout the project's lifecycle. Cost estimates are quantitative evaluations based on available information, considering alternatives like make vs. buy, buy vs. lease, and resource sharing for optimal project costs.
- They are usually expressed in currency units but may use other measures like staff hours. As the project progresses, cost estimates are reviewed and refined for increased accuracy. Costs are estimated for all project resources, including labour, materials, equipment, services, and contingencies, and can be presented at the activity level or summarized for a comprehensive view.

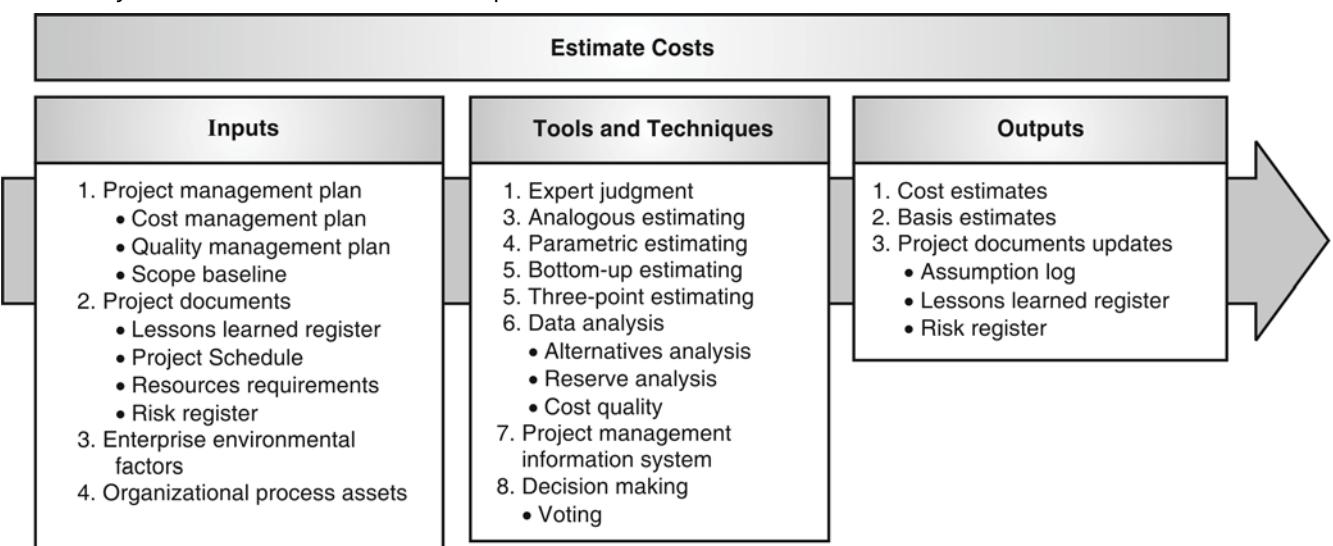


Fig. 3.3.3 : Estimate Cost: Inputs, Tools & Techniques and Outputs

i) Inputs

- **Project Management Plan** : It includes the cost management plan, describing estimating methods and precision required.
- **Quality Management Plan** : Describes activities and resources for achieving quality objectives.
- **Scope Baseline** : Contains the project scope statement, WBS, and WBS dictionary, including funding constraints and assumptions.
- **Project Documents** : May include lessons learned, project schedule, resource requirements, and risk register.
- **Enterprise Environmental Factors** : Influencing factors like market conditions published commercial information, exchange rates, and inflation.
- **Organizational Process Assets** : Such as cost estimating policies, templates, historical data, and lessons learned repository.

ii) Tools and Techniques

- **Expert Judgment** : Input from individuals or groups with specialized knowledge.
- **Analogous Estimating** : Using values from previous similar projects for estimation.
- **Parametric Estimating** : Using statistical relationships between historical data and other variables.
- **Bottom-Up Estimating** : Detailed estimation at the activity level, rolled up for reporting.
- **Three-Point Estimating** : Using optimistic, pessimistic, and most likely estimates for uncertainty.
- **Data Analysis** : Techniques like alternatives analysis and reserve analysis.
- **Project Management Information System (PMIS)** : Software and tools for cost estimating.
- **Decision Making** : Techniques like voting to improve estimate accuracy and commitment.

iii) Outputs

- **Cost Estimates** : Quantitative assessments of probable costs for project work, including contingency and management reserve.
- **Basis of Estimates** : Supporting documentation explaining how the cost estimate was derived, assumptions made, constraints, and risks considered.
- **Project Documents Updates** : Updates to documents like assumption log, lessons learned, and risk register based on the estimation process.

By regularly performing the Estimate Costs process and updating project documents based on the estimation results, project teams can continuously refine their cost estimates, improving accuracy and providing a solid foundation for informed decision-making throughout the project's execution. Effective cost estimation leads to better financial planning, cost control, and successful project delivery, ensuring that projects are completed within the allocated budget and delivering value to stakeholders.

3.3.3 Determine Budget

Determine Budget is the process of consolidating estimated costs of activities or work packages to establish an authorized cost baseline. The main advantage is defining the cost baseline for project monitoring and control. This process is performed once or at predefined project stages. A project budget comprises all authorized funds for project execution. The cost baseline is the approved time-phased project budget, including contingency reserves but excluding management reserve.

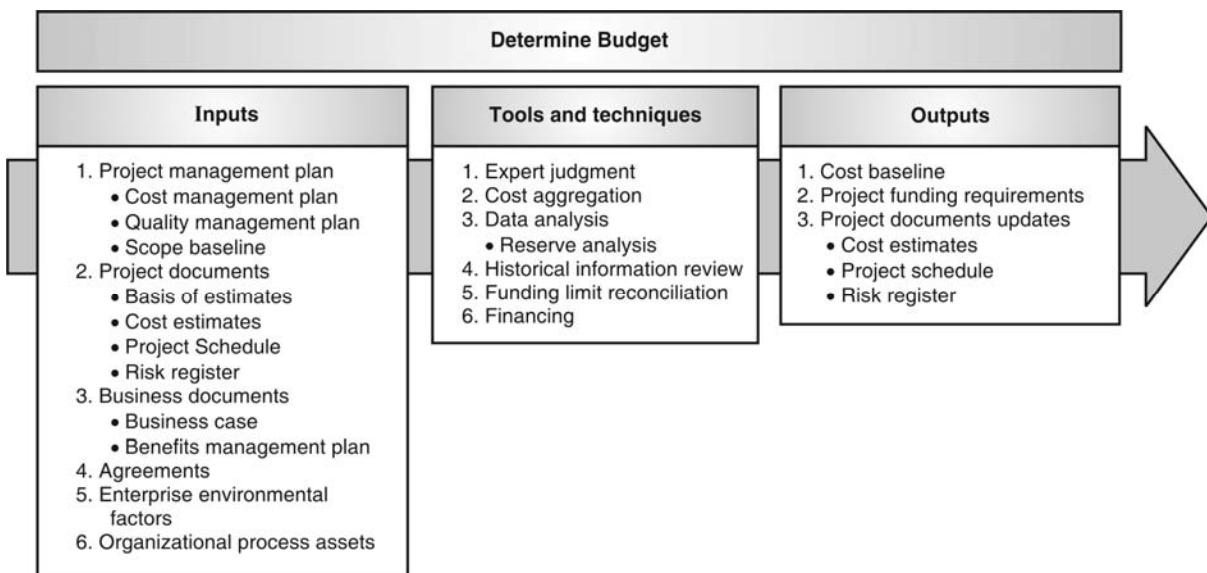


Fig. 3.3.4 : Determine Budget: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Management Plan** : The cost management plan outlines how the project costs will be structured into the budget. The resource management plan provides details on rates, travel costs, and other foreseen expenses necessary for the budget estimation. The scope baseline contains information for cost estimation and management.
- **Project Documents** : Basis of estimates contains supporting details for cost estimates, including assumptions dealing with indirect costs. Cost estimates for each activity are aggregated to obtain work package cost estimates. The project schedule provides planned start and finish dates for activities, milestones, and work packages for cost aggregation. The risk register helps aggregate risk response costs.
- **Business Documents** : The business case identifies critical success factors, including financial aspects. The benefits management plan includes metrics and calculations for the target benefits.
- **Agreements** : Information and costs related to purchased products, services, or results are considered.
- **Enterprise Environmental Factors** : Exchange rates are taken into account for large-scale projects with multiple currencies.
- **Organizational Process Assets** : Existing cost budgeting-related policies, procedures, and guidelines, historical information cost budgeting tools, and reporting methods can influence the Determine Budget process.

ii) Tools and Techniques

- **Expert Judgment** : Input from experts with knowledge in relevant areas, financial principles, and funding requirements is considered.
- **Cost Aggregation** : Cost estimates are aggregated by work packages and higher levels of the WBS to develop the overall project budget.
- **Data Analysis** : Reserve analysis helps establish management reserves for unforeseen work. Historical information is reviewed to develop parametric and analogous estimates.
- **Historical Information Review** : Past project data is used to create mathematical models for predicting total project costs.
- **Funding Limit Reconciliation** : The expenditure of funds is reconciled with funding limits to adjust work schedules if needed.
- **Financing** : External sources of funding may be sought for long-term projects, and compliance with funding entity requirements is ensured.

iii) Outputs

- **Cost Baseline** : The approved time-phased project budget, excluding management reserves, serves as the basis for comparison with actual results.
- **Project Funding Requirements** : Total and periodic funding requirements are derived from the cost baseline, including projected expenditures and liabilities.
- **Project Documents Updates** : Cost estimates, project schedules, and risk registers may be updated as part of the budgeting process.

By leveraging the Determine Budget process, project managers can establish a solid financial framework that aligns with the project's scope, schedule, and objectives. This well-defined budgeting approach enhances financial control, aids decision-making, and supports effective project monitoring and reporting. Continuous monitoring and updating of cost estimates and project schedules ensure that the budget remains current and adaptable to changes in project conditions, contributing to successful project delivery within approved financial constraints.

3.3.4 Control Cost

- Control Costs is the process of continuously monitoring the project's status to keep track of project costs and managing any changes to the cost baseline. The primary advantage of this process is that it ensures the cost baseline remains up-to-date throughout the project.
- Control Costs is an on-going process carried out throughout the project's duration. Cost control is the process of updating the budget based on actual costs spent. Any budget increase requires approval through the change control process.
- It involves managing changes, monitoring cost performance, and ensuring expenditures align with the approved baseline. The goal is to keep cost overruns within acceptable limits and inform stakeholders of approved changes and associated costs.

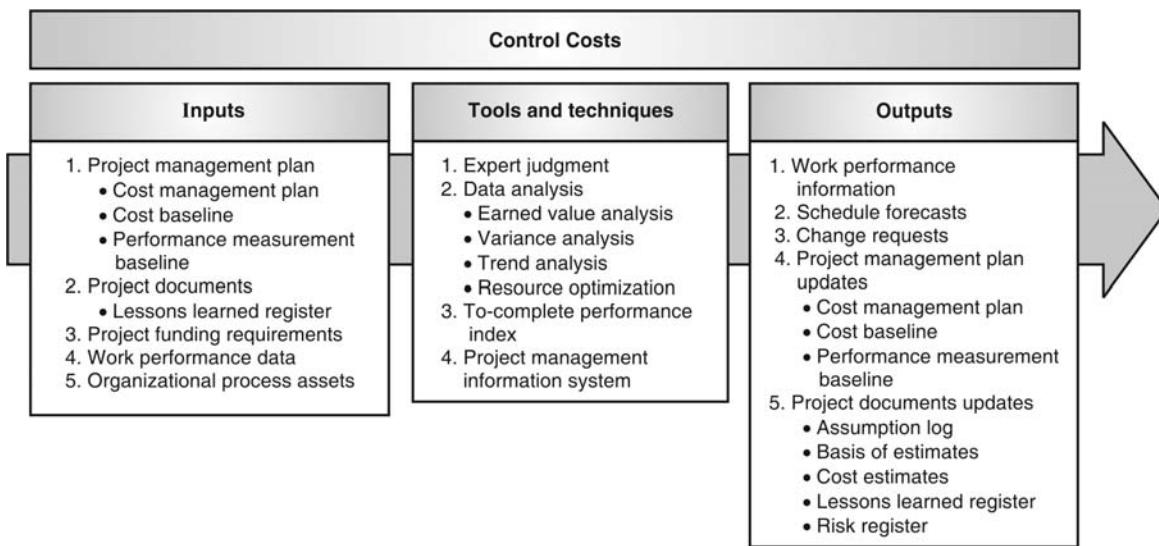


Fig. 3.3.5 : Control Cost: Inputs, Tools & Techniques and Outputs

i) Inputs

- Project Management Plan, including the Cost Management Plan, Cost Baseline, and Performance Measurement Baseline.
- Project Documents, such as the Lessons Learned Register, which can be applied to improve cost control.
- Project Funding Requirements, which include projected expenditures and anticipated liabilities.
- Work Performance Data, providing information on authorized costs, incurred costs, invoiced costs, and payments.
- Organizational Process Assets, including cost control policies, procedures, guidelines, and tools.

ii) Tools and Techniques

- **Expert Judgment :** Involves the use of variance analysis, earned value analysis, forecasting, and financial analysis by experts to assess cost performance.
- **Data Analysis :** Includes Earned Value Analysis (EVA) to compare planned value, earned value, and actual cost, and Variance Analysis to explain cost, schedule, and variance at completion (VAC) variances.
- **To-Complete Performance Index (TCPI) :** Measures the cost performance required to meet a specific management goal, expressed as the ratio of the cost to finish outstanding work to the remaining budget.
- **Project Management Information System (PMIS) :** Used to monitor EVM dimensions, display graphical trends, and forecast possible final project results.

iii) Outputs

- **Work Performance Information :** Information on cost performance compared to the cost baseline, including CV, CPI, EAC, VAC, and TCPI for projects using earned value analysis.
- **Cost Forecasts :** Calculated EAC value or bottom-up EAC value communicated to stakeholders.
- **Change Requests :** Analysis of project performance may lead to change requests for cost and schedule baselines or other components of the project management plan.

- **Project Management Plan Updates :** Revisions to the cost management plan, cost baseline, and performance measurement baseline based on approved changes.
- Overall, the Control Costs process ensures effective financial management, adherence to budgetary constraints, and informed decision-making, contributing to the successful delivery of the project within approved cost parameters and meeting stakeholders' financial expectations

3.4 Earned Value Management

Earned Value Management (EVM) is a project management technique used to assess a project's performance and progress by integrating scope, schedule, and cost measurements. It provides a way to objectively measure project performance against established baselines, allowing project managers and stakeholders to gain insights into project health and make informed decisions.

Benefits of Earned Value Management (EVM) are as follows:

- **Cost Control and Work Mapping :** EVM allows for precise mapping of work with associated costs, converting unknowns into quantifiable factors. It provides a clear picture of how costs align with progress, enabling better cost control throughout the project's lifecycle.
- **Performance Comparison :** EVM compares the current status against the project baseline, identifying critical paths and potential deviations. This empowers project managers to proactively address issues and take corrective actions before they escalate.
- **Data-Driven Decision Making :** EVM creates a data-based framework, offering actionable insights for future decisions. By analyzing cost and schedule variances, project managers can make informed choices to optimize resources, scope, and budgets.
- **Proactive Intervention :** EVM enables fast and early intervention in project management. Project managers can adjust project scope and budgets, invest in better technologies, procure additional resources, and set appropriate customer expectations to maintain project progress.
- **Enhanced Visibility and Accountability :** EVM promotes enhanced visibility by providing clear metrics for cost and schedule performance. Stakeholders become more accountable as progress is measured objectively, ensuring transparency and fostering a culture of responsibility.
- **Big Picture Insights :** EVM provides insights at both project and portfolio levels, offering a comprehensive view of project health and performance. It aids in prioritizing resources and aligning projects with organizational objectives for optimal portfolio management.

The key components of Earned Value Management are:

- **Planned Value (PV) or Budgeted Cost of Work Scheduled (BCWS) :** The authorized budget for the work planned to be completed up to a specific point in time, usually referred to as the "time now" or "status date."
- **Earned Value (EV) or Budgeted Cost of Work Performed (BCWP) :** The value of the work actually performed or completed up to the status date, according to the project plan.
- **Actual Cost (AC) or Actual Cost of Work Performed (ACWP) :** The total cost incurred for the work completed up to the status date.

- **Using these three values, several performance indicators can be calculated :**
 - Cost Variance (CV) = EV - AC: Indicates whether the project is under or over budget at the status date.
 - Schedule Variance (SV) = EV – PV : Indicates whether the project is ahead of or behind schedule at the status date.
 - Cost Performance Index (CPI) = EV / AC: Measures the cost efficiency of work performed compared to the cost spent.
 - Schedule Performance Index (SPI) = EV / PV: Measures the schedule efficiency of work performed compared to the To calculate the Earned Value (EV) of a project, you can use the following formula:

Example 3.4.1 : Project X has a budget at completion (BAC) of \$50,000. After one month of work, the project manager assesses the progress and determines that 30% of the work has been completed. Calculate the Earned Value (EV).

Solution :

$$\text{Earned Value (EV)} = \text{Percentage Complete (\%)} \times \text{Total Project Budget (BAC)}$$

$$\text{EV} = 0.30 (30\%) \times \$50,000 = \$15,000$$

The Earned Value for Project X after one month is \$15,000.

Example 3.4.2 : Project Y has a budget at completion (BAC) of \$200,000. At the end of the second quarter, the project manager evaluates the project progress and finds that 60% of the work has been completed. However, the actual costs incurred so far amount to \$120,000. Calculate the Cost Performance Index (CPI) and the Schedule Performance Index (SPI).

Solution:

$$\text{Cost Performance Index (CPI)} = \text{Earned Value (EV)} / \text{Actual Cost (AC)}$$

$$\text{CPI} = \$120,000 (\text{EV}) / \$120,000 (\text{AC}) = 1$$

$$\text{Schedule Performance Index (SPI)} = \text{Earned Value (EV)} / \text{Planned Value (PV)}$$

$$\text{SPI} = \$120,000 (\text{EV}) / \$200,000 (\text{BAC} \times \text{Percentage of work scheduled to be complete at this point})$$

$$\text{SPI} = \$120,000 (\text{EV}) / \$200,000 (0.60) = 0.60$$

The Cost Performance Index (CPI) is 1, indicating that the project is on budget. The Schedule Performance Index (SPI) is 0.60, suggesting that the project is behind schedule.

Example 3.4.3 : Project Z has a budget at completion (BAC) of \$80,000. At the end of the project, the project manager reviews the performance and finds that 90% of the work has been completed. The actual costs incurred throughout the project amount to \$75,000. Calculate the Cost Variance (CV) and the Schedule Variance (SV).

Solution :

$$\text{Cost Variance (CV)} = \text{Earned Value (EV)} - \text{Actual Cost (AC)}$$

$$\text{CV} = \$80,000 (0.90) - \$75,000 = \$72,000 - \$75,000 = -\$3,000$$

$$\text{Schedule Variance (SV)} = \text{Earned Value (EV)} - \text{Planned Value (PV)}$$

$$\text{SV} = \$80,000 (0.90) - \$80,000 = \$72,000 - \$80,000 = -\$8,000$$

The Cost Variance (CV) is -\$3,000, indicating that the project is over budget at this point. The Schedule Variance (SV) is -\$8,000, suggesting that the project is behind schedule.

Review Questions

- Q. 1** Explain the Project Schedule Management processes.
- Q. 2** Give Tools and Techniques of Plan Schedule Management.
- Q. 3** What are the inputs of Control Cost?
- Q. 4** Write short note on Estimate cost.
- Q. 5** Give the outputs of Control Schedule.



Note

4

Project Quality and Risk Management

Syllabus

Project Quality & Risk Management : Quality planning and standards, Quality assurance and control, Process improvement and Six Sigma concept, Risk Management-Risk identification and assessment, Risk response planning, Risk monitoring and control

4.1 Project Quality Management

Project quality management is an essential aspect of project management that focuses on ensuring the project's deliverables and processes meet the specified quality standards and requirements. It involves a series of interrelated processes to plan, control, and ensure the quality of the project throughout its lifecycle.

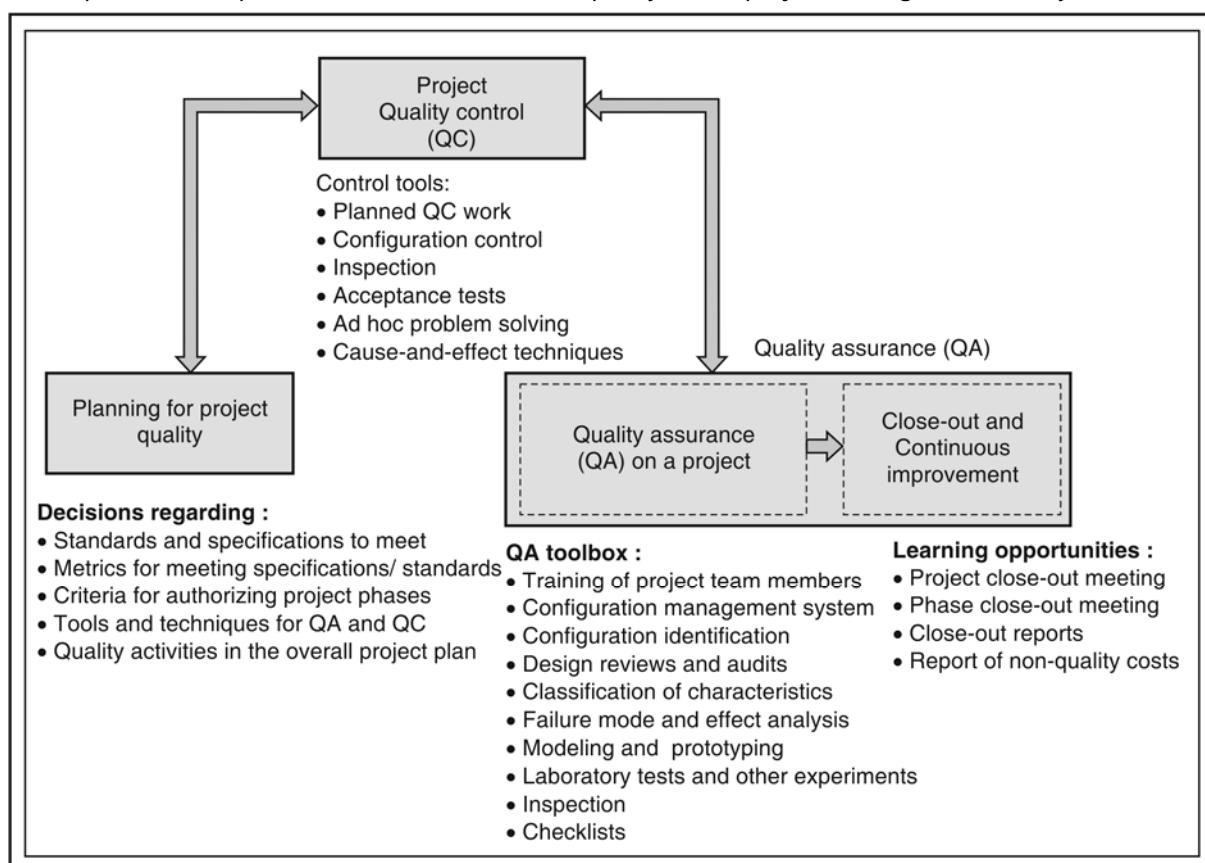


Fig. 4.1.1 : The Project Quality Management Process

The Project Quality Management Process can be divided into the following phases:

- **Quality Planning :** This stage involves the identification of pertinent standards and practices, along with devising strategies for their effective implementation.
- **Quality Assurance :** Here, the primary emphasis is on guaranteeing that the project adheres to and executes the quality standards established during the planning phase.
- **Quality Control :** This step is responsible for verifying that the products align with the quality criteria established in the planning phase.

4.1.1 Quality Planning

- Quality Planning involves figuring out the quality rules and standards for the project and its results. It also means recording how the project will show that it follows these rules and standards. This process is really helpful because it guides how we make sure things are good and right during the whole project.
- Quality planning should happen at the same time as other planning activities. For instance, if we need to make changes to what we're creating to meet quality standards, it might affect how much money we spend or how long things take. It's also important to carefully think about the possible problems these changes could cause.

Following are the key steps of Quality Planning in a brief format :

- **Define Objectives :** Set clear quality goals and criteria.
- **Identify Standards :** Determine industry or project-specific standards.
- **Develop Processes :** Design procedures to meet quality goals.
- **Resource Allocation :** Allocate necessary resources for quality.
- **Documentation :** Record plans and standards for reference.

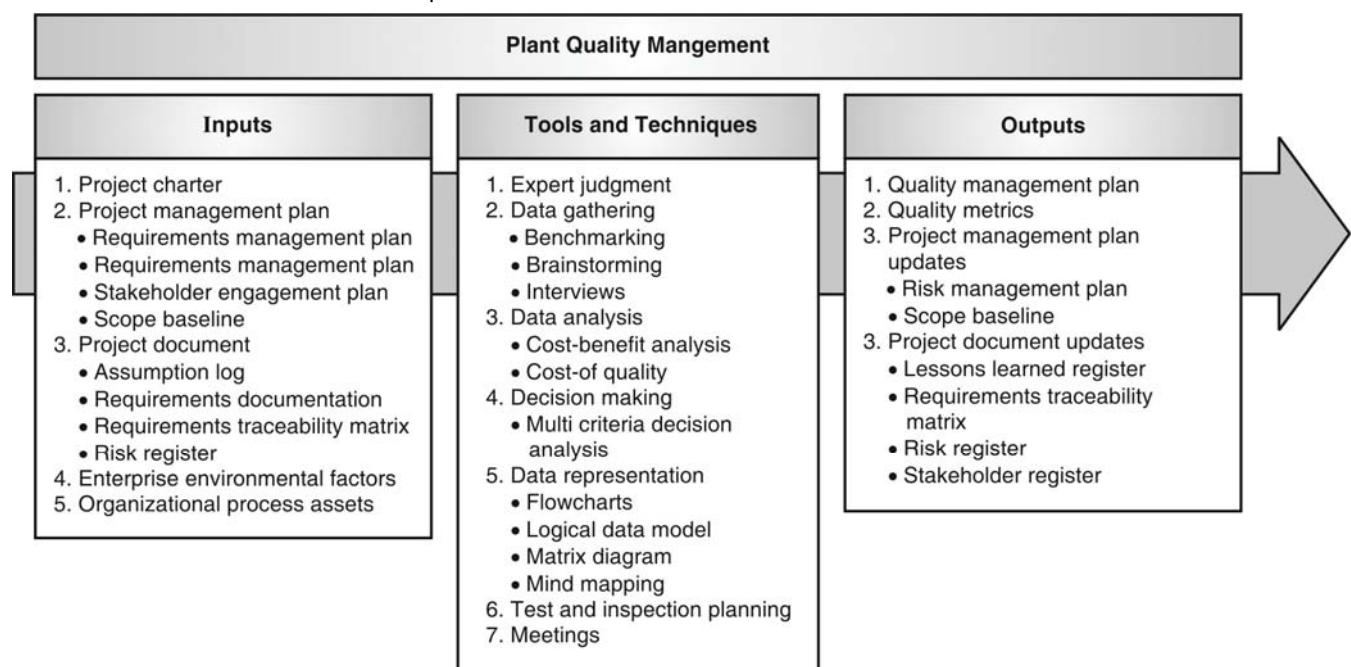


Fig. 4.1.2 : Plan Quality Management

i) Inputs

- **Project Charter** : Described in the project charter, it provides a high-level description of the project and product features. It also contains approval requirements, measurable objectives, and success criteria influencing quality management.
- **Project Management Plan**: This plan encompasses various elements, including the requirements management approach, risk management strategy, stakeholder engagement method, and scope baseline. These components shape quality planning.
- **Project Documents**: Inputs may come from documents like the assumption log (pertaining to quality assumptions and constraints), requirements documentation (project and product expectations), requirements traceability matrix (linking requirements to deliverables for testing), risk register (identifying threats and opportunities impacting quality), and stakeholder register (highlighting those affecting quality).
- **Enterprise Environmental Factors**: External influences like governmental regulations, specific rules and standards, location factors, organizational structure, market conditions, project conditions, and cultural perspectives can shape quality planning.
- **Organizational Process Assets** : The organization's resources, including its quality management system, policies, templates (like check sheets and traceability matrix), and historical information, impact the quality planning process.

ii) Tools and Techniques

- **Expert Judgment** : Involves input from experts with specialized knowledge in quality areas such as assurance, control, measurements, improvements, and systems.
- **Data Gathering** : Techniques like benchmarking (comparing with best practices), brainstorming (creative team input), and interviews (collecting quality needs and expectations) are used.
- **Data Analysis** : Methods include cost-benefit analysis (evaluating quality activity costs versus benefits), and understanding the cost of quality (COQ) – expenses related to prevention, appraisal, and failure.
- **Decision Making** : Multicriteria decision analysis helps prioritize alternatives for implementation based on criteria.
- **Data Representation** : Techniques like flowcharts (process maps), logical data models (visualizing data integrity), matrix diagrams (evaluating relationships), and mind mapping (gathering requirements and constraints) are used.
- **Test and Inspection Planning** : Project teams determine how to test or inspect products or services to meet stakeholder needs.
- **Meetings** : Planning meetings with key stakeholders, experts, and project team member's aid in developing the quality management plan.

iii) Outputs

- **Quality Management Plan** : Part of project management plan detailing execution of guidelines for quality objectives. Includes standards, roles, tools, and procedures.

- **Quality Metrics** : Attribute descriptions for quality verification in Control Quality process. Examples: on-time tasks, cost performance, defects, downtime.
- **Project Management Plan Updates** : Change control system for plan modifications. Influences risk and scope plans.
- **Project Documents Updates**: Quality planning-related updates to documents like lessons learned, requirements traceability matrix, risk and stakeholder registers.
- By utilizing inputs, tools, and outputs, the project is guided toward the successful execution of quality management and alignment with stakeholder expectations.

4.1.2 Quality Assurance

Quality Assurance (QA) is a systematic and proactive process that focuses on preventing defects, errors, and issues in products, processes, and deliverables. It involves implementing established standards, processes, and procedures to ensure that the desired level of quality is achieved and maintained throughout a project or organization. QA activities are designed to verify that the processes used to create products or deliver services are consistent, efficient, and effective in meeting predefined quality standards and objectives.

Following are the key steps of Quality Assurance in a concise format :

- **Process Design** : Develop clear processes and standards.
- **Training** : Train team members on quality requirements.
- **Implementation** : Apply processes consistently.
- **Auditing** : Regularly review and assess adherence.
- **Continuous Improvement** : Use feedback to enhance processes.

i) Inputs

- **Quality Management Plan** : Describes project-specific quality assurance approaches. Arises from the Plan Quality process.
- **Process Improvement Plan** : Outlines continuous process improvement strategies. Result of the Plan Quality process.
- **Quality Metrics** : Specifies measurable attributes and allowable variations. Result of the Plan Quality process.
- **Quality Control Measurements** : Outcomes of activities in the Perform Quality Control process. Used for process quality analysis here.
- **Project Documents** : Monitored for consistent use across the project team, ensuring version coherence (configuration management).

ii) Tools and Techniques

- **Quality Management and Control Tools** : Alongside the tools from the Plan Quality and Perform Quality Control processes, seven additional tools are utilized:
 - Affinity Diagrams
 - Process Decision Program Charts (PDPC)

- Interrelationship Digraphs
- Tree Diagrams
- Prioritization Matrices
- Activity Network Diagrams
- Matrix Diagrams
- **Quality Audits :** A systematic process assessing project activities' alignment with organizational quality policies, processes, and procedures. Compliant practices are incorporated into lessons learned, while non-compliant ones are rectified.
- **Process Analysis :** Identifies process enhancements and preventive actions through root-cause analysis.

iii) Outputs

- Change requests, which are directed to the Perform Integrated Change Control process for further consideration.
- Updates to the Project Management Plan, specifically affecting the Quality Management Plan, Scope Management Plan, Schedule Management Plan, and Cost Management Plan.
- Updates to various Project Documents, such as Quality Audit Reports, Training Plans, and Process Documentation.
- Updates to Organizational Process Assets (OPAs), including the organization's Quality Standards and the Quality Management System (Guidelines, Policies, Procedures).
- By utilizing inputs, tools, and outputs, Quality Assurance (QA) emerges as a methodical and proactive process dedicated to averting defects, errors, and complications in products, processes, and deliverables.

4.1.3 Quality Control

- Control Quality involves overseeing and documenting the outcomes of quality management tasks to evaluate performance and guarantee that project deliverables are thorough, accurate, and align with customer expectations. The main advantage of this process lies in confirming that project outcomes and efforts fulfil the criteria outlined by essential stakeholders for ultimate approval. Control Quality establishes whether the project outputs fulfil their intended purposes and adhere to relevant standards, prerequisites, laws, and specifications. This process is carried out continuously throughout the project lifecycle.

Following are the key steps of Quality Control in a succinct format:

- **Plan :** Establish quality standards and criteria.
- **Execute :** Implement processes according to the plan.
- **Inspect :** Monitor and assess results for compliance.
- **Correct :** Address any deviations or issues found.
- **Learn :** Continuously improve based on insights gained.

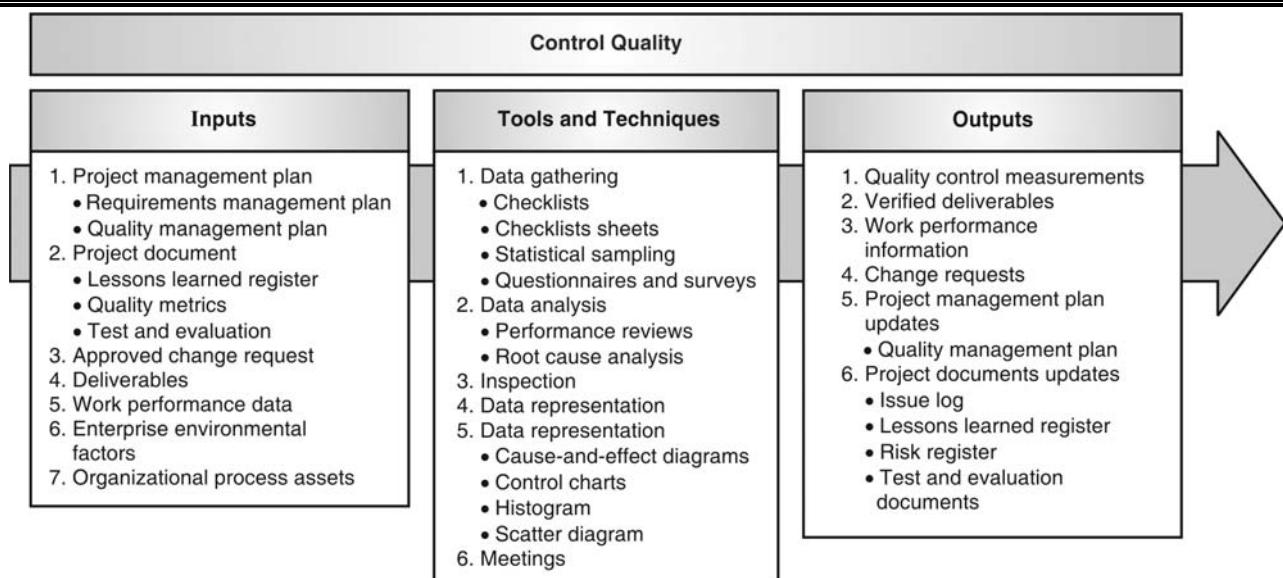


Fig. 4.1.3 : Control Quality: Inputs, Tools & Techniques, and Outputs

i) Inputs

- **Project Management Plan :** The quality management plan defines the approach for quality control within the project.
- **Project Documents :** Relevant documents like lessons learned register, quality metrics, and test and evaluation documents contribute valuable insights.
- **Approved Change Requests :** Changes approved through the Perform Integrated Change Control process may impact quality control methods.
- **Deliverables :** Outputs from the Direct and Manage Project Work process are inspected against defined acceptance criteria.
- **Work Performance Data :** Contains technical measurements, quality metrics, and project performance data.
- **Enterprise Environmental Factors :** Factors like project management information systems, regulations, and standards influence quality control.
- **Organizational Process Assets :** Quality standards, templates, and defect reporting procedures shape the quality control process.

ii) Tools and Techniques

Control Quality employs diverse techniques to ensure project deliverables meet quality expectations :

- **Data Gathering :** Utilizes checklists, statistical sampling, and surveys.
- **Data Analysis :** Includes performance reviews and root cause analysis.
- **Inspection :** Examines work products for conformance.
- **Testing/Product Evaluations :** Systematically tests to identify defects.
- **Data Representation :** Uses diagrams, charts, histograms, and scatter plots.
- **Meetings :** Reviews change requests and conducts retrospectives.

iii) Outputs

- **Quality Control Measurements** : Documented results of Control Quality actions, aligned with the quality plan.
- **Verified Deliverables** : Assessed outputs, confirmed for correctness, becoming inputs for formal acceptance.
- **Work Performance Information** : Includes fulfilment status, rejections, rework needs, corrective recommendations, verified deliverables, quality metric updates, and process adjustment requirements.
- **Change Requests** :: Triggered by changes affecting project plan components, reviewed through Integrated Change Control.
- **Project Management Plan Updates** : Reflect changes via change requests, including adjustments to quality management plans.
- **Project Documents Updates** : Modified documents, such as issue logs, lessons learned, risk registers, and test/evaluation records, capturing insights and enhancing future processes.
- Through the utilization of these inputs, tools, and outputs, the Control Quality process establishes a systematic approach to monitor, evaluate, and enhance the quality of project deliverables.

4.2 Process Improvement

Process improvement in project management refers to the systematic effort of identifying, analysing, and enhancing the various processes and workflows involved in managing a project. The goal of process improvement is to optimize efficiency, effectiveness, quality, and overall project performance. It involves a continuous cycle of evaluating existing processes, identifying areas for improvement, implementing changes, and monitoring the outcomes to ensure sustained enhancements.

Key aspects of process improvement in project management include :

- **Identifying Inefficiencies** : The first step is to identify processes or activities within the project management lifecycle that are inefficient, redundant, or not adding value. This can be done through data analysis, feedback from stakeholders, and benchmarking against industry best practices.
- **Analysis and Evaluation** : Once inefficiencies are identified, a thorough analysis is conducted to understand the root causes and underlying issues. This may involve using techniques like process mapping, flowcharts, and data analysis to pinpoint bottlenecks or areas of waste.
- **Defining Improvement Strategies** : Based on the analysis, improvement strategies and solutions are formulated. This could involve streamlining workflows, eliminating unnecessary steps, automating manual processes, or introducing new tools and technologies.
- **Implementing Changes** : The identified improvements are implemented in a controlled manner. This may involve training team members on new processes, updating documentation, and ensuring that changes are rolled out smoothly.
- **Monitoring and Measurement** : After implementing changes, on-going monitoring and measurement are crucial to assess the impact of the improvements. Key performance indicators (KPIs) are established to track progress and determine whether the desired outcomes are being achieved.

- **Feedback and Adaptation :** Feedback from project team members and stakeholders is essential to fine-tune the improvements and make necessary adjustments. Lessons learned from the implementation process are documented and used to inform future process improvement initiatives.
- **Continuous Improvement Cycle :** Process improvement is an iterative process that follows a continuous improvement cycle. As one set of improvements is implemented and monitored, the focus shifts to identifying new areas for enhancement and repeating the improvement cycle.
- Benefits of process improvement in project management include increased efficiency, reduced costs, improved quality, enhanced stakeholder satisfaction, and better project outcomes. It also contributes to the organization's ability to adapt to changing circumstances and evolving project requirements.
- Overall, process improvement is a fundamental aspect of effective project management, contributing to the success and competitiveness of an organization in delivering projects on time, within budget, and to the desired level of quality.

4.2.1 Six Sigma Concept

A Six Sigma is a comprehensive and structured methodology aimed at improving the quality of processes and products within an organization. It focuses on minimizing defects, reducing variation, and enhancing overall performance to achieve near-perfect results. Originally developed at Motorola in the 1980s and popularized by companies like General Electric, Six Sigma has become a widely adopted approach to process improvement across various industries.

The term "Six Sigma" refers to a statistical concept that measures the spread or variation in a process. In a normal distribution, which is often represented as a bell curve, the symbol " σ " (sigma) represents the standard deviation, a measure of how much the values deviate from the mean. Achieving Six Sigma quality means that the process is so well controlled that it produces only 3.4 defects per million opportunities, indicating a high level of precision and consistency.

Six Sigma methodologies is typically implemented through a series of steps known as the DMAIC cycle, which stands for Define, Measure, Analyze, Improve, and Control.

Here's an overview of each step :

- **Define :** Clearly define the problem or opportunity for improvement. Establish project goals, objectives, scope, and boundaries. Identify key stakeholders and understand their requirements and expectations.
- **Measure :** Collect and analyse relevant data to quantify the current state of the process. Identify critical process metrics, or "key performance indicators" (KPIs), and establish a baseline measurement. This step helps determine the extent of the problem and provides a foundation for improvement.
- **Analyse :** Analyse the collected data to identify root causes of defects or issues. Use statistical tools and techniques to identify factors contributing to process variation. Determine which variables have the most significant impact on the process outcome.
- **Improve :** Develop and implement solutions to address the identified root causes. Experiment with process changes and modifications, and use statistical analysis to validate the effectiveness of the improvements. Optimize the process to achieve desired outcomes.

- **Control :** Establish control mechanisms to sustain the improvements and prevent regression. Develop monitoring and measurement systems to track on-going performance. Implement standardized processes and provide training to ensure that improvements are maintained over time.

Key principles and components of Six Sigma include :

- Focus on customer requirements and satisfaction.
- Data-driven decision-making and problem-solving.
- The use of statistical tools and techniques to analyse and improve processes.
- Cross-functional teams working together to achieve improvements.
- Leadership commitment and support for continuous improvement initiatives.
- Training and certification programs to develop Six Sigma practitioners (e.g., Green Belts, Black Belts, Master Black Belts).
- By applying Six Sigma principles and methods, organizations can streamline processes, reduce waste, improve efficiency, enhance customer satisfaction, and ultimately achieve higher levels of quality and performance.

4.3 Project Risk Management

4.3.1 Risk Identification

Risk identification is a fundamental step in project risk management that involves identifying potential risks that could impact a project's objectives. This process helps ensure that all potential sources of uncertainty are recognized and considered.

Following are the key steps of Risk Identification in a concise format :

- **Brainstorming :** Gather team to generate potential risks.
- **Checklists :** Use predefined lists to prompt risk ideas.
- **Stakeholder Input :** Seek insights from project stakeholders.
- **Document Review :** Analyse past project data and lessons learned.
- **Expert Judgment :** Consult experienced individuals for risk insights.

Following are the inputs, tools and outputs involved in risk identification:

i) Inputs

- **Project Management Plan :** This includes the overall project plan, scope statement, schedule, budget, and other relevant documents that provide a comprehensive understanding of the project's goals, objectives, and constraints.
- **Project Documents :** Various project documents, such as requirements documentation, stakeholder registers, lessons learned from previous projects, and organizational process assets, provide valuable information about the project's context and potential risks.
- **Stakeholder Engagement :** Input from stakeholders, including team members, sponsors, customers, and subject matter experts, can provide insights into potential risks from different perspectives.

- **Expert Judgment :** Involving experts with relevant experience and domain knowledge can help in identifying risks that might not be obvious to others.

ii) Tools and Techniques

- **Brainstorming :** A group discussion where project team members and stakeholders generate ideas and potential risks related to the project.
- **Checklists :** Predefined lists of common risks or risk categories that can help prompt thinking about potential risks.
- **SWOT Analysis :** Assessing the project's strengths, weaknesses, opportunities, and threats to identify potential risks.
- **Documentation Reviews :** Reviewing project documentation to identify risks that have been encountered in similar projects or lessons learned from past projects.
- **Assumptions Analysis :** Identifying and challenging assumptions made during project planning to uncover potential risks.

iii) Outputs

- **Risk Register :** A comprehensive list of identified risks, along with their descriptions, potential impact, likelihood, and initial assessment of their significance.
- **Risk Documentation :** Detailed information about each identified risk, including its description, potential consequences, triggers, and any relevant notes.
- **Risk Categories :** Grouping risks into categories based on their common characteristics or sources, which can help in organizing and managing them effectively.
- **Risk Statements :** Clear and concise descriptions of individual risks, highlighting their potential effects on the project objectives.
- **Initial Risk Assessment :** Preliminary evaluation of risks, often in terms of their impact and likelihood, to prioritize them for further analysis and response planning.

Effective risk identification ensures that project teams are well-prepared to manage potential uncertainties and threats. The outputs of this process serve as a foundation for subsequent risk management activities, such as risk assessment, response planning, monitoring, and control.

4.3.2 Risk Assessment

Risk Assessment is a critical phase in project risk management that involves evaluating and prioritizing identified risks based on their potential impact and likelihood. The process helps project teams focus their efforts on addressing the most significant risks to ensure project success.

Following are the key steps of Risk Assessment in a concise format :

- **Identification :** Identify and list potential project risks.
- **Analysis :** Evaluate impact and likelihood of each risk.
- **Prioritization :** Rank risks based on their significance.
- **Qualitative/Quantitative :** Use qualitative or quantitative methods for assessment.
- **Updated Register :** Keep the risk register updated with assessments.

Following are the inputs, tools, and outputs involved in risk assessment:

i) Inputs

- **Risk Register** : The list of identified risks from the previous step (risk identification) serves as the primary input for risk assessment. Each risk is described with details such as its description, potential consequences, triggers, and initial assessment.
- **Risk Data** : Information gathered about each risk, such as historical data, expert opinions, and industry benchmarks, provides context for evaluating potential impacts and likelihoods.
- **Project Documentation** : The project management plan, scope statement, schedule, budget, and other project documents provide a foundation for understanding the project's goals, objectives, constraints, and context.
- **Stakeholder Engagement** : Input from stakeholders, including their perspectives on risks and potential impacts can influence the assessment process.

ii) Tools and Techniques

- **Probability and Impact Matrix** : This tool involves categorizing risks based on their probability of occurrence and potential impact on the project. It helps prioritize risks by assigning them qualitative values (e.g., low, medium, high) for both likelihood and consequence.
- **Qualitative Risk Analysis** : Assessing risks using descriptive scales to determine their significance. Risks are often evaluated based on their probability and impact, and then ranked or categorized accordingly.
- **Quantitative Risk Analysis** : In cases where sufficient data is available, quantitative techniques are used to assign numerical values to probabilities and impacts. This allows for a more precise assessment of risks and their potential effects.
- **Risk Scoring Models** : These models use predefined criteria to assign scores to risks, helping in ranking and prioritizing them based on their combined scores.

iii) Outputs

- **Prioritized Risk List** : The primary output of risk assessment is a list of risks ranked or categorized based on their potential impact and likelihood. This list helps project teams understand which risks require immediate attention.
- **Risk Assessment Matrix** : A matrix that visually presents the assessed risks, their probabilities, impacts, and severity scores. This matrix helps project managers and stakeholders quickly identify high-priority risks.
- **Updated Risk Register** : The risk register is updated with additional details, such as the assessed impact and likelihood, and any changes in the risk rankings.
- **Risk Assessment Report** : A comprehensive report summarizing the findings of the risk assessment process, including the rationale for prioritizing certain risks and the potential implications for the project.
- Effective risk assessment provides project teams with a clear understanding of the project's risk landscape, enabling them to allocate resources and develop appropriate strategies to manage and mitigate the identified risks.

4.3.3 Risk Response Planning

Risk Response Planning is a crucial process in project risk management that involves developing strategies and action plans to address identified risks. This proactive approach aims to either mitigate the impact of risks or take advantage of potential opportunities.

Key steps of Risk Response Planning are as follows :

- **Prioritization:** Identify and rank risks based on their impact and likelihood.
- **Threat Strategies:** Choose how to address negative risks – avoid, mitigate, transfer, or accept.
- **Opportunity Strategies:** Decide how to leverage positive risks – exploit, enhance, share, or accept.
- **Action Plans:** Develop detailed steps and responsibilities for chosen strategies.
- **Contingency/Fallback:** Create backup plans for risks that can't be fully addressed.

Following are the inputs, tools, and outputs involved in Risk Response Planning:

i) Inputs

- **Risk Register :** The list of identified risks serves as the primary input. This register contains detailed information about each risk, including its description, potential consequences, triggers, and initial assessment.
- **Risk Assessment Results :** Information from the risk assessment phase, including the prioritized list of risks and their assessed probabilities, impacts, and severities, guides the response planning process.
- **Project Management Plan :** The overall project plan, scope statement, schedule, budget, and other relevant documents provide context for developing risk response strategies that align with the project's objectives.
- **Stakeholder Engagement :** Input from stakeholders, especially those who have expertise or insights into specific risks, can provide valuable perspectives for developing effective response plans.

ii) Tools and Techniques

- **Strategies for Negative Risks (Threats) :** Different strategies can be employed for addressing negative risks (threats), including risk avoidance (eliminating the risk altogether), risk mitigation (reducing the impact or likelihood of the risk), risk transfer (shifting the risk to another party), or risk acceptance (acknowledging the risk without taking specific actions).
- **Strategies for Positive Risks (Opportunities) :** For positive risks (opportunities), strategies may include risk exploitation (taking actions to ensure the opportunity occurs), risk enhancement (increasing the likelihood or impact of the opportunity), risk sharing (collaborating with others to maximize the opportunity), or risk acceptance (actively seeking and embracing the opportunity).
- **Contingency and Fallback Plans :** In situations where risks cannot be completely eliminated, contingency plans outline predefined actions to be taken if the risk occurs. Fallback plans detail alternate approaches in case the primary plan are unsuccessful.

iii) Outputs

- **Risk Response Plan :** This comprehensive document outlines the specific actions to be taken for each identified risk. It includes details such as the chosen response strategy, responsible parties, action steps, resources required, and timelines.
- **Contingency Plans :** Plans that define alternative actions to be taken if specific risks materialize. These plans help the project team respond swiftly and effectively to unexpected events.
- **Fallback Plans :** Plans that outline alternative approaches or actions to be taken if the original risk response plan does not yield the desired results.
- **Updates to the Risk Register :** The risk register is updated to include the developed risk response plans, providing a complete record of the project's risk management efforts.
- Risk response planning is essential for minimizing the negative impact of risks and capitalizing on opportunities to enhance project success. By carefully crafting response plans, project teams can navigate uncertainties and improve their ability to achieve project objectives.

4.4 Risk Monitoring

Risk Monitoring is a critical phase in project risk management that involves tracking and assessing identified risks throughout the project lifecycle. This on-going process ensures that risks are managed effectively and any changes or developments are promptly addressed.

Key steps of Risk Monitoring are :

- **Continuous Assessment :** Regularly review and reassess identified risks.
- **Performance Tracking :** Monitor project performance data and indicators.
- **Adaptive Actions :** Adjust response plans as risks evolve.
- **Technical Evaluation :** Analyse technical aspects for potential risks.
- **Lessons Learned :** Document insights for future projects.

Following are the inputs, tools, and outputs involved in Risk Monitoring:

i) Inputs

- **Risk Register :** The list of identified risks serves as the primary input. This register contains detailed information about each risk, including its description, potential consequences, triggers, and initial assessment.
- **Risk Response Plan :** The documented strategies and action plans developed during the risk response planning phase provide a roadmap for addressing specific risks.
- **Project Performance Data :** Information related to project progress, status reports, performance metrics, and any deviations from the project plan provides insights into how risks are affecting the project.
- **Change Requests :** Proposed changes to the project scope, schedule, budget, or other aspects may impact the risk landscape and trigger the need for adjustments in risk response plans.

ii) Tools and Techniques

- **Risk Reassessment** : Regularly reviewing and re-evaluating identified risks to determine if their potential impact and likelihood have changed. This may involve qualitative or quantitative reassessment based on new information.
- **Risk Audits** : Independent reviews of risk management processes and activities to ensure that risks are being effectively addressed and managed according to the established plans.
- **Variance and Trend Analysis** : Comparing actual project performance data against the planned performance to identify any significant deviations or trends that could indicate potential risk occurrences.
- **Technical Performance Analysis** : Assessing technical aspects of the project to detect any potential issues or risks that might arise due to technical complexities or limitations.

iii) Outputs

- **Updated Risk Register** : The risk register is continually updated to reflect changes in risk assessments, newly identified risks, and any modifications to risk response plans.
- **Risk Status Reports** : Regular reports that provide an overview of the current status of identified risks, any actions taken, and the effectiveness of risk response plans.
- **Change Requests** : If risks evolve or new risks are identified, change requests may be generated to modify the project plan, budget, or other aspects to address these changes.
- **Lessons Learned Documentation** : Insights gained from monitoring and addressing risks are documented as lessons learned. This information contributes to future projects by sharing knowledge and best practices.
- Risk monitoring ensures that the project team remains vigilant in tracking risks and making necessary adjustments to keep the project on track. By continuously evaluating the risk landscape and implementing appropriate actions, project teams can minimize the negative impact of risks and enhance the project's overall chances of success.

4.4.1 Risk Control

Risk control is a critical and dynamic process within project management that focuses on actively managing and addressing identified risks. It involves taking deliberate actions to mitigate, prevent, or respond to potential uncertainties that could impact a project's success. The goal of risk control is to minimize the negative effects of risks and enhance the project's ability to achieve its objectives.

Following are the key steps of Risk Control in a brief format :

- **Action Implementation** : Execute planned risk response strategies.
- **On-going Monitoring** : Continuously track risk status and developments.
- **Adaptation** : Adjust response plans based on changing circumstances.
- **Technical Analysis** : Assess technical complexities for potential risks.
- **Lessons Learned** : Document insights gained for future projects.

Following are the inputs, tools, and outputs involved in Risk Control:

i) Inputs

- **Risk Register** : The list of identified risks serves as a primary input. It contains detailed information about each risk, including its description, potential consequences, triggers, and initial assessment.
- **Risk Response Plan** : The documented strategies and action plans developed during the risk response planning phase guide the implementation of specific actions to address risks.
- **Project Performance Data** : Information related to project progress, status reports, performance metrics, and deviations from the project plan provides insights into how risks are affecting the project.
- **Change Requests** : Proposed changes to the project scope, schedule, budget, or other aspects may arise due to risks, necessitating adjustments in risk response plans.

ii) Tools and Techniques

- **Risk Reassessment** : Continuously evaluating identified risks to determine if their potential impact and likelihood have changed. This may involve qualitative or quantitative reassessment based on new information.
- **Technical Performance Analysis** : Assessing technical aspects of the project to identify potential issues or risks that may arise due to technical complexities or limitations.
- **Audit and Review** : Conducting regular reviews and audits of risk management processes and activities to ensure that risks are being effectively controlled according to the established plans.
- **Status Meetings** : Regular meetings to discuss the current status of risks, the effectiveness of risk response plans, and any new developments that may impact the project's risk landscape.

iii) Outputs

- **Updated Risk Register** : The risk register is continually updated to reflect changes in risk assessments, newly identified risks, and any modifications to risk response plans.
- **Change Requests** : If risks evolve or new risks are identified, change requests may be generated to modify the project plan, budget, or other aspects to address these changes.
- **Risk Control Actions** : Specific actions taken to address or mitigate risks based on the strategies outlined in the risk response plan.
- **Lessons Learned Documentation** : Insights gained from risk control activities are documented as lessons learned, contributing to future projects by sharing knowledge and best practices.

Risk control ensures that the project team remains proactive in addressing risks and taking necessary actions to manage uncertainties effectively. By actively implementing risk response plans and closely monitoring the risk landscape, project teams enhance their ability to navigate challenges and ensure successful project outcomes.

Review Questions

- Q. 1** What is Project quality management?
- Q. 2** Write short note on Quality Assurance (QA).
- Q. 3** Explain Six Sigma Concept.
- Q. 4** Explain Project Risk Management.



Note

5

Project Resource and Procurement Management

Syllabus

Project Resource & Procurement Management : Team development and roles, Staffing, training, and motivation, Conflict resolution and communication management, Procurement planning and contract types, Solicitation, source selection, and contract administration, Vendor management and relationship building.

Project Integration Management : Project integration processes and activities, Change management & project closure, Lessons learned and knowledge transfer

5.1 Project Resource Management

Project Resource Management refers to the processes and activities involved in effectively planning, acquiring, allocating, and utilizing the various resources required to successfully execute a project. Resources in this context can encompass a wide range of elements, including human resources (project team members and stakeholders), materials, equipment, facilities, and any other assets necessary for project completion. The primary goal of project resource management is to ensure that the right resources are available at the right time, in the right quantity, and at the right cost to achieve project objectives.

5.1.1 Develop Team

Team development refers to the deliberate and systematic process of improving the performance, collaboration, and effectiveness of a group of individuals working together toward a common goal. It involves enhancing the team's interpersonal relationships, communication, skills, and overall dynamics to optimize their ability to achieve desired outcomes.

Process of Development Team is as follows :

The process of team development typically follows a series of stages as the team evolves and matures. One of the most widely recognized models for team development is Bruce Tuckman's "Forming, Storming, Norming, Performing, Adjourning" (or "Tuckman's Stages") model.

Following are the stages :

1. Forming

- In this initial stage, team members come together, often with a sense of anticipation and curiosity.
- Roles and responsibilities may not be well-defined, and individuals may be polite and cautious in their interactions.
- Team members start to get to know each other and build relationships.

2. Storming

- As the team starts working on tasks, conflicts and differences may arise due to varying opinions, personalities, and work styles.
- Disagreements, power struggles, and challenges to authority can occur during this stage.
- Effective teams work through conflicts, establish norms, and find ways to collaborate despite differences.

3. Norming

- Team members start to resolve their differences and establish clearer roles, norms, and expectations.
- Collaboration becomes smoother as trust and respect grow.
- Team cohesion and camaraderie strengthen as individuals align around common goals.

4. Performing

- In this stage, the team is highly functional, with clear roles, effective communication, and a strong sense of purpose.
- Team member's works together smoothly to achieve goals, solves problems, and make decisions.
- Creativity and innovation flourish, and the team produces high-quality results.

5. Adjourning (or Transforming)

- In this final stage, the project is completed, and the team disbands (for temporary teams) or transitions to new tasks or projects (for on-going teams).
- Team members reflect on their accomplishments and the experiences gained during the project.
- Lessons learned are documented, and successes are celebrated.
- It's important to note that while the "Forming, Storming, Norming, Performing, Adjourning" model provides a structured framework for team development, not all teams follow this exact progression. Some teams may cycle back to earlier stages when new challenges arise or when team membership changes. Effective team development requires on-going efforts to nurture relationships, address conflicts, and foster a positive team culture throughout the project's lifecycle.

5.1.2 Roles

Roles in project management refer to specific positions and responsibilities that individuals assume to ensure the successful planning, execution, and completion of a project. Each role has distinct tasks and duties that contribute to the overall project objectives.

Following are some key roles commonly found in project management:

1. **Project Manager (PM)** : The leader who is responsible for planning, executing, and closing a project, ensuring it meets its objectives and is completed within scope, time, and budget constraints. The Project Manager leads and guides the project, ensuring its successful execution, adherence to timelines and budgets, and alignment with organizational goals. They coordinate tasks, allocate resources, manage risks, facilitate communication, and make critical decisions to drive project progress.

2. **Project Sponsor :** A senior-level individual or group that provides financial support, advocacy, and strategic direction for the project. The Project Sponsor provides essential support by securing funding, advocating for the project's importance, and offering strategic direction. They help remove obstacles, ensure alignment with business objectives, and make high-level decisions to ensure project success.
3. **Project Team Members :** Individuals with specific roles and skills contributing to project tasks and deliverables. Project Team Members contribute their specialized skills and expertise to execute tasks, collaborate with colleagues, and deliver project outcomes. They actively engage in teamwork, share insights, and work diligently to meet project milestones.
4. **Stakeholders :** Individuals or groups affected by or having an interest in the project's outcome. Stakeholders are individuals or groups directly impacted by or having a vested interest in the project's outcome. They provide valuable input, offer requirements, and maintain a keen interest in project progress to ensure it aligns with their needs.
5. **Business Analyst :** Analyses project requirements; gathers user needs, and translates them into functional specifications. The Business Analyst plays a crucial role in understanding and translating user needs and business requirements into actionable project specifications. They bridge the gap between technical teams and business stakeholders to ensure effective communication.
6. **Subject Matter Experts (SMEs) :** Individuals with specialized knowledge relevant to specific project aspects. Subject Matter Experts bring their deep domain knowledge and insights to guide decision-making, solve complex problems, and provide valuable guidance on specific aspects of the project.
7. **Project Co-ordinator :** Assists the project manager with administrative tasks, communication, and coordination. The Project Co-ordinator assists the Project Manager with administrative tasks, facilitates communication among team members, schedules meetings, and helps ensure smooth project operations.
8. **Risk Manager :** Identifies, assesses, and manages potential risks that may impact the project's success. The Risk Manager identifies potential risks that could impact the project's success, develops strategies to mitigate them, and monitors their status throughout the project lifecycle.
9. **Quality Assurance/Quality Control (QA/QC) Specialist :** Ensures project deliverables meet defined quality standards and are free from defects. The QA/QC Specialist ensures project deliverables meet predetermined quality standards and are free from defects, contributing to the overall success and reliability of the project's outcomes.
10. **Change Manager :** Manages changes to project scope, requirements, and objectives to ensure alignment with project goals. The Change Manager navigates changes to project scope, requirements, and objectives, ensuring that modifications are effectively evaluated, approved, communicated, and integrated into the project plan.
11. **Procurement Manager :** Oversees procurement processes, vendor selection, and contract management. The Procurement Manager oversees the procurement process, including vendor selection, contract negotiation, and relationship management, ensuring the project has the necessary resources and services to succeed.
12. **Communications Manager :** Develops and implements a communication plan to ensure effective information flow among stakeholders. The Communications Manager develops and implements a

communication plan to ensure efficient information sharing among stakeholders, fostering engagement, collaboration, and a clear understanding of project progress and updates.

- These roles, among others, work collaboratively to ensure a project's successful initiation, execution, and completion, contributing their unique skills and expertise to achieve the desired project outcomes.

5.2 Staffing

Staffing in project management refers to the process of selecting, acquiring, and managing the right individuals with the appropriate skills, expertise, and experience to fulfill the roles and responsibilities required for a project's successful execution.

Effective staffing ensures that the project team is adequately equipped to deliver high-quality results within the project's scope, schedule, and budget constraints. This process involves identifying staffing needs, recruiting or assigning team members, providing training and support, managing their performance, and fostering a collaborative and productive work environment. Proper staffing contributes to efficient task completion, optimal resource utilization, and ultimately the achievement of project objectives.

Steps involved in staffing process are as follows :

- **Identify Staffing Needs :** Determine the specific roles, skills, and expertise required for the project. Define the responsibilities and qualifications for each role.
- **Resource Availability Assessment :** Assess the availability of existing team members within the organization who possess the required skills. Determine if any gaps need to be filled by external hires or contractors.
- **Recruitment and Selection :** If external resources are needed, initiate the recruitment process. Advertise job openings, review resumes, conduct interviews, and select candidates who best match the project's requirements.
- **Team Assignment :** Assign selected or existing team members to their respective roles and responsibilities within the project. Ensure each member understands their role and the project's objectives.
- **Skill Development :** Identify any skill gaps among team members and provide necessary training or development opportunities to enhance their abilities and contribute effectively to the project.
- **Team Integration :** Facilitate team integration by conducting orientation sessions, introducing team members, and fostering a positive team culture. Promote collaboration and effective communication.
- **Performance Management :** Continuously monitor and evaluate team members' performance. Provide feedback, recognize achievements, and address any performance issues promptly to ensure project goals are met.
- **Resource Allocation :** Efficiently allocate team members to project tasks based on their skills and availability. Avoid overloading team members while ensuring balanced workloads.
- **Communication :** Maintain open and transparent communication with the project team. Clearly communicate project objectives, expectations, timelines, and any changes that may affect team members.
- **Conflict Resolution :** Address conflicts or disagreements among team members promptly and constructively. Foster a supportive environment that encourages teamwork and collaboration.

- **Motivation and Engagement :** Keep team members motivated and engaged by recognizing their contributions, providing opportunities for growth, and ensuring a positive working atmosphere.
- **On-going Management :** Continually manage and adjust staffing as needed throughout the project lifecycle. Monitor team performance, address challenges, and make necessary changes to maintain project success.

By following these steps, project managers can effectively staff their projects with the right people, ensuring the team is well-equipped to deliver successful outcomes.

5.2.1 Training

Training in project management involves equipping individuals with the knowledge, skills, and techniques necessary to effectively plan, execute, and manage projects. This training aims to enhance project management competency, improve performance, and ensure successful project delivery.

Key steps in training are as follows :

- **Needs Assessment :** Identify skill gaps and training requirements for team members. Understand areas where training is needed to enhance project management competencies.
- **Training Plan :** Develop a training plan outlining the specific courses, workshops, or learning opportunities required for each team member.
- **Training Delivery :** Provide project management training through workshops, online courses, seminars, or specialized training programs.
- **Tailored Content :** Customize training content to address the unique challenges and requirements of the project and align with the organization's project management methodology.
- **Skill Development :** Offer training in project management methodologies, tools, techniques, communication, leadership, and other relevant areas to enhance team members' skills.
- **Application to Projects :** Encourage participants to apply newly acquired knowledge and skills to real project scenarios, reinforcing their learning.
- **Certification :** Offer certification options for team members to validate their project management skills and expertise.
- **Continuous Learning :** Promote a culture of continuous learning by providing access to resources, webinars, and forums to stay updated on project management trends.
- **Feedback and Improvement :** Gather feedback from participants to continuously improve training programs, address gaps, and enhance the effectiveness of future training initiatives.

5.2.2 Motivation

Motivation is like a booster that helps people and teams achieve big goals. It creates a teamwork atmosphere where everyone works together for the same targets. The level of motivation among people can impact various aspects of a project, including meeting deadlines, staying on budget, ensuring high quality, and delivering what the customer needs. So, project managers should figure out what might make people less motivated and work to keep everyone excited and motivated to make the project successful.

Key Steps in Motivation

- **Understanding Individual Needs :** Get to know what drives and inspires each team member on a personal level. Understand their goals, interests, and values.
- **Setting Clear Goals :** Define clear and achievable goals for individuals and the team as a whole. Goals give a sense of purpose and direction.
- **Providing Autonomy :** Allow team members to have a say in how they approach tasks and make decisions. Autonomy fosters a sense of ownership and responsibility.
- **Recognition and Rewards :** Recognize and reward accomplishments and efforts, whether through verbal praise, incentives, or public acknowledgment.
- **Encouraging Skill Development :** Provide opportunities for skill enhancement and learning, contributing to personal growth and job satisfaction.
- **Effective Communication :** Maintain open and transparent communication, sharing project updates, expectations, and feedback regularly.
- **Creating a Positive Environment :** Foster a positive work atmosphere that promotes collaboration, trust, and camaraderie among team members.
- **Challenging Work :** Assign tasks that are interesting and challenging, promoting engagement and a sense of accomplishment.
- **Feedback and Support :** Offer constructive feedback, guidance, and support to help team members improve and overcome obstacles.
- **Lead by Example :** Project enthusiasm, commitment, and a strong work ethic as a role model for team members.
- **Personalized Approach :** Tailor motivation strategies to suit individual preferences and needs, recognizing that what motivates one person may differ from another.
- **Regular Check-Ins :** Schedule regular check-ins to discuss progress, address concerns, and provide guidance, ensuring everyone stays aligned and motivated.

By following these key steps, project managers can create a motivating environment that boosts team morale, engagement, and overall project success.

5.3 Conflict Resolution

Conflict resolution in project management refers to the systematic process of addressing and resolving disagreements, disputes, or differences that arise among project team members, stakeholders, or other involved parties.

It involves identifying, understanding, and finding solutions to conflicts in a way that promotes effective communication, cooperation, and the achievement of project objectives. The steps include recognizing conflicts, understanding their causes, evaluating their impact, brainstorming solutions, negotiating agreements, implementing changes, and monitoring outcomes to ensure sustained harmony and project success.

Conflict Resolution Steps in Project Management

- **Identification** : Recognize and acknowledge the presence of a conflict. This involves understanding the issues and parties involved.
- **Understanding** : Gather information to comprehend the nature and root causes of the conflict. Listen to the perspectives of all parties involved.
- **Evaluation** : Assess the impact of the conflict on the project, team dynamics, and objectives. Determine the urgency and significance of resolution.
- **Resolution Options** : Brainstorm and explore potential solutions. Consider alternatives that address the underlying causes of the conflict.
- **Negotiation** : Engage in open discussions with the parties involved to find a mutually acceptable solution. Seek compromises and common ground.
- **Agreement** : Reach a consensus on the chosen resolution. Ensure all parties are committed to the agreed-upon solution.
- **Implementation** : Put the resolution plan into action. Assign responsibilities and monitor progress to ensure the agreed-upon changes are being implemented.
- **Follow-Up** : Continuously assess the effectiveness of the resolution. If needed, make adjustments and communicate any changes to maintain harmony.

Conflict Resolution Strategies in Project Management

- **Collaboration** : Encourage open communication and problem-solving among conflicting parties to find a win-win solution that benefits everyone.
- **Compromise** : Both parties make concessions to reach a middle ground that partially satisfies each side's needs.
- **Avoidance** : Temporarily set aside the conflict if it's not critical to the project's success, but remain vigilant for potential escalation.
- **Accommodation** : One party yields to the other's needs or preferences to maintain harmony, often when the issue is less significant.
- **Competing** : Assertive approach where one party's interests take precedence over the other's, suitable for time-sensitive or critical decisions.
- **Communication Improvement** : Enhance communication and clarity to prevent misunderstandings that lead to conflict.
- **Training and Education** : Provide conflict resolution training and education to team members to equip them with the skills needed to handle conflicts effectively.
- **Mediation** : Involve a neutral third party to facilitate discussions and guide conflicting parties toward resolution.

By employing these conflict resolution steps and strategies, project managers can manage conflicts constructively, foster collaboration, and maintain a productive project environment.

5.4 Communication Management

- Project Communications Management involves the necessary steps to ensure the right planning, gathering, generating, sharing, storing, fetching, overseeing, controlling, monitoring, and final handling of project-related information.
- A significant portion of a project manager's time is devoted to communicating with various parties, including team members and external stakeholders. These stakeholders can be from inside the organization, spanning all levels, or from outside it.
- Effective communication serves as a link between diverse stakeholders who may come from different cultural and organizational backgrounds, possess varying expertise, and hold distinct viewpoints and interests. These differences can affect how a project is carried out and its following are the steps in Project Communications Management :
 - **Plan Communications Management :** This involves creating a suitable strategy and plan for project communications, considering the information needs of stakeholders and available organizational resources.
 - **Manage Communications :** This step includes generating, collecting, sharing, storing, retrieving, and properly handling project information, following the outlined communications plan.
 - **Control Communications :** This process oversees and manages communications across the entire project journey, ensuring that stakeholders' information requirements are fulfilled and maintaining control over the flow of information.

5.5 Project Procurement Management

Project Procurement Management is one of the ten knowledge areas defined by the Project Management Institute (PMI) within the project management framework. It focuses on the processes and activities necessary to acquire goods, services, or works from external sources to support the project's objectives. This knowledge area encompasses the planning, selection, negotiation, contracting, and management of vendors and suppliers to ensure that project needs are met effectively and efficiently.

5.5.1 Procurement Planning

Procurement Planning is an important process in project management that involves systematically outlining how a project's goods and services will be acquired, sourced, and managed to fulfill project requirements. It encompasses a series of steps, inputs, tools, and outputs to ensure effective procurement strategies and successful project execution.

Key Steps in Procurement Planning

- **Identify Procurement Needs :** Determine the goods, services, or resources required for the project, considering quality, quantity, and specifications.
- **Analyse Procurement Requirements :** Assess the identified needs to establish a comprehensive understanding of procurement necessities.

- **Determine Procurement Approach :** Decide on the most suitable procurement method, such as competitive bidding, negotiations, or sole sourcing.
- **Develop Procurement Strategy :** Create a strategic plan detailing how procurement activities will be executed, addressing vendor selection, contract types, and risk management.
- **Estimate Procurement Costs :** Estimate the budget required for procurement activities, considering costs associated with vendor contracts, materials, and services.
- **Identify Potential Suppliers :** Identify and evaluate potential suppliers based on their capabilities, track record, and ability to meet project needs.
- **Conduct Market Research :** Research the market to understand pricing trends, supplier capabilities, and potential risks.
- **Develop Procurement Plan :** Document the procurement strategy, processes, timeline, roles, and responsibilities in a formal procurement plan.
- Effective procurement planning ensures that the project acquires the right resources at the right time, cost, and quality, enhancing project performance and minimizing risks associated with procurement activities.

5.5.2 Contract

A contract is an agreement between two parties wherein one party (the contractor) promises to perform a service, and the other party (the client) promises to do something in return typically make payment for the service. Both the service requirements and the payment must be clear and unequivocally spelled out in the contract.

Types of contract

In project management, various types of contracts are utilized to define the terms of engagement between parties. These contracts determine how payments are made, costs are managed, and incentives are structured.

Here are explanations of some common contract types:

1. **Fixed Price Contract :** A fixed price contract is a type of agreement in project management where a predetermined and unchanging price is established for the scope of work or deliverables. In this contract, the contractor agrees to complete the specified tasks or provide the required products for the agreed-upon price. This places the financial risk of any cost overruns or unexpected expenses on the contractor. The fixed price nature of the contract provides the client with budget predictability and incentivizes the contractor to efficiently manage costs and complete the project within the agreed budget. However, it also requires careful scope definition and management to avoid misunderstandings or disputes.
2. **Cost Plus Contract :** With a cost-plus contract, the client agrees to reimburse the contractor for the project's actual costs, along with a predetermined additional fee or percentage. This contract provides transparency but may require effective cost control mechanisms. This type of contract is particularly suitable when the scope of work is uncertain or subject to changes. It ensures that the contractor is compensated fairly for their efforts and expenses while allowing the client to have insight into the project's costs.
3. **Incentive Contract :** An incentive contract is a project management agreement that introduces motivation and performance-based rewards into the arrangement. In this type of contract, specific incentives or penalties are established to encourage the contractor to achieve predefined project goals. The incentives could be financial, such as bonuses for early completion or cost savings, or non-financial, like enhanced

reputation or future opportunities. Conversely, penalties may be imposed for delays, quality issues, or cost overruns. Incentive contracts align the interests of both parties and promote collaboration, as the contractor is driven to excel and deliver optimal results to earn the rewards. However, designing balanced incentives and clearly defining performance metrics are essential to ensure fairness and prevent unintended consequences.

- 4. Multiple Incentive Contract :** This advanced contract blends various incentive mechanisms, such as cost-sharing, cost overruns sharing, and bonus payments, to align both parties' interests and promote efficient project execution.

Selecting the appropriate contract type is a critical decision in project management, as it impacts risk allocation, cost management, and project outcomes. Careful consideration is necessary to align the contract with project goals and establish a fair and mutually beneficial agreement between the involved parties.

5.5.3 Solicitation

The solicitation process in project management is a systematic approach to procure goods, services, or resources required for a project. It involves several steps to gather proposals, bids, or offers from potential suppliers and select the most suitable ones to meet the project's needs. The process ensures transparency, fairness, and effective vendor selection.

Following are the key steps in the solicitation process

- **Identify Procurement Needs :** Determine what goods, services, or resources are needed for the project and create a clear description of the requirements.
- **Develop Procurement Documents :** Prepare documents such as Request for Information (RFI), Request for Proposal (RFP), or Request for Quotation (RFQ) outlining the project's needs, evaluation criteria, terms, and conditions.
- **Invite Suppliers :** Distribute the procurement documents to potential suppliers, inviting them to submit their proposals or bids.
- **Receive Supplier Responses :** Gather and review the proposals or bids submitted by suppliers, ensuring they meet the specified requirements.
- **Evaluate Proposals :** Assess the proposals based on predetermined criteria, which may include factors like cost, quality, experience, and compliance with project specifications.
- **Select Suppliers :** Choose the suppliers that best align with the project's objectives and requirements. This could involve negotiations, clarifications, or additional rounds of evaluation.
- **Award Contracts :** Issue contracts or purchase orders to the selected suppliers, outlining the terms, scope, deliverables, and agreed-upon pricing.
- **Contract Management :** Monitor and manage the supplier's performance throughout the project to ensure they meet the contractual obligations and deliver as per the agreement.
- **Close Solicitation Process :** Once the suppliers are selected and contracts are awarded, formally close the solicitation process and proceed with the project's procurement activities.

The solicitation process aims to ensure fair competition, transparency, and effective communication between the project team and potential suppliers. It allows project managers to make informed decisions, obtain the best value for resources, and contribute to successful project outcomes.

5.5.4 Source Selection

Source selection in project management refers to the process of evaluating and choosing the most appropriate suppliers or vendors to provide goods, services, or resources needed for a project. It involves assessing and comparing potential sources based on various criteria, such as cost, quality, expertise, delivery capabilities, and alignment with project requirements. The source selection process aims to ensure that the selected suppliers can effectively contribute to the project's success while providing optimal value and minimizing risks.

Key Steps in Source Selection :

- **Evaluate Supplier Proposals :** Review and analyse the proposals or bids submitted by potential suppliers, assessing their suitability and alignment with project needs.
- **Assess Criteria :** Evaluate suppliers based on predetermined criteria, which may include technical capabilities, financial stability, past performance, and compliance with project specifications.
- **Weighted Evaluation :** Assign weights to each criterion to reflect their importance and impact on the project's success.
- **Scoring and Ranking :** Score suppliers based on their performance against the criteria, and rank them to identify the most suitable options.
- **Selection Decision :** Use the scores and rankings to make an informed decision about which suppliers to select for the project.
- **Negotiations :** Engage in negotiations with selected suppliers to finalize terms, pricing, and contractual agreements.
- **Contract Award :** Issue contracts or purchase orders to the chosen suppliers, outlining the terms, scope, and expectations.
- **Contract Management :** Continuously monitor and manage supplier performance to ensure they meet contractual obligations and deliver as agreed.
- Source selection is a critical aspect of procurement in project management, as it directly impacts the project's success, quality, and budget. A well-executed source selection process helps project managers make informed decisions, establish effective partnerships with suppliers, and ensure the availability of necessary resources to accomplish project objectives.

5.5.5 Contract Administration

Contract administration in project management refers to the systematic and organized process of managing all aspects of a contract throughout its lifecycle to ensure its successful execution. This includes overseeing the implementation of the contractual agreements, monitoring performance, managing changes, and ensuring that both parties fulfil their obligations as stipulated in the contract. Contract administration involves various activities to ensure that the project stays on track, meets its objectives, and maintains a positive working relationship between the parties involved.

Key Activities in Contract Administration

- **Work Authorization** : Initiating and authorizing work to begin based on the terms and conditions of the contract.
- **Performance Monitoring** : Tracking and evaluating the progress, budgets, schedules, and technical performance of the contracted work.
- **Quality Assurance** : Ensuring that the contracted work meets the specified quality standards and requirements.
- **Change Control** : Managing changes to the contract, assessing their impact, and making necessary modifications in accordance with established procedures.
- **Payment and Invoicing** : Overseeing the invoicing process to ensure accurate and timely billing for services and materials provided.
- **Approval and Documentation** : Securing necessary approvals before making contract modifications and maintaining proper documentation of all changes.
- **Customer Satisfaction** : Monitoring customer satisfaction and addressing any concerns or issues related to the contracted work.
- **Risk Management** : Identifying and managing risks associated with the contract's execution, performance, and outcomes.
- **Communication** : Maintaining effective communication with all parties involved in the contract to ensure transparency and alignment.
- **Conflict Resolution** : Resolving disputes and conflicts that may arise during the course of the contract.

Contract administration ensures that both the contractor and the client adhere to the terms of the contract, minimizing misunderstandings, mitigating risks, and maximizing the chances of successful project outcomes. Effective contract administration contributes to the overall project control efforts and helps maintain a productive and collaborative working relationship between all stakeholders.

5.6 Vendor Management

Vendor management in project management involves the structured process of selecting, overseeing, and collaborating with external suppliers, vendors, or contractors who provide goods, services, or resources essential for the successful execution of a project. Effective vendor management ensures that the project receives the necessary inputs in a timely and efficient manner while maintaining a positive and productive relationship with vendors.

Key steps of Vendor Management are as follows :

- **Vendor Selection** : Carefully assessing potential vendors based on their capabilities, expertise, reputation, and alignment with project requirements. This includes evaluating their track record, financial stability, and ability to deliver on commitments.
- **Contract Negotiation** : Negotiating and finalizing contractual agreements that outline the scope of work, deliverables, timelines, pricing, quality standards, and other terms and conditions.

- **Performance Monitoring** : Continuously tracking and evaluating the vendor's performance to ensure they meet agreed-upon standards, schedules, and deliverables. This involves regular communication and progress assessments.
- **Issue Resolution** : Addressing any challenges or issues that arise during the course of the vendor's engagement and collaborating to find effective solutions.
- **Quality Assurance** : Ensuring that the vendor's outputs meet the required quality standards and align with project specifications.
- **Risk Management** : Identifying and mitigating risks associated with vendor performance, such as delays, quality issues, or unexpected changes.
- **Relationship Building** : Establishing and nurturing a positive and collaborative working relationship with vendors based on clear communication, mutual respect, and shared goals.
- **Communication** : Maintaining open and transparent communication channels with vendors to ensure alignment, manage expectations, and address any concerns.

5.6.1 Benefits of Effective Vendor Management

- **Timely Delivery** : Ensuring that project inputs are delivered on schedule, minimizing disruptions and delays.
- **Cost Control** : Monitoring vendor performance helps control costs and avoids budget overruns.
- **Quality Assurance** : Effective vendor management contributes to maintaining high-quality project outcomes.
- **Risk Mitigation** : Proactively addressing potential risks and issues associated with vendor performance.
- **Innovation** : Collaborating with vendors can lead to innovative solutions and ideas that enhance project outcomes.
- **Productive Relationships** : Building positive vendor relationships fosters mutual trust, co-operation, and a willingness to work together for project success.

Overall, successful vendor management enhances a project's efficiency, effectiveness, and overall performance while fostering a productive and collaborative partnership with external suppliers.

5.6.2 Relationship Building

Relationship building in project management refers to the intentional efforts and strategies employed to foster positive interactions, collaboration, and trust among project stakeholders, team members, partners, clients, vendors, and other involved parties. Effective relationship building contributes to the success of projects by enhancing communication, promoting cooperation, and creating a supportive and harmonious working environment.

It involves several key aspects

- **Open Communication** : Establishing clear and transparent channels of communication enables stakeholders to share information, updates, concerns, and feedback. Regular and honest communication builds understanding and prevents misunderstandings.

- **Trust and Mutual Respect :** Building trust and mutual respect among team members and stakeholders promotes a sense of reliability, integrity, and commitment. Trust encourages open sharing of ideas and promotes a positive atmosphere.
- **Active Listening :** Actively listening to others' perspectives and concerns demonstrates respect and empathy. This practice helps in understanding different viewpoints and addressing potential conflicts.
- **Collaboration :** Encouraging teamwork and collaboration enables diverse stakeholders to work together toward shared goals. Collaborative efforts leverage the strengths and expertise of each individual, resulting in better outcomes.
- **Conflict Resolution :** Addressing conflicts constructively and finding mutually acceptable solutions strengthens relationships. Open discussions, compromise, and finding common ground help prevent conflicts from escalating.
- **Appreciation and Recognition :** Acknowledging and appreciating the contributions of team members and stakeholders fosters a sense of value and motivation. Recognizing achievements and efforts boosts morale and encourages continued dedication.
- **Cultural Sensitivity :** Being aware of and respecting cultural differences among team members and stakeholders promotes inclusivity and avoids misunderstandings or misinterpretations.
- **Regular Interaction :** Regular meetings, updates, and check-ins create opportunities for stakeholders to connect, share progress, and address any concerns. Consistent interactions help build a sense of community and shared purpose.
- **Shared Goals and Objectives :** Clearly communicating and aligning project goals and objectives among stakeholders promotes a unified focus and commitment to achieving desired outcomes.
- **Problem-Solving Together :** Collaboratively addressing challenges and finding solutions strengthens relationships and demonstrates a commitment to overcoming obstacles.
- **Flexibility and Adaptability :** Being open to adapting plans and strategies based on evolving circumstances or stakeholder input demonstrates a willingness to work together and accommodate changing needs.
- **Feedback Mechanisms :** Creating avenues for providing and receiving feedback encourages continuous improvement and demonstrates a commitment to enhancing project processes and outcomes.
- By prioritizing relationship building, project managers create an environment where positive interactions, effective communication, and shared goals contribute to successful project execution and stakeholder satisfaction. Strong relationships enhance the overall project experience, facilitate smoother operations, and lead to more favourable project outcomes.

5.7 Project Integration Management

5.7.1 Project Integration Process and Activities

Project integration involves bringing together various components, processes, and activities of a project to ensure that they work harmoniously towards achieving the project's objectives. It's a crucial aspect of project management that helps ensure the overall success and coherence of the project.

Following are some key processes and activities involved in project integration :

- **Develop Project Charter :** This is the initial step where the project is formally authorized. It involves defining the project's high-level objectives, stakeholders, and initial scope.
- **Develop Project Management Plan :** This comprehensive document outlines how the project will be executed, monitored, controlled, and closed. It includes plans for scope, schedule, cost, quality, resources, communication, risk management, and procurement.
- **Direct and Manage Project Work :** This involves overseeing and co-ordinating the various activities and tasks outlined in the project management plan. The project manager ensures that work is progressing according to the plan and manages any deviations.
- **Perform Integrated Change Control :** As the project progresses, changes are inevitable. This process involves reviewing and approving or rejecting proposed changes to the project's scope, schedule, cost, or other aspects. It ensures that changes are properly evaluated and their impact is managed.
- **Monitor and Control Project Work :** This process involves tracking the project's performance and comparing it to the project management plan. It helps identify any variances or deviations from the plan and allows for corrective actions to be taken.
- **Perform Quality Assurance :** Quality assurance activities ensure that the project's processes and deliverables meet the required standards. It involves conducting audits and reviews to verify compliance with quality requirements.
- **Validate Scope :** This process involves obtaining formal acceptance from the project stakeholders that the project deliverables meet the specified requirements and are complete.
- **Control Scope :** Scope control ensures that project scope changes are managed and controlled. It prevents scope creep and ensures that changes to scope are properly evaluated and approved.
- **Control Schedule and Cost :** These processes involve monitoring and managing the project's schedule and cost performance. Variance analysis is conducted to compare actual performance against the baseline plan, and corrective actions are taken if needed.
- **Perform Risk Management :** This process involves identifying, assessing, and managing project risks. It includes developing risk response strategies to mitigate or address potential issues that could impact the project's success.
- **Monitor and Control Risks :** Once risks are identified and response strategies are in place, on-going monitoring and control ensure that risks are managed effectively and those new risks are identified and addressed as they arise.
- **Close Project or Phase :** This final process involves finalizing all project activities, obtaining formal acceptance from stakeholders, and ensuring a smooth transition of project deliverables to the operational phase or the next project phase. Lessons learned are documented for future reference.
- Effective project integration requires constant communication, collaboration, and co-ordination among project team members, stakeholders, and relevant departments. It ensures that the project's components work together seamlessly to achieve the desired outcomes.

5.7.2 Change Management

Change management in project management refers to the structured approach and processes used to plan for, manage, and implement changes within a project environment. It focuses on minimizing resistance, ensuring smooth transitions, and maximizing the positive outcomes of changes to project scope, objectives, processes, or any other aspect that may impact the project. Effective change management helps to maintain project stability while adapting to evolving circumstances.

Here's how change management is typically approached in project management :

- **Identify Change :** Recognize the need for a change, whether it's due to new requirements, shifts in stakeholder expectations, or external factors.
- **Assess Impact :** Evaluate the potential impact of the proposed change on various aspects of the project, such as scope, schedule, budget, resources, and risks.
- **Change Request :** Formalize the change by submitting a change request, detailing the reasons, the proposed change, and its anticipated benefits.
- **Change Evaluation :** Review the change request and assess its feasibility, alignment with project goals, and potential consequences.

Analysis and Planning

- Analyze the change's implications, including its effects on project objectives, scope, schedule, and resources.
- Develop a plan outlining how the change will be managed, communicated, and integrated into the project.

Stakeholder Engagement

- Identify and engage key stakeholders who may be impacted by the change.
- Communicate the change, its rationale, and the anticipated benefits to gain their buy-in and address concerns.
- **Risk Assessment :** Evaluate potential risks associated with the change and develop strategies to mitigate or manage them.

Change Implementation

- Execute the approved change according to the established plan.
- Co-ordinate with relevant teams, departments, and stakeholders to ensure a smooth transition.

Communication

- Maintain transparent and consistent communication throughout the change process.
- Keep stakeholders informed about the progress, status, and any adjustments made during implementation.
- **Training and Support :** Provide necessary training and support to ensure team members are prepared to work with the new processes, tools, or deliverables resulting from the change.

Monitoring and Control

- Continuously monitor the change's progress and its impact on the project.
- Compare actual outcomes with expected results and adjust the approach if needed.

- **Documentation :** Document the change management process, including decisions made, reasons for the change, and lessons learned.

Integration and Closure

- Integrate the change into the project's overall scope, objectives, and deliverables.
- Ensure that the change is properly closed out and that any ongoing monitoring or follow-up is established.

Lessons Learned

- After the change has been implemented and the project is complete, conduct a lessons learned review to capture insights and improve future change management processes.
- Change management helps project teams navigate uncertainties, adapt to evolving circumstances, and ensure that changes are well-structured and aligned with project objectives. It minimizes disruption, reduces resistance, and enhances the project's overall success.

5.7.3 Project Closure

Project closure is the final phase of the project management lifecycle, where the project is formally completed, all activities are concluded, and the project's outcomes are handed over to the intended recipients or stakeholders. This phase involves a series of activities to ensure that the project is successfully wrapped up and transitioned to the next phase, whether it's the operational phase or the closure of the entire project.

Following are the key steps involved in project closure:

Finalize Deliverables

- Ensure that all project deliverables have been completed and meet the required quality standards.
- Obtain formal acceptance from stakeholders for each deliverable.

Hand Over Deliverables

- Transfer the completed deliverables to the appropriate stakeholders or operational teams.
- Provide any necessary documentation, training, or support to facilitate the transition.
- **Close Procurements :** Complete any remaining procurement-related activities, such as settling contracts, finalizing payments, and ensuring that all contractual obligations are met.

Complete Administrative Closure

- Update and finalize project documentation, including project plans, schedules, budgets, and other records.
- Archive project files and documentation for future reference.

Perform Lessons Learned

- Conduct a comprehensive review of the project's successes, challenges, and areas for improvement.
- Document lessons learned and best practices to apply to future projects.

Release Resources

- Release project team members and other resources that were allocated to the project.
- Ensure that all resources are appropriately reassigned or released as needed.

Close Financials

- Review and reconcile project expenditures against the budget.
- Ensure that all financial accounts related to the project are settled and closed.

Communicate Closure

- Notify stakeholders, team members, and relevant parties about the project's successful completion and closure.
- Provide a summary of the project's achievements, outcomes, and key metrics.

Celebrate Achievements

- Recognize and celebrate the efforts and contributions of the project team and stakeholders.
- Acknowledge milestones, accomplishments, and successful completion of the project.

Final Project Review : Conduct a final review to assess whether the project objectives were met and if the project was executed according to the project management plan.

Document Project Closure Report

- Create a project closure report that summarizes the entire project lifecycle, from initiation to closure.
- Include information about achievements, challenges, lessons learned, and recommendations for future projects.
- **Obtain Sign-Off :** Obtain formal sign-off from key stakeholders and project sponsors indicating that the project has been successfully completed and the objectives have been achieved.
- Project closure ensures that all loose ends are tied up, stakeholders are satisfied, and the project's outcomes are properly documented and handed over. It provides a foundation for evaluating project performance, capturing lessons learned, and improving future project management practices.

5.7.4 Lessons Learned and Knowledge Transfer

Lessons learned and knowledge transfers are essential components of project management that contribute to continuous improvement, informed decision-making, and the enhancement of future projects. They involve capturing valuable insights, experiences, and best practices gained from the project and sharing them within the organization.

Here's an overview of each concept

Lessons Learned

Lessons learned refer to the valuable knowledge and experiences gained from the successes and challenges encountered during a project. These insights are documented and shared to help improve future project performance.

The process of capturing lessons learned involves :

- **Identification :** Project teams and stakeholders identify key successes, failures, challenges, and unexpected events that occurred during the project.
- **Documentation :** Lessons learned are documented in a structured manner, detailing the context, actions taken, outcomes, and the impact on the project.

- **Analysis :** The documented lessons learned are analysed to understand the underlying causes of both positive and negative outcomes.
- **Categorization :** Lessons are categorized based on their relevance to specific project phases, processes, or aspects (e.g., scope, schedule, risk management).
- **Recommendations :** Actionable recommendations are developed based on the lessons learned to inform future projects and mitigate potential risks.
- **Sharing :** The documented lessons learned are shared with project stakeholders, teams, and the broader organization to promote learning and continuous improvement.

5.7.5 Knowledge Transfer

Knowledge transfer involves the deliberate sharing of knowledge, expertise, and best practices from one part of an organization (or from one project) to another. It ensures that valuable insights gained from previous projects are transferred to individuals or teams that can benefit from them.

The process of knowledge transfer includes:

- **Identifying Knowledge :** Identify explicit and tacit knowledge that is relevant and valuable for the recipient team or project.
- **Documentation :** Document knowledge and best practices in a clear and accessible format, such as manuals, guidelines, procedures, or training materials.
- **Training and Mentoring :** Provide training sessions, workshops, or mentorship opportunities to transfer skills, expertise, and know-how from experienced individuals to newcomers.
- **Collaborative Platforms :** Use collaboration tools, intranets, or knowledge management systems to facilitate the sharing of knowledge across teams and projects.
- **Communication :** Promote open communication and encourage sharing of experiences and insights during project reviews, meetings, and discussions.
- **Feedback Loop:** Establish a feedback loop to ensure that the transferred knowledge is effectively applied and refined based on real-world experiences.

The benefits of capturing lessons learned and facilitating knowledge transfer include:

- Avoiding the repetition of mistakes and challenges in future projects.
- Accelerating learning curves for new team members.
- Enhancing decision-making with insights from past experiences.
- Promoting a culture of continuous improvement and innovation.
- Fostering collaboration and knowledge-sharing within the organization.

Both lessons learned and knowledge transfer contribute to building a repository of organizational knowledge that empowers project teams to work more effectively and efficiently, leading to improved project outcomes over time.

Review Questions

- Q. 1** Explain Project Resource Management.
- Q. 2** Explain steps involved in staffing process.
- Q. 3** Explain Communication Management.
- Q. 4** Explain Types of contract.



6

Advanced Topics in Project Management

Syllabus

Agile Project & Management in the Digital Age : Agile principles and methodologies, Agile project planning and execution, Managing iterative and incremental development, Role of technology in project management, Virtual teams and distributed project management, Tools and software for project planning and collaboration.

6.1 Agile Project & Management in the Digital Age

6.1.1 The history of Agile Methodology

- Depending on the source, the origins of Agile methodology can be traced back to the 1990s, 1975, or even as early as the 1960s. However, everyone agrees that Agile took root with the creation of the Manifesto for Agile Software Development, also known as The Agile Manifesto. The Agile Manifesto was originally released in February 2001 to create a new way of managing software development.
- A group of leading software developers wrote the manifesto on a retreat in Utah, where they had met to discuss industry problems and potential solutions. This group understood that the software industry needed a better, quicker way to get products to market. Their goal was to develop new methods for changing a product and project that would not impact the cost or delay the production schedule.
- They determined that dividing a project into shorter iterations would allow for faster development and testing. Reviews (called sprint retrospectives) would take place at the end of every iteration, and changes could then be made without having to wait for the end product.
- The Agile Manifesto was initially drafted as a solution for software development management, but the Agile methodology has since grown to encompass projects across various industries and businesses.

Agile Principles

There are 12 Principles of Agile alliances which are listed as below:

1. Our highest priority is to satisfy the customer through early and continuous delivery of valuable software.
2. Welcome changing requirements, even late in development. Agile processes harness change for the customer's competitive advantage.
3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to shorter timescale.
4. Business people and developers must work together daily throughout the project.
5. Build projects around motivated individuals. Give them the environment and support they need and trust them to get the job done.

6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation.
7. Working software is the primary measure of progress.
8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely.
9. Continuous attention to technical excellence and good design enhance agility.
10. Simplicity – the art of maximizing the amount of work not done- is essential.
11. The best architectures, requirements, and designs emerge from self-organizing teams.
12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly.

These agile principles provide practical guidance for development teams. Another way of organizing the 12 principles is to consider them in the following four distinct groups:

- (i) Customer satisfaction
- (ii) Quality
- (iii) Teamwork
- (iv) Project management

Agile principles of quality

An agile project team commits to producing quality in every product it creates from development through documentation to integration and test results - every day. Each project team member contributes his or her best work all the time. Although all 12 principles support the goal of quality delivery, principles 1, 3, 4, 6-9, and 12 stand out for us.

These principles, in practice on a day-to-day basis, can be described as follows :

- The development team members must have full ownership and be empowered to solve problems. They carry the responsibility for determining how to create the product, assigning tasks, and organizing product development. People not doing the work don't tell them how to do it.
- With software development projects, an agile approach requires architectures that make coding and the product modular, flexible, and extensible. The design should address today's problems and make inevitable changes as simple as possible.
- A set of designs on paper can never tell you that something will work. When the product quality is such that it can be demonstrated and ultimately shipped in short intervals, everyone knows that the product works at the end of every sprint.
- As the development team completes features, the team shows the product owner the product functionality to get validation that it meets the acceptance criteria. The product owner's reviews should happen throughout the iteration, ideally the teams. However, agile planning is more evenly distributed throughout the project and is done by the entire team that will be working on the project.

6.1.2 Agile Methodology

Types of Agile Methodologies

Agile project management is not a singular framework but an umbrella term that includes a wide range of methodologies, including Scrum, Kanban, Extreme Programming (XP), and the Adaptive Project Framework (APF).

- i) **Scrum :** It is ideal for projects with rapidly changing requirements, using short sprints.
- ii) **Kanban :** It visualizes project progress and is great for tasks requiring steady output.
- iii) **Lean :** It streamlines processes, eliminating waste for customer value.
- iv) **Extreme Programming (XP) :** It enhances software quality and responsiveness to customer satisfaction.
- v) **Adaptive Project Framework (APF) :** Works well for projects with unclear details, as it adapts to constantly evolving client needs.

1. Agile methodologies vs. traditional approaches

- Agile methodologies can be compared with traditional approaches to project management. Let's highlight the Waterfall approach as an example.
- When working with this traditional methodology, teams would follow a strictly linear sequence: requirements gathering, design, build, test, deliver. They are required to complete one phase before moving on to the next one. Changes are difficult to incorporate once a stage is completed and customer interactions are limited. As a result, Waterfall suits projects with fixed guidelines and minimal changes.
- By comparison, Agile methodologies are far more fluid in nature. Every Agile framework emphasizes a degree of adaptability, breaking projects into phases and embracing changing requirements. Through iterations and incremental efforts, they incorporate collaboration and customer feedback, leading to continuous improvement.

2. Agile in software development

- Agile enables software development teams to stay adaptable. With an iterative and adaptive approach, the aim is to produce the highest-quality software product that puts the customer at the heart of the process. By prioritizing flexibility, Agile teams can quickly react to changes, deliver products faster, and thrive in a collaborative environment.
- By building Agile teams with the right qualities such as self-organization and effective collaboration. The software development process can be accelerated while leaving space for vital customer feedback.
- One of the most compelling reasons to adopt the Agile approach in software development is the dynamic workflows and work systems that contribute to a better end product. By listening to customer feedback and carrying out several iterations and rounds of software testing, you can iron out any kinks along the way and build the best possible software.
- The Agile software development life cycle helps you break down each project you take on into six simple stages:
 - i) **Concept :** Define the project scope and priorities
 - ii) **Inception :** Build the Agile team according to project requirements

- iii) **Iteration** : Create code factoring in customer feedback
- iv) **Release** : Test the code and troubleshoot any issues
- v) **Maintenance** : Provide ongoing tech support to ensure the product remains serviceable
- vi) **Retirement** : The end of the product lifespan, which often coincides with the beginning of a new one

3. Agile methodology in non-software projects

- While many think of the Agile methodology as a solution mostly for the software industry, its applications extend far beyond.
- Here are some examples of Agile methodology in action in various project types:

4. Marketing campaigns

By bringing together designers, marketers, writers and colleagues from other departments, you can build a cross-functional team ready to tackle marketing campaigns. Using sprints and a task backlog, you can identify the highest-priority tasks and streamline the execution.

5. Event planning

Agile methodologies lend themselves well to event planning, as each part of the event can be broken down into a sprint, and daily stand-ups or Kanban boards can help you maintain a clear strategic direction at all times.

6. Product development

- As you might imagine, since Agile methodology works for virtual products, it can work just as well for physical products. This time, though, instead of troubleshooting code, you'll be diagnosing and fixing prototypes.
- Generally, to get the best out of any of the Agile methodologies for non-software projects, you should always aim to keep the customer in mind. Just as Agile software development must factor in the end user, non-software use cases benefit from a customer-focused approach.
- By integrating the customer and their feedback in everything you do, you can better organize your priorities and plan your phases. It's also a good idea to evaluate whether you need a systematic approach to tackling major projects or an easy-to-follow visual workflow for a series of smaller projects, as this can influence which framework is best for your team.

How to implement Agile methodology into projects?

If you're wondering how to apply these theoretical frameworks to your team's workflows, here's a step-by-step guide for Agile methodology implementation:

7. Choose the right Agile framework

- Your first priority is to select the right Agile framework for your team. Here's a reminder of some of the most popular options:
 - **Scrum** : Principle-based project management
 - **Kanban** : Visual workflows and processes

- **Scrumban** : Hybrid of Scrum and Kanban
- **XP** : Customer-focused product development
- **APF** : Versatile teamwork
- When selecting an Agile framework, consider the size of your team, the specific project requirements, and the level of experience your team has with the various methodologies. The more you know about your team and the projects you handle on a regular basis, the easier it will be for you to pick the right framework every time.

8. Assemble your Agile team

An Agile team isn't like any ordinary team. If you want to find success with any of the Agile methodologies, you need to build a team with clear roles and responsibilities and a culture of collaboration.

What are some of the responsibilities of an Agile team?

- **Self-organization** : One of the cornerstones of an Agile team is the ability to self-organize. In Agile project management, the onus is on individual team members and teams to take initiative and organize themselves in a way that will lead to the highest output.
- **Cross-functional collaboration** : Going hand in hand with the need for self-organization is the Agile demand for cross-functional collaboration. Agile teams have to relay information across departments and be able to work closely with a range of colleagues.
- **Iteration planning** : Specific to Agile project management, iteration planning requires team members to outline the scope of individual sprints according to the product backlog.

9. Plan the project

- Now that you've selected one of the Agile methods and assembled your A-team, it's time to plan out your project. Meticulous planning is one of the secret ingredients of successful Agile project management.
- From the outset, you need to spend time clearly defining your project goals and scope. This will prevent unexpected setbacks and allow you to break down each portion of the project into manageable sprints (if you're using Scrum). You might also draw up a product backlog during the planning phase, which is most common in software development projects. The product backlog allows you to assign a priority level to your tasks so everyone on the team knows what they should focus on.

10. Manage stakeholder expectations

- Before you get your project underway, it's important to check in with any key stakeholders to make sure you factor in their feedback. Depending on the level of their involvement, your project stakeholders may then want to be kept in the loop throughout the process or at least receive regular updates.
- Creating feedback loops eases any uncertainty on the stakeholder end and allows you to stay open to change should it be necessary at any stage of the process.

11. Measure success

- Measuring project success is key to making meaningful progress with your Agile methodology of choice. By paying attention to what worked and what didn't during the project management process, you can extract key lessons to apply to future Agile projects.

- There are various ways to effectively track progress and measure success with Agile projects:
 - **Daily stand-ups** : Brief meetings to discuss obstacles and find solutions
 - **Sprint reviews** : Informal sit-down meetings to present work and solicit team feedback
 - **Retrospectives** : Reflections on past work to inspire and influence future progress
- You should also introduce key performance indicators (KPIs) before embarking on any new major project, as getting specific will help you establish milestones and measure progress.

12. Agile Planning

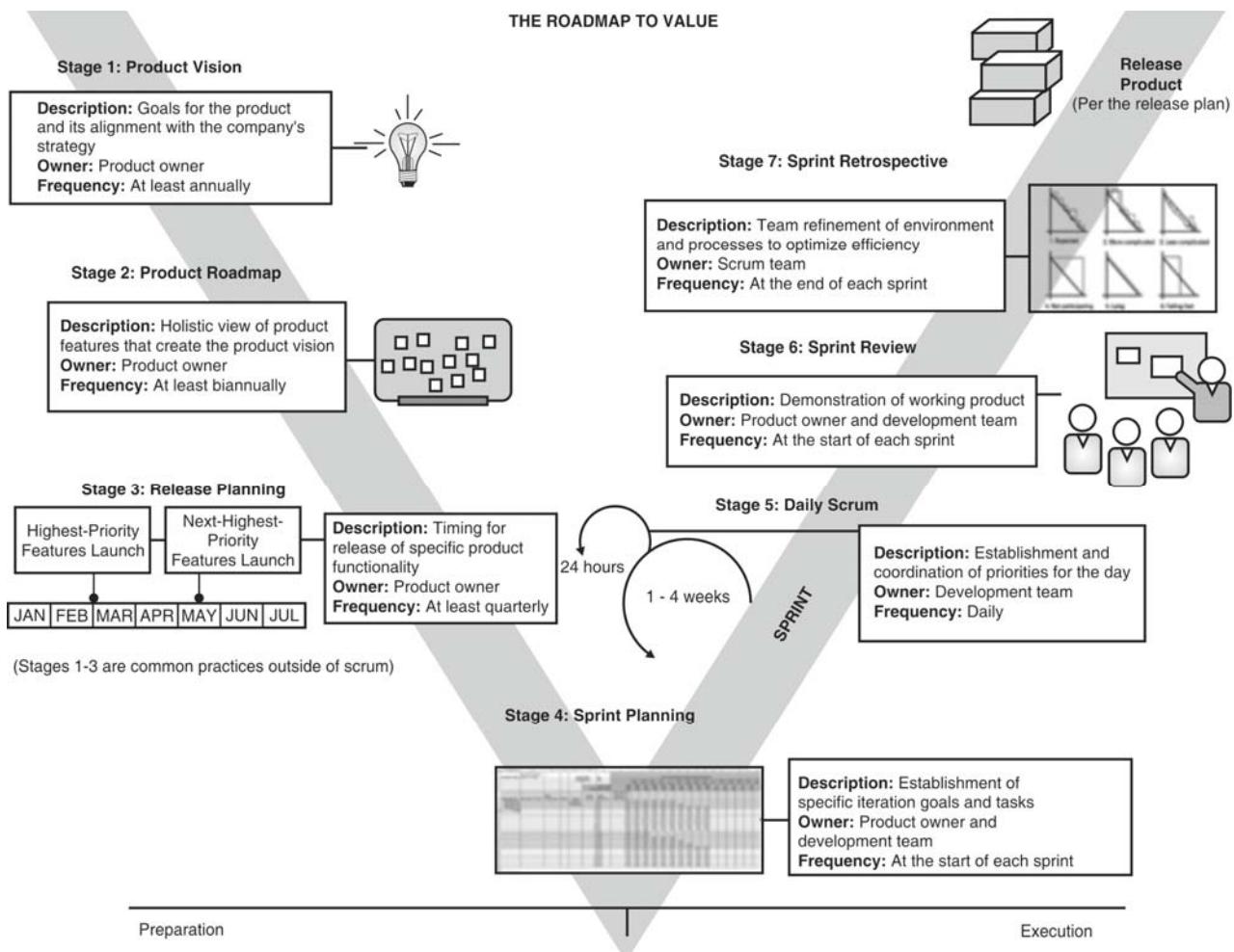


Fig. 6.1.1 : Stages of agile planning and its execution with the Roadmap to Value

The Roadmap to Value has seven stages

- In stage 1, the product owner identifies the product vision. The product vision is your project's destination or end goal. The product vision includes the outer boundary of what your product will be, how the product is different from the competition, how the product will support your company or organization's strategy, who will use the product, and why people will use the product. On longer projects, revisit the product vision at least once a year.
- In stage 2, the product owner creates a product roadmap. The product roadmap is a high-level view of the product requirements, with a general time frame for when you will develop those requirements. It also gives

context to the vision by showing the tangible features that will be produced during the project. Identifying product requirements and then prioritizing and roughly estimating the effort for those requirements allow you to establish requirement themes and identify requirement gaps. The product owner, with support from the development team, should revise the product roadmap at least biannually.

- In stage 3, the product owner creates a release plan. The release plan identifies a high-level timetable for the release of working functionality to the customer. The release serves as a mid-term boundary against which the scrum team can mobilize. An agile project will have many releases, with the highest-priority features appearing first. You create a release plan at the beginning of each release, which is usually at least quarterly.
- In stage 4, the product owner, the development team, and the scrum master will plan iterations, also called as sprints, and start creating the product functionality in those sprints. Sprint planning sessions take place at the start of each sprint. During sprint planning, the scrum team determines a sprint goal, which establishes the immediate boundary of work that the team forecasts to accomplish during the sprint, with requirements that support the goal and can be completed in the sprint. The scrum team also outlines how to complete those requirements.
- In stage 5, the development team has daily scrum meetings during each sprint to coordinate the day's priorities. In the daily scrum meeting, you discuss what you completed yesterday, what you will work on today, and any roadblocks you have, so that you can address issues immediately.
- In stage 6, the scrum team holds a sprint review at the end of every sprint. In the sprint review, you demonstrate the working functionality to the product stakeholders.
- In stage 7, the scrum team holds a sprint retrospective. The sprint retrospective is a meeting where the scrum team discusses the completed sprint with regard to their processes and environment, and makes plans for process improvements in the next sprint. Like the sprint review for inspecting and adapting the product, a sprint retrospective is held at the end of every sprint to inspect and adapt your processes and environment.
- Each stage in the Roadmap to Value is repeatable, and each stage contains planning activities. Agile planning, like agile development, is iterative.

Progressive elaboration

- During each stage in an agile project, you plan only as much as you need to plan. In the early stages of your project, you plan widely and holistically to create a broad outline of how the product will shape up over time. In later stages, you narrow your planning and add more details to ensure success in the immediate development effort. This process is called a progressive elaboration of requirements.
- Planning broadly at first and in detail later, when necessary, prevents you from wasting time on planning lower-priority product requirements that may never be implemented. This model also lets you add high-value requirements during the project without disrupting the development flow.
- The more just-in-time your detailed planning is, the more efficient your planning process becomes.
- **REMEMBER** Some studies show customers rarely or never use 64 percent of the features in an application. In the first few development cycles of an agile project, you complete features that have the highest priority and that people will use. Typically, you release those groups of features as early as possible to gain market share through first-mover advantage; receive customer feedback for viability; monetize functionality early to optimize return on investment (ROI); and avoid internal and external obsolescence.

Inspect and adapt

- Just-in-time planning brings into play two fundamental tenets of agile techniques: inspect and adapt. At each stage of a project, you need to look at the product and the process (inspect) and make changes as necessary (adapt).
- Agile planning is a rhythmic cycle of inspecting and adapting. Consider the following:
 - Each day during the sprint, the product owner provides feedback to help improve the product as the development team creates the product.
 - At the end of each sprint, in the sprint review, stakeholders provide feedback to further improve the product.
 - Also, at the end of each sprint, in the sprint retrospective, the scrum team discusses the lessons it learned during the past sprint to improve the development process.
 - After a release, the customers can provide feedback for improvement. Feedback might be direct, when a customer contacts the company about the product, or indirect, when potential customers either do or don't purchase the product.
 - Inspect and adapt, together, are fantastic tools for delivering the right product in the most efficient manner.
- **REMEMBER** At the beginning of a project, you know the least about the product you are creating, so trying to plan fine details at that time just doesn't work. Being agile means, you do the detailed planning when you need it, and immediately develop the specific requirements you defined with that planning.

6.2 Project Execution

6.2.1 Defining the Product Vision

- The first stage in an agile project is defining your product vision. The product vision statement is an elevator pitch, or a quick summary, to communicate how your product supports the company's or organization's strategies. The vision statement must articulate the end state for the product.
- The product might be a commercial product for release to the marketplace or an internal solution that will support your organization's day-to-day functions. For example, say your company is XYZ Bank and your product is a mobile banking application. What company strategies does a mobile banking application support? How does the application support the company's strategies? Your vision statement clearly and concisely links the product to your business strategy.
- Fig.6.2.1 shows how the vision statement - stage 1 of the Roadmap to Value - fits with the rest of the stages and activities in an agile project.

A common agile practice

Stage 1 : Product Vision

- a. **Description :** Goals for the product and its alignment with the company's strategy Owner: Product owner
- b. **Frequency :** At least annually



Fig. 6.2.1 : The product vision statement as part of the Roadmap to Value

- The product owner is responsible for knowing about the product, its goals, and its requirements throughout the project. For those reasons, the product owner creates the vision statement, although other people may have input. After the vision statement is complete, it becomes a guiding light, the “what we are trying to achieve” statement that the development team, scrum master, and stakeholders refer to throughout the project.
- When creating a product vision statement, follow these four steps:
 1. Develop the product objective.
 2. Create a draft vision statement.
 3. Validate the vision statement with product and project stakeholders and revise it based on feedback.
 4. Finalize the vision statement.
- The look of a vision statement follows no hard-and-fast rules. However, anyone involved with the project, from the development team to the CEO, should be able to understand the statement. The vision statement should be internally focused, clear, nontechnical, and as brief as possible. The vision statement should also be explicit and avoid marketing fluff.

Step 1 : Developing the product objective

- To write your vision statement, you must understand and be able to communicate the product's objective. You need to identify the following:
 - **Customer:** Who will use the product? This question might have more than one answer.
 - **Key product goals:** How will the product benefit the company that is creating it? The goals may include benefits for a specific department in your company, such as customer service or the marketing department, as well as the company as a whole. What specific company strategies does the product support?
 - **Need:** Why does the customer need the product? What features are critical to the customer?
 - **Competition:** How does the product compare with similar products?
 - **Primary differentiation:** What makes this product different from the status quo or the competition or both?

Step 2 : Creating a draft vision statement

- After you have a good grasp of the product's objective, create a first draft of your vision statement.
- You can find many templates for a product vision statement. For an excellent guide to defining the overall product vision, see *Crossing the Chasm*, by Geoffrey Moore (published by HarperCollins), which focuses on how to bridge the gap (chasm) between early adopters of new technologies and the majority who follow.

- The adoption of any new product is a gamble. Will users like the product? Will the market take to the product? Will there be an adequate return on investment for developing the product? In Crossing the Chasm, Moore describes how early adopters are driven by vision, whereas the majority are sceptical of visionaries and interested in down-to-earth issues of quality, product maintenance, and longevity.
- Technical stuff Return on investment, or ROI, is the benefit or value a company gets from paying for something. ROI can be quantitative, such as the additional money ABC Products makes from selling widgets online after investing in a new website. ROI can also be something intangible, such as better customer satisfaction for XYZ Bank customers who use the bank's new mobile banking application.
- By creating your vision statement, you help convey your product's quality, maintenance needs, and longevity. Moore's product vision approach is pragmatic. In Figure 6.2.2 we construct a template based on Moore's approach to connect the product more explicitly to the company's strategies. If you use this template for your product vision statement, it will stand the test of time as your product goes from early adoption to mainstream usage.

Vision Statement for Product	
For	(target customer)
who	(needs)
the	(product name)
is a	(product category)
that	(product benefit, reason to buy)
Unlike	(competitors)
our product	(differentiation/value proposition)

Fig. 6.2.2 : Expansion of Moore's template for a vision statement.

- Using our expansion of Moore's template, a vision statement for a mobile banking application might look like the following:
 - **For** XYZ Bank customers
 - **Who** want access to banking capability while on the
 - **The** My XYZ
 - **Is a** mobile application?
 - **That** allows secure, on-demand banking, 24 hours a day.
 - **Unlike** online banking from your home or office computer, our product allows users immediate access,
 - **Which supports our strategy to** provide quick, convenient banking services, anytime, anywhere.
- As you can see, a vision statement identifies a future state for the product when the product reaches completion. The vision focuses on the conditions that should exist when the product is complete.
- **WARNING** Avoid generalizations in your vision statement such as "make customers happy" or "sell more products." Also watch out for too much technological specificity, such as "using release 9.x of Java, create a program with four modules that ..." At this early stage, defining specific technologies might limit you later.

Here are a few extracts from vision statements that should ring warning bells:

- Secure additional customers for the My XYZ application.
- Satisfy our customers by December.
- Eliminate all defects and improve quality.
- Create a new application in Java.
- Beat the Widget Company to market by six months.

Step 3 : Validating and revising the vision statement

- After you draft your vision statement, review it against the following quality checklist:
 - Is this vision statement clear, focused, and written for an internal audience?
 - Does the statement provide a compelling description of how the product meets customer needs?
 - Does the vision describe the best possible outcome?
 - Is the business objective specific enough that the goal is achievable?
 - Does the statement deliver value that is consistent with corporate strategies and goals?
 - Is the product vision statement compelling?
 - Is the vision concise?
- These yes-or-no questions will help you determine whether your vision statement is thorough and clear. If any answers are no, revise the vision statement.
- When all answers are yes, move on to reviewing the statement with others, including the following:
 - **Project stakeholders:** The stakeholders will be able to identify that the vision statement includes everything the product should accomplish.
 - **Your development team:** The team, because it will create the product, must understand what the product needs to accomplish.
 - **Scrum master:** A strong understanding of the product will help the scrum master remove roadblocks and ensure that the development team is on the right path later in the project.
 - **Agile mentor:** Share the vision statement with your agile mentor, if you have one. The agile mentor is independent of the organization and can provide an external perspective, qualities that can make for a great objective voice.
- See whether others think the vision statement is clear and delivers the message you want to convey. Review and revise the vision statement until the project stakeholders, the development team, and the scrum master fully understand the statement.
- **REMEMBER** At this stage of your project, you might not have a development team or scrum master. After you form a scrum team, be sure to review the vision statement with it.

Step 4 : Finalizing the vision statement

- After you finish revising the vision statement, make sure your development team, scrum master, and stakeholders have the final copy. You might even put a copy on the wall in the scrum team's work area, where you can see it every day. You will refer to the vision statement throughout the life of the project.

- If your project is more than a year long, you may want to revisit the vision statement. We like to review the product vision statement at least once a year to make sure the product reflects the marketplace and supports any changes in the company's needs. Because the vision statement is the long-term boundary of the project, the project should end when the vision is no longer viable.
- **REMEMBER** The product owner owns the product vision statement and is responsible for its preparation and communication across the organization. The product vision sets expectations for stakeholders and helps the development team stay focused on the goal.

1. Creating a Product Roadmap

- The product roadmap, stage 2 in the Roadmap to Value (see Figure 6.2.3) is an overall view of the product's requirements and a valuable tool for planning and organizing the journey of product development. Use the product roadmap to categorize requirements, prioritize them, identify gaps and dependencies, and determine a timetable for releasing to the customer.
- A common agile practice stage 2: PRODUCT ROADMAP

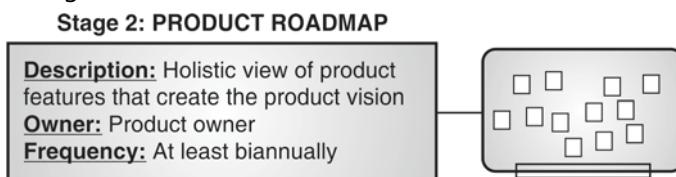


Fig. 6.2.3 : The product roadmap as part of the Roadmap to Value

- As he or she does with the product vision statement, the product owner creates the product roadmap, with help from the development team and stakeholders. The development team participates to a greater degree than it did during the creation of the vision statement.
- **TIP** Keep in mind that you will refine requirements and effort estimates throughout the project. In the product roadmap phase, it's okay for your requirements, estimates, and time frames to be at a very high level.
- To create your product roadmap, you do the following:
 1. Identify stakeholders.
 2. Establish product requirements and add them to the roadmap.
 3. Arrange the product requirements based on values, risks, and dependencies.
 4. Estimate the development effort at a high level and prioritize the product's requirements.
 5. Determine high-level time frames for releasing groups of functionalities to the customer.
- Because priorities can change, expect to update your product roadmap throughout the project. We like to update the product roadmap at least twice a year.
- **TIP :** Your product roadmap can be as simple as sticky notes arranged on a whiteboard, which makes updates as easy as moving a sticky note from one section of the whiteboard to another.
- You use the product roadmap to plan releases - stage 3 in the Roadmap to Value. Releases are groups of usable product functionality that you release to customers to gather real-world feedback and to generate return on investment.

The following section details the steps to create a product roadmap.

Step 1 : Identifying stakeholders

- When initially establishing the product vision, it's likely you will have identified only a few key stakeholders who are available to provide high-level feedback. At the product roadmap stage, you put more contexts to the product vision and identify how you achieve the vision, which gives more insight into who will have a stake in your project.
- This is the time to engage with existing and newly identified stakeholders to gather feedback on the functionality you want to implement to achieve the vision. The product roadmap is your first cut at a high-level product backlog, discussed later in this chapter. With this first round of detail identified, you will want to engage more than just the scrum team, project sponsor, and obvious users.

Consider including the following people

- **Marketing department:** Your customers need to know about your product, and that is what the marketing department provides. They need to understand your plans, and may have input into the order in which you release functionality to the market, based on their experience and research.
- **Customer service department:** Once your product is in the market, how will it be supported? Specific roadmap items might identify the person you'll need to prepare for support. For instance, a product owner may not see much value in plugging in a live online chat feature, but a customer service manager may see it differently because his or her representatives can handle simultaneously only one phone call but as many as six chat sessions.
- **Sales department:** Make sure that the sales team members see the product so that they start selling the same thing you are building. Like the marketing department, the sales department will have first-hand knowledge about what your customers are looking for.
- **Legal department:** Especially if you are in a highly regulated industry, review your roadmap with legal counsel as early as possible to make sure you haven't missed anything that could put your project at risk if discovered later in the project.
- **Additional customers:** While identifying features on your roadmap, you may discover additional people who will find value in what you will create. Give them a chance to review your roadmap to validate your assumptions.

Step 2 : Establishing product requirements

- The second step in creating a product roadmap is to identify, or define, the different requirements for your product.
- When you first create your product roadmap, you typically start with large, high-level requirements. The requirements on your product roadmap will most likely be at two different levels: themes and features. Themes are logical groups of features and requirements at their highest levels. Features are parts of the product at a very high level and describe a new capability the customer will have once the feature is complete.

Decomposing Requirements

- Throughout the project, you'll break down requirements into smaller, more manageable parts using a process called decomposition, or progressive elaboration. You can break down requirements into the following sizes, listed from largest to smallest:
 - **Themes:** A theme is a logical group of features and is also a requirement at its highest level. You may group features into themes in your product roadmap.
 - **Features:** Features are parts of products at a very high level.
- Features describe a new capability the customers will have once the feature is complete. You use features in your product roadmap.
 - **Epic user stories:** Epics are medium-sized requirements that are decomposed from a feature and often contain multiple actions or channels of value. You need to break down your epics before you can start creating functionality from them.
 - **User stories:** User stories are requirements that contain a single action or integration and are small enough to start implementing into functionality.
 - **Tasks:** Tasks are the execution steps required to develop a requirement into working functionality. You break down user stories into different tasks during sprint planning.
- Keep in mind that each requirement may not go through all these sizes. For example, you may create a particular requirement at the user story level, and never think of it on the theme or epic scale. You may create a requirement at the epic user story level, but it may be a lower-priority requirement. Because of just-in-time planning, you may not take the time to decompose that lower-priority epic user story until you complete development of all the higher-priority requirements.
- To identify product themes and features, the product owner can work with stakeholders and the development team. It may help to have a requirements session, where the stakeholders and the development team meet and write down as many requirements that they can think of.

TIP: When you start creating requirements at the theme and feature level, it can help to write those requirements on index cards or big sticky notes. Using a physical card that you can move from one category to another and back again can make organizing and prioritizing those requirements very easy.

While you create the product roadmap, the features you identify start to make up your product backlog — the full list of what is in scope for a product, regardless of level of detail. Once you have identified your first product features, you have your product backlog started.

Step 3 : Arranging product features

- After you identify your product features, you work with the stakeholders to group them into themes — common, logical groups of features. A stakeholder meeting works well for grouping features, just like it works for creating requirements. You can group features by usage flow, technical similarity, or business need.
- Visualizing themes and features on your roadmap allows you to assign business value and risks associated with each feature relative to others. The product owner, along with the development team and stakeholders, can also identify dependencies between features, locate any gaps, and prioritize the order in which each feature should be developed based on each of these factors.

- Here are questions to consider when grouping and ordering your requirements:
 - How would customers use our product?
 - If we offered this proposed feature, what else would customers need to do? What else might they want to
 - Can the development team identify technical affinities or dependencies?
- Use the answers to these questions to identify your themes. Then group the features by these themes. For example, in the mobile banking application, the themes might be
 - Account information
 - Transactions
 - Customer service functions
 - Mobile functions

Common activities		Reduction in call volume	
Authenticate and access my accounts	Pay bills	Order checks	Order a copy a statement
View balance	Transfer money between accounts	Put a stop on a check or range of checks	Open an account
View pending transactions	View a statement	Change password	
View bills			
Find a branch/ ATM machine	Call customer service		

Fig. 6.2.4 : Shows features grouped by themes

6.3 Managing Iterative and Incremental Development

- Iterative and incremental development is a process that combines the iterative design method with the incremental build model. It is used by software developers to help manage projects. To fully understand the incremental and iterative development process, you must first split it into its two parts:
 - i) **Incremental** : An incremental approach breaks the software development process down into small, manageable portions known as increments. Each increment builds on the previous version so that improvements are made step by step.
 - ii) **Iterative** : An iterative model means software development activities are systematically repeated in cycles known as iterations. A new version of the software is produced after each iteration until the optimal product is achieved.
- Iterative and incremental development models are complementary in nature, which is why they are often used together to boost their efficacy and achieve project deliverables.

Iterative and Incremental Development in Agile

- The incremental and iterative development process is closely associated with Agile project management, most notably the Scrum methodology. This is because it aligns with one of the key pillars of Agile: responding to change over following a set plan.
- Rather than adhering to a linear Waterfall method, software developers will react quickly to changes as their product evolves. They will build on previous versions to improve their product and repeat this process until the desired deliverables are achieved.
- An example of iterative and incremental development in Agile could be the creation of a new e-commerce website. The project would be broken down into smaller increments, such as building a wireframe, uploading products, and creating advertising copy. As these steps are unfolding, the software development team would repeat the cycles of prototyping and testing to make improvements to the website with each iteration.

Why is Iterative and Incremental Development Important?

The incremental and iterative development process is integral to the field of Agile software development as it enables project managers to reap the benefits of both incremental and iterative approaches. Incremental development ensures that developers can make changes early on in the process rather than waiting until the end when the allotted time has run out and the money has been spent. Iterative development means improvements are made on an ongoing basis, so the end result is likely to be delivered on time and be of higher quality.

6.4 Role of Technology in Project Management

- In geographically dispersed projects, the project manager cannot visit every site and meet face-to-face with the workers and staff. This is not a good situation, but it happens. In such cases the project manager is forced to rely on technology—to use video and audio-conferencing, websites, e-mail, and the telephone. Video-conferencing can be effective but is expensive and requires appropriate technical facilities; audioconferencing can be good too, but involves careful scheduling so as not to waste peoples' time. The Internet is effective for broadcasting plans, reports, documents, and memos; however, it is passive and does not require that people see or respond to documents.
- The overall best form of long-distance communication is frequent one-on-one conversations on the telephone, not e-mail. Over the telephone, the project manager can listen to tone of voice, probe for details, and obtain real-time feedback. But site managers, workers, and contractors are not always completely truthful, so the project manager should also have a trusted source onsite to oversee work and report back progress. But the best communication remains face-to-face, and for sensitive issues it is worth traveling the distance to visit the site and meet with team members in person.
- A good rule of thumb is: the more sensitive the issue, the lower the technology to communicate it! For highly sensitive issues, use face-to-face; for relatively sensitive issues, the telephone is okay; for less or non-sensitive issues, use e-mail and fax. Important discussions and commitments should always be followed up in writing.
- Many project management software products take advantage of web-enabled technology that offer "paperless" plans and reports on interactive websites. This technology is especially well suited for situations where project team members and stakeholders are situated at different sites. Putting information on a project website or other network utilizing Internet standards affords the benefits of immediate availability of information, efficiency and accessibility for communication between workers, ease of usage, and reliability and currency of information because it is communicated in real time.

- With web-browser integrated project management software, team members can report progress and retrieve assignments through their own individual web pages. The manager can aggregate information from scattered worksites to get an overview of the entire project.
- In most cases, the necessary tools are already at hand. Web-enabled project software requires only one thing: access to a web browser such as Internet Explorer or Netscape. Since Internet and intranet networks are easy to learn and use, team members readily adapt to a web-based PMIS for sending and accessing project information.
- Special website administration is usually not necessary since team members maintain their own sites, and the costs associated with overhead, update, and maintenance of web-based communication are very low.

6.5 Virtual Teams and Distributed Project Management

- Virtual Team is a group of people with a shared goal who work in different locations and who engage with each other primarily through phone and other electronic communications.
- Virtual teams are composed of members who might be working remotely, across various time zones, and possibly from different organizational backgrounds. They rely on technology to communicate, collaborate, and coordinate their efforts. Common communication tools for virtual teams include video conferencing, instant messaging, project management software, and email.

6.5.1 Relevance to Agile Principles

- Individuals and Interactions over Processes and Tools :** Agile emphasizes the importance of direct communication among team members. In virtual teams, effective communication tools and practices are crucial to foster interaction despite physical separation. Agile teams need to prioritize establishing clear and frequent communication channels to ensure that team members stay connected, share updates, and resolve issues in a timely manner.
- Working Solutions over Comprehensive Documentation :** Agile promotes practical solutions rather than exhaustive documentation. Virtual teams benefit from this principle as it encourages focusing on delivering functional outputs rather than getting caught up in excessive documentation. Collaborative tools and shared online spaces can be used to create and maintain essential project documentation in a lightweight and accessible manner.
- Customer Collaboration over Contract Negotiation :** Agile methodologies stress the importance of involving customers and stakeholders throughout the development process. Virtual teams must make an extra effort to keep customers engaged and informed despite physical distance. Regular video conferences, virtual demos, and user feedback sessions can bridge this gap and ensure customer needs are met.
- Responding to Change over Following a Plan :** Agile teams remain flexible and responsive to changes in requirements. For virtual teams, this principle is vital due to potential challenges posed by different time zones and communication barriers. Regular feedback loops, adaptive planning, and transparent communication are essential to address changes swiftly and ensure alignment across dispersed team members.
- Collaboration and Adaptability :** Virtual teams often have members from diverse backgrounds, cultures, and time zones. This diversity can enrich problem-solving and innovation but also demands a strong focus

on collaboration and adaptability. Agile principles encourage cross-functional collaboration, which is particularly important in virtual teams to ensure a holistic approach to project delivery.

6. Regular Reflection and Improvement : Agile frameworks advocate for regular retrospectives to assess what's working well and what can be improved. Virtual teams should schedule virtual retrospectives to reflect on their processes, communication methods, and collaboration tools. This practice helps identify areas of improvement and strengthens the team's performance over time.

In summary, Agile principles provide a valuable framework for guiding the practices of virtual teams. They emphasize communication, collaboration, flexibility, and customer focus – all of which are critical for the success of teams working in remote and distributed environments.

6.6 Tools and Software for Project Planning and Collaboration

Respondents of the 2019 State of Agile survey provided these five tips for how to implement Agile in an organization:

- Put internal Agile coaches in place to help others learn and implement Agile Have strong executive sponsorship for the adoption of Agile project management Implement company-provided training programs for all employees who will be involved with or be a stakeholder in Agile projects Promote and enforce consistent practices and processes across all Agile teams Provide standard tools across all teams.
- Your Agile implementation plan should follow the guidelines and structure of any organizational change implementation plan. For instance, before implementing Agile, leadership should inspire change in employees by presenting a compelling vision for the future. This includes communicating Agile methodology advantages and how Agile will benefit your people and your business.
- Communication is key. Before, during, and after implementing any large change, the management team should consistently communicate what, when, and why changes are happening and what they mean for employees. It's also important to share what will be staying the same.
- For instance, if the organization will use both Waterfall and Agile methodologies to suit different projects and customer/business needs, it's important to understand which methodology will be used and when.
- Strong management support can aid change, but it's also vital to provide training and coaching to all impacted employees. Agile experts can help teach your teams the proper applications of Agile methodology for a smooth transition. Plus, it ensures consistent processes and practices throughout the organization.
- If Waterfall methodologies are entrenched in the culture of your company, this can create a general resistance to change that's not easy to overcome. In this case, management may need to focus on enforcing and encouraging Agile practices.
- It's also essential to capture project data and metrics. If you can show statistics that prove Agile results in greater project performance, it can help win over hesitant stakeholders.

6.6.1 Industries that can Benefit from Agile Project Management Techniques

- The Agile methodology is used by a growing number of companies across all industries. While technology is still the most common industry for Agile, finance, professional services, insurance, government, and many other sectors are also embracing it.

- Numerous companies are adopting the Agile methodology with confidence. Organizations are taking rapid strides towards growth even as the world evolves at lightning speed. However, an Agile transformation is overdue for many companies. Let's look at industries that can significantly benefit from going Agile:

1. Construction

- Construction industry projects are perfect for the Agile methodology. A typical project life cycle involves design, pre-construction, procurement, development, and the final post-construction stage.
- It is a very linear industry where the next step can be started after the previous one is completed. Agile construction teams can utilize Agile for the design and pre-construction phase to create iterative tasks, adapt to upcoming changes, and deliver value on time.
- By including the Agile principle of visualization, teams can eliminate waste, avoid loss of time, and immediately respond to emerging issues.

2. Engineering

- Agile project management techniques are a great fit for the traditional engineering sector's linear and well-defined sequential processes.
- Different stages in an engineering project span from concept development, requirements gathering, system architecture, design and development, integration, evaluation, testing, and operations and maintenance.
- Changes in the engineering industry can be costly. When teams apply Agile tools, they proactively collect customer feedback and incorporate that into their prototype or minimum viable product (MVP). This helps them deliver a constant value stream in smaller batch sizes and save on costs.
- Agile has a strong focus on continuous improvement. Teams use Kanban boards to map their workflows from start to finish- this way, they spot obstacles before they occur and eliminate any wasteful activities, optimizing the entire engineering value chain.

3. Event planning

- Whether you're planning for a one-time event or a recurring one, there are many elements to be considered. The Agile methodology enables event planning companies to make real-time changes to their plans and iterate faster to meet deadlines.
- Agile's method of visualizing project tasks helps teams track progress and avoid stress due to unnecessary slip-ups.

4. Finance

- Agile can be an excellent option for finance companies. Apart from helping them automate routine tasks and establish customized internal workflows, the Agile methodology also eliminates manual errors.
- Agile finance teams can also implement emerging technologies, upskill their employees and introduce newer ways of working.
- Agile finance teams can monitor budgets and maintain the focus on profitability by tracking every entry in real time. Since Agile brings together cross-functional teams working in sprints, any issue can be resolved at the source.

5. Product development

- Agile project management tools are a great fit for the dynamic product development space. While traditional product development focuses on building the entire product before launch, Agile emphasizes getting work done in smaller sprints. It shortens timelines and increases productivity while creating more autonomy for product teams.
- Instead of being told what to build, Agile gives product development and UX teams a more hands-on approach. Agile requirements are generated in the form of user stories and the entire team decides how best they can serve the customer.

6. Leading companies that use Agile methodology

Some of the most well-known companies that use Agile project management techniques are:

- **Amazon** : Some form of Agile was present at Amazon as early as 1999, but it was between 2004 and 2009 that the organization achieved the widespread adoption of Scrum. It's now one of the most common and well-known examples of Agile project management.
- **Cisco** : Cisco adopted Agile in 2015 to lower defects, reduce employee overtime, and improve product delivery times.
- **Google** : Google is one of the best-known companies that use Scrum. The company has many applications such as Gmail, Google Maps, Google Calendar, etc. that all need regular updates. To handle the updating, testing, and release of so many products quickly and consistently, Google utilized the Scrum framework.
- **Lego** : Lego adopted Agile back in 2015 to improve communication, focus, and productivity. It helped them achieve more accurate estimates, reduce paperwork, and become more efficient.
- **Netflix** : Netflix is a great example of a company that uses Agile project management to remain innovative and stay ahead of the competition. Netflix uses Agile to create television shows and movies to quickly and consistently provide content for all demographics.
- **Microsoft**: Microsoft uses Agile for both small and enterprise-sized projects. The company first implemented a small-scale Agile model and then scaled and modified it for larger projects and solutions.
- **Spotify**: Spotify embraced Agile software development practices to compete with well-established competitors such as Apple, Google, and Amazon.

How to choose the best Agile project management tool?

- Agile project management tools are any tools used to manage and execute an Agile project. In the most basic form, a whiteboard and sticky notes could be considered Agile management tools. The key difference between Agile tools and other project management tools is their ability to handle Agile frameworks, such as Kanban and Scrum.
- In other words, Agile tools must be able to support Agile project management best practices. For instance, if you're adopting a Scrum framework, it's important to select Agile project management software that can create, update, and share Scrum boards.

- The best Agile software will help your team embrace the key pillars and values of Agile. This means your Agile management software should increase visibility, communication, and collaboration among team members and stakeholders. It should also be versatile enough to change the requirements of your project as needed.

6.6.2 Features to Look for in Agile Project Management Tools

- When looking for the best Agile project tool, consider whether the software will allow you to add new tasks, change resources, or create a new sprint in an existing project.
- Don't forget that both Agile and non-Agile project management tools should enable you to follow project planning best practices. This means any tool you choose should help you create and maintain project structure, record changes, track and monitor progress, view trends, and give visibility into your projects' performance.
- When determining which Agile project management tools are best for your team or organization, here are some other important factors to consider:
 - How many projects will you need your tools to handle at one time?
 - How many people need to be able to use the tool at once?
 - Will you be managing both Agile and non-Agile projects? Do you need a tool that can handle both?
 - Do you expect your organization to grow in the next two to five years? The best Scrum tools should be capable of growing with your business.
 - How user-friendly is the Agile project tool? What's the average user satisfaction rating of the tools you're considering?
 - How will users access the Agile project tool? Do you need Scrum project management tools that are accessible from multiple locations or mobile devices?
 - What other tools or systems will your new Agile project management tools need to integrate with? If you have ERP (enterprise resource planning) software you need your Scrum management tools to integrate with, it's essential to check for this compatibility before purchasing.
 - Before starting with the Agile methodology, check out the top features your Agile project tool should have:
 - **Project progress and visualization** : Seeing project progress helps team members know everyone's status, including the expected time required for completion. Any tasks lagging behind their due dates are displayed clearly, so teams can take action to speed up completion.
 - **Easy collaboration** : Composing frequent and time-consuming emails isn't great for project productivity. See if your Agile software provides you with a seamless interface for collaborating with the entire team and integrates with your team's favourite messaging app.
 - **Customized reports** : Every department tracks various metrics. Therefore, your Agile project tool should be able to provide customized reports for internal teams, senior management, and external stakeholders.
 - **Manage project portfolio** : With the number of projects increasing, your Agile project management tools should be able to handle the overall project portfolio. It should allow project managers to jump into different projects seamlessly based on their needs.

- **Bug tracking :** Every project has issues and bugs. You need a tool that helps you identify, evaluate, and resolve them immediately. With a robust issue tracking feature, teams will be able to work on specific issues and resolve them without impacting the entire project.
- **Building your first Agile workflow and project plan :** Once you've selected your Agile tools, it's time to create your first Agile workflow and project plan.
- It's easiest to develop a project plan before you create workflows, as the plan will identify which workflows and phases your project will need.
- The Agile project plan's role is similar to that of any traditional project plan in many ways. Firstly, an Agile project begins with a pre-planning step where the project vision is both defined and documented. This is also where known business and technical requirements are documented.
- This phase of basic project planning is also when your project team members will be assigned. High-level estimates for budget, time, and scope should also be gathered and documented. Your project team will then determine the number of sprints or iterations required for the project, the length of each sprint, and the expected deliverable or outcome.
- The big difference between Agile and traditional project methodologies comes after high-level planning is done. For an Agile project, you'll plan only the initial sprint in detail, rather than the entire project. Under Agile, it's only after each sprint is completed that the next sprint's details are planned. This iterative process enables your project team to adapt each sprint plan based on the previous sprint outcome(s).
- The sprint details of your plan should be put into your Agile project management tool. If your software comes with templates, you may be able to use a blank Agile template or a sample Agile project plan to create your new project plan.
- Here's an Agile project plan example that can be used as a template:

Active Tasks by Assignee					...
	Title	Status	Duration	Effort	
1	^ Backlog	3			
2	^ John Smith	2			
3	Collect feedback	New		2d	
4	Release to production	New		4h	
5	^ Jessica Brown	1			
6	Final testing & release preparation	New		4h	
7	^ Current Sprint	2			
8	^ John Smith	2			
9	Develop front-end logic	Development		5d	
10	Develop front-end markup	Development		3d	

Fig. 6.6.1 : Agile project plan example

- Once your project plan is complete, it's time to set up the proper project management workflows within your new Agile project software. For instance, if you'll be using the Scrum framework you'll now need to create your Scrum workflow.
- Workflows ensure tasks and activities move through the right people at the right time and the work is properly completed and tracked. Since Agile best practices recommend an iterative and incremental approach, your workflows need to accommodate cycles of work.
- A standard workflow would often assume a task would move from "in progress" to "in review" to "complete." But with Agile project planning, you may need to exchange tasks between "in progress" and "in review" several times before they ever get to the "complete" phase. It's critical that your software can handle this without losing visibility of progress.
- Here's an Agile workflow example:

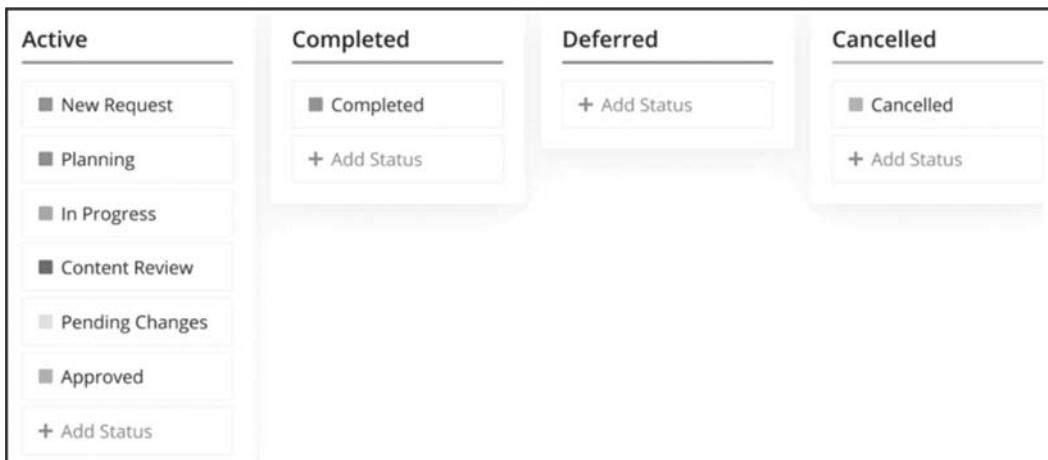


Fig. 6.6.2 : Agile workflow example

- Once created, you can use these workflows, along with a project dashboard, to easily track your overall project progress.

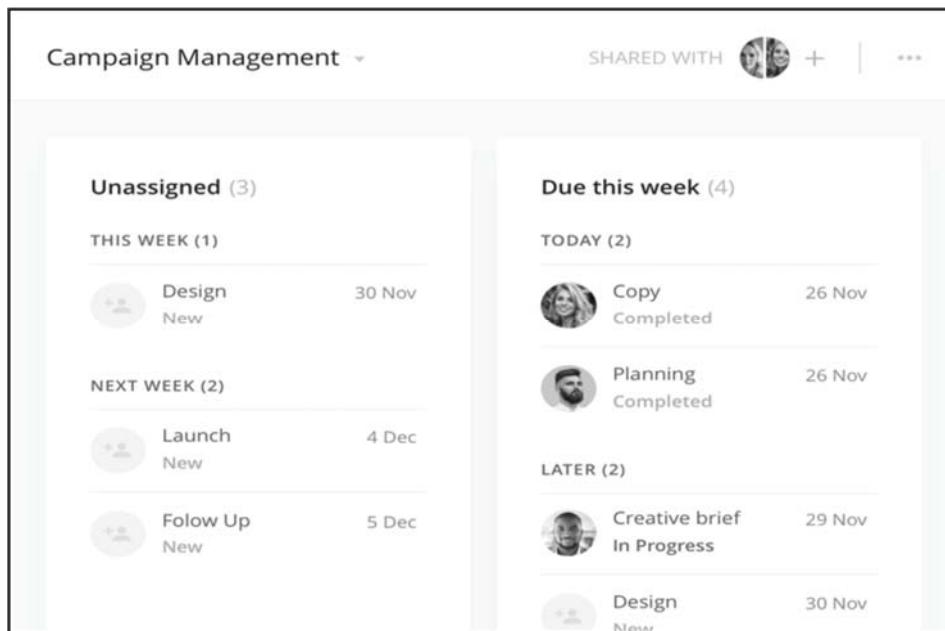


Fig. 6.6.3 : Example of Project dashboard

- More than a methodology: How to create an Agile environment
- As we discussed in another section, two of the most common setbacks to adopting an Agile methodology are due to the organization's culture being at odds with Agile values or a general resistance to change across the organization.
- Therefore, Agile must be viewed not just as a project methodology but also as a holistic approach to projects. Agile impacts the entire organization, even those not directly working on projects. And to be successful, the overall company environment needs to support the values and principles of Agile.

The four pillars that any Agile environment needs to support are:

1. Individuals and interactions over processes and Agile project management tools The Company must value people over processes and be willing and open to adapt to changing needs.
2. Working software over comprehensive documentation the emphasis must be on creating working project deliverables. Stakeholders, including the executive, should support eliminating needless documentation and reducing paperwork requirements to allow team members to spend more time creating project deliverables.
3. Customer collaboration over contract negotiation. The customer must be viewed as a teammate, and an open relationship must be formed with frequent communication. Your company needs to be willing to make changes to satisfy the customer, even if that means having to amend the original contract.
4. Responding to change over following a plan. An Agile environment requires a willingness to be flexible and adapt quickly to changes. If technology requires a change of scope midway through a project, an Agile team will work it into the next sprint, whereas a traditional environment may refuse to adapt.

The bottom line is that companies with Agile environments typically accept and promote change, innovation, and process improvement. They understand different Agile frameworks and support Agile practices, such as planning in sprints and working collaboratively. These workplaces support their team members and view engaged employees and customers as more important than following documented processes.

Review Questions

- Q. 1** Explain the history of Agile Methodology.
- Q. 2** Write short note on, Marketing Campaigns, Event Planning, Product Development.
- Q. 3** Explain Role of Technology in Project Management.
- Q. 4** How to Choose the Best Agile Project Management Tool?
- Q. 5** Explain Project Planning and Collaboration.
- Q. 6** Write note on virtual teams.
- Q. 7** Give Types of Agile Methodologies.
- Q. 8** Write down Agile Principles.



7

Effective People Management in Projects

Syllabus

Effective People Management in Projects : Leadership styles and characteristics, Team building and motivation techniques, Emotional intelligence in project management, Stakeholder identification and analysis, Stakeholder engagement and communication strategies, Conflict resolution and negotiation skills

7.1 Leadership in Project Management

7.1.1 Leadership Style

- There is variety of organizational forms apropos for different purposes and types of work. Likewise, there is a variety of suitable leadership styles depending on the situation. Leadership is the ability to influence the behaviour of others to accomplish what is desired; *leadership style* is the way in which a leader achieves that influence.
- Leadership style can generally be divided between the two extreme approaches of *task-oriented* and *relations-oriented*. Task-oriented leaders show higher concern for the goal and the work and tend to behave in a more autocratic fashion. Relations oriented managers show greater concern for people and tend to exercise a more democratic leadership style.
- Numerous studies have attempted to discern the most appropriate or effective leadership style. Most management theorists agree that no one leadership style is best for all situations. Effective style depends upon characteristics of the leader, the followers, the leader's interpersonal relationship with followers, and the nature and environment of the task.
- This perspective is called the contingency approach or situational approach to leadership. There are many different contingency models; all suggest that the leader should use the style that best fits the work situation and try not to apply the same style to all employees and situations. Brief mention will be made of two of these models-those of Fred Fiedler and Hersey and Blanchard.

Contingency and Situational Approaches

- According to Fiedler, 3 the three variables that most affect a leader' s influence is whether
 - i) The work group accepts or rejects the leader,
 - ii) The task is relatively routine or complex, and
 - iii) The leader has high or low formal authority.

- Although the project manager might encounter any of these situations, the most common(as described in the previous chapters) is likely to be:
 - He has relatively low formal authority.
 - He gets along with team members and is respected for his ability and expertise.
 - The task is relatively complex and requires a good deal of judgment or creativity.
- Fiedler' s research indicates that under these three conditions a *relations- oriented* style is the most effective. The most prominent behaviour in this style is the leader's positive emotional ties with and concern for his subordinates. Hersey and Blanchard 4 use a model called *situational leadership* that weighs the interplay of three variables:
 - i) The amount of direction and guidance a leader gives(task behaviour),
 - ii) The amount of socio-emotional support he gives (relations behaviour), and
 - iii) The readiness of followers to perform the task (maturity).
- The last variable, "maturity" has two aspects: the person's skill or ability to do something and the person's motivation or willingness to do it. According to the model the most effective leader behaviour depends upon the maturity level of the followers. Project managers seldom manage laborers or even shop-floor people. Usually they deal with technical specialists, managers, professionals, trades people, and other highly trained people.

Thus, they tend to work with people who are either,

- (1) Able but perhaps unwilling to do what the manager wants or
 - (2) Both able and willing to do what he wants.
- For Group (1) the model suggests a *participative* style as more effective. The thrust of a participative leadership style is toward facilitating, supporting, and communicating with followers. Both managers and followers share decision making. For Group (2), the model suggests a delegating style as more effective. The manager identifies the problem or goal and gives the followers responsibility to carry out the task. Followers are permitted to solve the problem and determine how, where, and what to do.
 - In their research on managing scientific and technical personnel, Hersey and Blanchard found that people with high-level education and experience responded better to participating and delegating management, and did *not* respond well to strong task behaviour and close supervision; sometimes, however, they did need socio-emotional support.
 - Of course, this is not to say that project managers never face workers who are unwilling to follow instructions or will not take initiative. In cases where delegation or diplomacy fails, a project manager with legal authority may resort to using it. Like other managers, he must occasionally cajole, give orders, and fire people to get the job done.

Project Circumstances

- Effective leadership style also depends on project circumstances, especially project length and intensity. For example, a less participative, more directive style may be more appropriate when there is less time to complete the work. Thus, the work *place* sometimes constrains the available leadership options, and in situations where there is high intensity and involvement, these incentives may act as "substitutes for leadership.
- "People generally find it difficult to build trust and confidence when a job needs to be completed in only a few days, especially so for a job involving subcontractors where no more than an arms-length association may exist, or where the workforce is transient and unfamiliar.
- In such situations the project manager may need to be more directive and assertive. As with other aspects of the project manager's role, he must be adaptable-able to wear different leadership-style hats and change them quickly.

7.1.2 Participative Management

- The models of both Fiedler and Hersey and Blanchard offer similar conclusions about project situations: the most effective leadership style for project managers is a relations-oriented style-supportive, facilitative, and encouraging.
- As mentioned, this does not mean that project managers must never use high task behaviour or tell people what to do, but that in *most* project situations, high relations behaviour works best, even when combined with high task behaviour. This conclusion is further supported by Sayles and Chandler who found that in large aerospace projects the preferred style of leadership is participative management.
- They observed that project managers seldom give orders to the individuals they influence, partly because most of these individuals are not subordinate to the project manager, and also because giving orders induces a "no, we won't do it" reaction.
- Project managers use participative management because they deal with specialists and other managers who *must* share in the decision making. Although project manager shave a purview of the total system, they are farther removed from problems than the specialists and often do not know the answers to technical questions.

Motivation

- Project work may be stimulating, satisfying, and provide a great sense of achievement. Combined with constant pressure to meet project goals, these are natural motivators. Elements inherent to project management systems-contractual agreements, work breakdown structures, responsibility matrixes, and work package orders-may also be motivators.
- They provide clear goals that, when combined with financial and career rewards, motivate people in the same way as the management-by-objective approach. But project work can include many de-motivators as well. Too much pressure leads to stress, tension, and conflict. On large jobs individuals can lose sight of the end-item and feel alienated. Formal mechanisms of control also can be threatening.

- One advantage of participative decision making is that it helps diminish potential de-motivators by garnering workers' commitment to project decisions. Participative project managers do not relinquish responsibility, they delegate it. Even when they have legal authority, effective project managers involve others by, e.g., acquainting them with problems, consulting them for their opinions, and giving them frequent feedback. Knowledgeable workers are allowed to help prepare project plans and budgets.
- In providing such assistance, they can appreciate how and where their work fits in; this encourages closer association with the project and greater dedication to its success. As stated earlier, people and situations vary, so the project manager must determine how much responsibility individual workers can be given and how much they have to be monitored and directed.

Management Development

- Most project managers rely on human relations skills to influence actions. They work hard at being supportive, involving others in decision making, and at not being dogmatic or impatient. In projects where high potential for conflict exists, project managers need to develop good personal relationships, especially during the early phases of the project when patterns are set.
- To do this they have to invest considerable emotional energy in their work, be open with people, and work hard at trusting and gaining the trust of others. But simply telling people they need to shift from a traditional management style (high task-oriented) to a project style (high relations- and task-oriented) is not enough.
- Especially in matrix organizations, unless project managers receive support in adjusting to relations-oriented leadership, they might not be able to do it; left alone, patterns of behaviour develop naturally that can destroy participation, trust, and cooperation.
- A planned process of individual and group development-team building and inter personal skills training often is necessary to help managers and subordinates make the transition. In the words of Benn is and Nan us, the most effective leaders are able to "align" the energies of people and groups behind the goal.
- They lead by "pulling rather than by pushing; by inspiring rather than by ordering; and by creating achievable, challenging expectations and rewarding progress rather than by manipulating." The ample evidence, both anecdotal and empirical, is that effective project managers are strong leaders who utilize participative management.

7.1.3 Teams in Project Management

- All project organizations, whether they be task forces, pure projects, or matrices, are comprised of groups. As Figure 15-1 illustrates, in a large project some of these groups comprise people from within one organization (the project office, mid-level managers, and functional and multifunctional work package teams), while others comprise multiple organizations (cross-organizational project management, functional groups, and so on).
- In many of these groups membership overlaps and people serve dual roles that link the groups together. The term *project team* as used here can refer to any group working in the project or to all groups in combination.
- The difference between a group and a team is that the former is simply a collection of people, whereas the latter is a collection working toward a common goal. Thus, virtually all work accomplished in a project, whether mental or physical labour, is the product of teams. To be successful, a project needs *teamwork*.

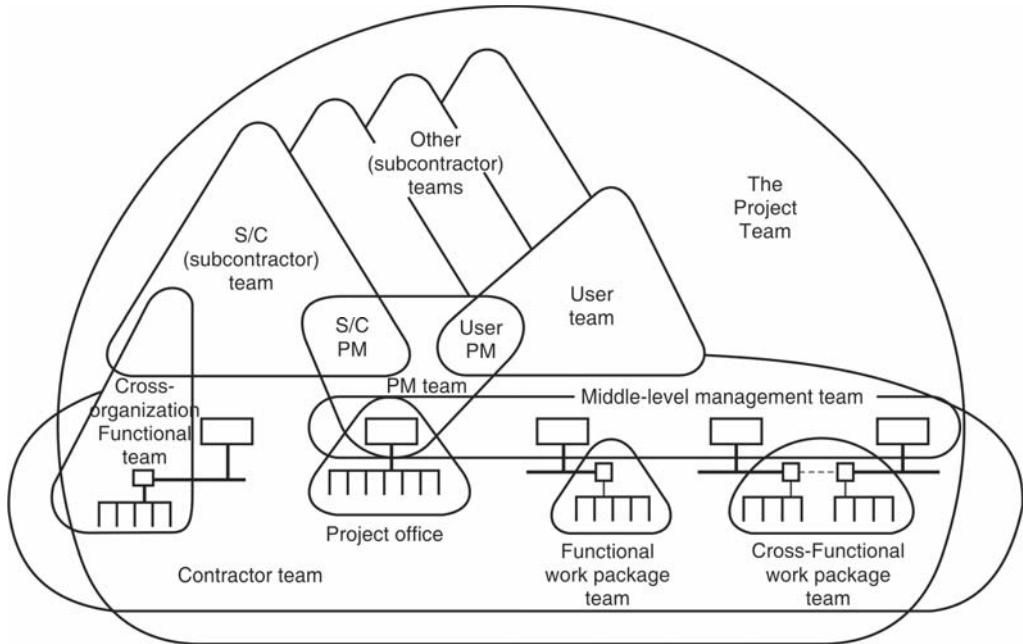


Fig. 7.1.1 : Groups comprising the project team

The Trouble with Teams

- Failures in projects often can be traced to the inability of a team to make the right decisions or perform the right tasks. These failures often stem from the maladies that teams suffer: internal conflict, member anxiety, and frustration; time wasted on irrelevant issues; and decisions made haphazardly by senior people, coalitions, or default. Team members often are more concerned with getting the task *done* than with doing it *right*.
- Many teams never know what their *purpose* is, so they never know when, or if, they have achieved it. In projects with multiple teams, each might have different attitudes, orientation, and goals.
- Some teams might be physically isolated and maintain separate offices, creating and reinforcing separating boundaries. Or teams might develop an "us versus them" attitude leading to intergroup competition, resentment, and conflict. These occurrences make for a portentous project environment and bode ill for project success.

7.1.4 High-Performing Teams

- In contrast, successful projects are the result of the efforts of *effective* teams, those that succeed in achieving whatever they have set out to do. In an effective team, individuals and groups work together as a single cohesive unit. What makes a team effective? Peter Vaill has studied a large number of highly effective teams that "perform at levels of excellence far beyond those of comparable systems."
- The prominent feature he found for all of them is that they know and are committed to team goals. Members are never confused about why the team exists or what their individual roles are. Leaders inculcate belief in the team's purpose, eliminate doubts, and embody a team spirit. He also found the following:
 - Commitment to the purpose of the system is never perfunctory and motivation is always high.
 - Teamwork is focused on the task. Distinctions between task and process functions dissolve. Members develop behaviours that enable them to do what they must.

- Leadership is strong, clear, and never ambivalent. Leaders are reliable and predictable, regardless of style.
- The team is clearly separated from others; members uniformly feel that "we are different."
- Vaill found three characteristics always present in the behaviour and attitudes of leaders and members of high-performing systems. He calls them time, feeling, and focus. First, leaders and members devote extraordinary amounts of time to the task. They work at home, in the office, in taxicabs-anywhere. They fully commit themselves for the duration of the project.
- Second, they have very strong feelings about the attainment of the goal. They care deeply about the team's purpose, structure, history, future, and the people in it. And third, they focus on key issues; they have a clear list of priorities in mind. In high-performing teams, time, feeling, and focus are always found together.
- Vaill encourages would-be leaders to "Seek constantly to do what is right and what is needed in the system (focus). Do it in terms of your energy (time). Put your whole psyche into it (feeling)." High-performing teams function as a whole. Everyone devotes lots of time, intensely values the team and its purpose, and is clear about priorities.
- Successful project organizations are high-performing teams. For project managers, Vaill's findings underscore the importance of clear definition of project objectives, clarification of the roles and tasks of team members, strong commitment to achieving objectives, and a "project spirit" that bonds everyone together.

Example 1

Time, Feeling, and Focus in Project Management: Renovating the Statue of Liberty.

The renovation of the Statue of Liberty is a good example of the kind of commitment and effort required for successfully managing a large-scale project. Over 25 firms submitted proposals for the task of leading the team of 500 engineers, architects, artisans, and craftsmen who would do the renovation. Selected for the job was the small construction management firm of Lehrer/McGovern, Inc. As Hofer describe the firm's partners: Lehrer is soft-spoken and generally conservative in appearance; McGovern clean-shaves his head, has a handle barmustache, and wears cowboy boots. Despite differences in appearance, the two share similar goals and broad experience as civil engineers and construction managers. Did they devote a lot of time to the project? To co-ordinate the more than 50 businesses doing the job, Lehrer and McGovern worked as many as 16 hours each day. As managers they handled everything from helping architects and craftsmen implement plans, to making arrangements with subcontractors and ensuring that materials were ordered and delivered on time. Did they in still feeling for the project? Said Lehrer, "this project is a labor of love.

The spirit and pride of hundreds of men and women involved bring out the best of us as Americans." They expected and they inspired feelings like that from everyone else, too. They only hired people who had "the same commitment and dedication as we do, who are aggressive and ambitious and understand that virtually nothing is impossible." Before beginning this job they gave each subcontractor a lecture about the importance of the job and that nothing can be allowed to damage the "crown jewel of the United States." Did they maintain focus? Their major emphasis was on top quality work. The two partners believe that management's close and personal involvement is crucial to quality, so they made frequent visits to the site to personally supervise or handle thousands of details. Obviously, this was an exceptional project; it was highly publicized, it faced considerable political pressure to succeed, and it had to be completed in time to celebrate the Statue's centennial anniversary. But many other prominent, highly charged projects have bombed. In this case, time, feeling, and focus helped bring success to a prominent project.

7.1.5 Effective Project Teams

- Because project work requires close collaboration, people in project teams have to rely on and accept one another's judgments. Managers must share information and consult with each other to make decisions, and team members must support each other and accept others' viewpoints. Individuals, departments, or organizations must be committed to project objectives, not just their own.
- One way for increasing commitment and collaboration on a project team is to stimulate interaction between members. In some cases, this can be achieved by having members share office quarters. Presumably, individuals with frequent daily contact are more likely to identify with the group. Although close physical proximity *can* increase members' affiliation with a group, alone it is insufficient to make an effective, cohesive team.
- Vaill's findings indicate that effective teams are clear about their purpose, are committed to it, know their individual roles, and understand how to function as a team. In most projects, however, people have not previously worked together and do not have the time to form friendships, develop group work habits, or build team spirit.
- In many projects it is common that patterns of effective group work never develop; it is the purpose of teambuilding to ensure that doesn't happen.

7.2 The Team Building Approach

- The importance of teamwork to project success has been firmly established. In a study of two NASA research centers, 36 experienced project managers were asked to rank the most important principal functions of their job. The function of collecting, organizing, directing, and motivating the project team and supporting groups was ranked as first in importance by 20 managers from one center and as second by 16 managers from the other center.¹⁷ In another study involving 32 project groups in research and product development projects, the single most important factor to achieving project goals was found to be group cohesiveness.¹⁸ Effective groups do not just happen. Like any other purposeful system, every team and organization must be developed.
- This is the purpose of team building, a procedure whereby a team formally ponders how it should work or has been working with the purpose of improving its functioning and output. Team building considers issues such as decision making, problem solving, team objectives, internal conflict, and communication. These are called group process issues, referring to processes or methods by which the team gets things done.
- Ordinarily these are responsibilities of the team leader, though many leaders ignore them. Effective groups recognize and monitor these issues, regardless of the leader. The idea of formally looking at group processes is new to many people because groups rarely do it. Using the team building approach, a group explores whatever process issues its members consider important, then plans for how it will resolve these issues and perform its work.

When it is Needed?

The need for team building depends on the team members and the nature of the task. Generally, the more varied the backgrounds and responsibilities of team members, the greater the need. For example, members of multidisciplinary or multi organizational teams have different work backgrounds and goals as well as different

outlooks on planning and doing work. Some members take a wider perspective, others are detail people. Team building can help both types accept their differences and define common goals. Projects involving innovation, new technology, high risks, changes in policies and procedures, tight schedules, or large investments typically place teams under heavy stress. To some extent stress may improve the output of a group, but after a point it becomes detrimental. Team building helps the group avoid conflict or deal with problems that arise from stress. With this approach, problems are disclosed and resolved as they occur, before they can escalate and interfere with team performance. Team building efforts may be applied to experienced teams, teams of strangers, or several teams that must work together toward a common goal.

7.2.1 Aspects of Team Building Efforts

The purpose of team building is to improve group problem solving and group work efforts. To this end, the approach strives to achieve norms such as:

1. Effective communication among members.
2. Effective resolution of group process problems.
3. Techniques for constructively using conflict.
4. Greater collaboration and creativity among team members.
5. A more trusting, supportive atmosphere within the group.
6. Clarification of the team's purpose and the role of each member.

Three features common to any team building effort are:

- (i) It is carefully planned and facilitated, often by a consultant or professional staff person from human relations or the PMO.
- (ii) The consultant collects data about the group process functioning of the team in advance, then helps the group "work through" the data during a diagnostic/problem-solving workshop.
- (iii) The team makes provisions for later self-evaluation and follow-up.

Following are examples of team building as applied to three situations: current, ongoing work teams; new teams; and multiple teams that must work together.

7.2.2 Improving Ongoing Work Teams

- First consider how team building is applied to an experienced team within a functional department or project that has been having problems working together. Such teams include a cross-functional management team, a design-build team, or a team

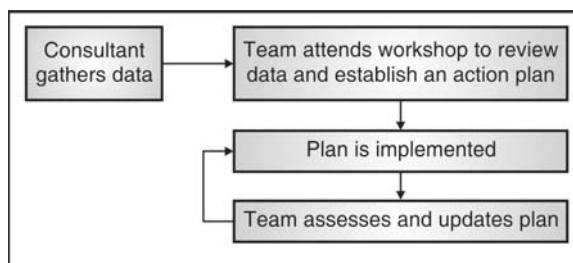


Fig. 7.2.1 : Team building cycle

- The author has worked with project groups where problems ranging from technical issues to interpersonal conflict were resolved with team building workshops. The purpose of the workshop is twofold: It provides a structure for the team to resolve interpersonal or group process issues as well as a forum where the group examines itself as a team. Participants often find these sessions refreshing. They gain stimulating insight into group dynamics and develop a model of behaviour to follow in the future.
- To ensure that action steps are implemented and process issues continue to be addressed, the workshop always includes follow-up sessions. These take place formally at 2–3-month intervals or less formally during regular meetings. The team takes stock of its functioning, what improvements it has made, and what still is needed. As the group becomes more effective, the group itself takes over the consultant's role. Whenever follow-up sessions reveal new problems, the process is repeated.
- The full cycle is summarized in Fig.7.2.1 ,Two conditions are necessary for team building to succeed. First, management's *support* is needed. The team leader and upper managers must face the issues uncovered and assist in (or provide resources for) working toward solutions. Second, team members must *want* to resolve the group ' s problems. They must be open and honest in providing information, willing to share in the responsibility for having caused problems, and eager to work toward solutions.

7.2.3 Building New Teams

- With small variation, team building can be applied to *new* project teams. The new team might be a concurrent engineering team, a work package team, or a management or design team with representatives from the client and contractor. The purpose of team building for a new team is similar to those of an experienced one-to develop a plan for working together and build good working relationships and a good working environment.
- New teams have the advantage of not having established bad habits and poor working relationships. The first task of a newly formed team is to reach agreement on its purpose, how it will achieve its purpose, and the roles of its members. It then asks itself: How can we effectively work together in a manner that will allow us to accomplish our purpose and leave us feeling good about one another?
- A team building workshop led by a facilitator is convened to help members become acquainted, reach agreement on objectives, and decide how they will function as a team. In *Team Building: Issues and Alternatives*, William Dyer describes several workshop agendas.

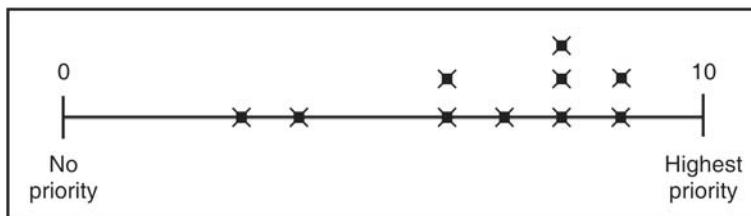


Fig. 7.2.2 : Priority ranking of project for 10 team members

The following is one possible application to new project teams :

Step 1 : Develop a priority level. Sometimes members of a team differ widely in the priority they place on the project goal or work tasks. Especially in ad hoc teams or task forces with part-time members, some members give the project high priority, others low. One way of acknowledging these differences is for each member to indicate on a scale of 1 to 10 the priority of the project compared to her other work.

Another way is to ask each person to indicate the amount of daily or weekly time she can devote to the project. The information then is tallied and posted on a chart similar to Figure 15-3. A group discussion follows about commitments to the project, and about which members will accept heavier duties than others. People who so desire can explain their position on the chart. This discussion helps reduce the potential resentment of some members committing to more work or less work than others.

Step 2 : Share expectations. Each person is asked to think about the following questions: (1) What would this team be like if everything worked ideally? (2)What would it be like if everything went wrong? (3) In general, what kinds of problems occur in work groups? and (4) What actions do you think need to be taken to develop an effective team? Each person's responses are shared verbally and then posted. Concerns and answers are discussed. Differences that surface will be worked through later in Step 4.

Step 3 : Clarify purpose and objectives. The team discusses and writes down its purpose and objectives. Sometimes this is straightforward, as for a work package team where the goal has been already set; other times the group will have to define the goal on its own. Either way, the purpose and objectives should be clearly defined and accepted by all members. The group objectives are the standard against which all plans and actions will be measured. The group then develops sub objectives so that members may be given specific assignments. The team objectives should complement and conform to the user and system objectives and requirements as defined in the SOW or charter. In fact, a session like this can be used to create portions of the SOW or charter.

Step 4 : Formulating operating guidelines. Commonly, group conflict arises over different expectations about work roles, job assignments, and how the group ought to work. This conflict can be reduced by establishing group guide lines addressing the following areas:

1. How will the team make decisions? by dictate of the leader, by vote, by consensus, or by other means? Who should be involved in making decisions? Not everyone should be required to resolve all problems because some will require input from only two or three members. In most cases, the best-informed people should make decisions. Total-group decision making should be done only as often as necessary, but as little as possible.
2. How will the team resolve differences among members and subgroups? Disagreements waste a lot of time, so guidelines should address the kinds of conflicts likely to arise and options for resolving them-consensus, vote, or calling in a mediator.
3. How will the work be assigned? The team should specify which activities will be handled by the whole group and which by subgroups or individuals. Tasks maybe divided according to expertise, position of authority, or personal preference. If several people want to do a task, how should they be chosen-by skill, experience, or volunteer?
4. How will the team ensure that work is completed? One person falling behind can delay the work of others. The team must ensure that assignments and completion dates are clear and that corrective action is taken when efforts lag or are out of control. How will the team handle slackers?
5. How will the team ensure open discussion? The team must ensure that members are able to openly discuss issues so that ideas are not ignored or suppressed and that personal problems do not block team effectiveness. People less inclined to speak up because of personality, language, or culture must be as much engaged in the process as everyone else (sometimes by pointedly calling on them and requiring their input).

6. How frequently and where will the team meet? What do members expect about attendance?
7. How will the team evaluate its performance and make changes? There should be procedures for periodic review and evaluation of the team, assessment of the guidelines' effectiveness and opportunity for the team to change some of the guidelines. Teams might also discuss roles and responsibilities of group members and points of ambiguity, overlap, and conflict. This option is discussed later. Some teams appoint one member each meeting the role of making sure the team conforms to its guidelines.

New teams do not have to wait for problems to arise before they take action; they can prevent potential problems. Through team building members develop the common expectations necessary to build trust and mutual commitment.

Disbanding Teams

Successful teams generate close ties and strong relationships, but when projects end, so do their teams. People are usually reluctant to abandon relationships, and the disbanding of a cohesive team produces feelings of loss. These feelings should be acknowledged, shared, and accepted. The closeout of the project may be followed by a ceremony-a banquet, party, or informal get-together-to give the team recognition for its accomplishments and time to say goodbye.

Intergroup Problem Solving

Intergroup problem solving (IGPS) is a technique for improving working relationships among several teams working on a project. It confronts issues such as communicating or withholding information, competing against or collaborating between teams, or co-ordinating joint efforts. Following is a general design for an IGPS intervention.

The two or more groups are brought together in a day-long session where they do the following:

1. Each group separately compiles four lists:
 - a. What they believe are the responsibilities of the *other* group?
 - b. How they feel about the other group, including its strengths and weaknesses:
 - c. What the group thinks are its own responsibilities? and
 - d. What they anticipate the other group thinks about them (strengths and weaknesses)?
 2. The groups meet to share their lists. The only discussion allowed is to clarify points of disagreement and to prioritize the issues that need to be resolved.
 3. The groups separate, this time to discuss what they learned from each other's lists and to prioritize the issues that need to be resolved.
 4. Finally, the groups again meet together to discuss differences and develop a plan to resolve them.
- A few weeks later at a follow-up session, they meet to determine how well their plan is working. The result of the procedure is usually a much-improved understanding of each group's expectations about the other and a more effective working relationship. IGPS is applied whenever groups interface or must work together.

Examples are project and user teams, or project teams from different organizations and functional areas. Without IGPS, groups often try to optimize their own goals, and overall project goals suffer.

- One group does not understand the requirements of another group or share its expectations about what they should do. IGPS is useful whenever there are interdependencies, deadlines, or situations that induce intergroup conflict and stress. Participants in an intergroup session are likely to have a "gee whiz" experience.
- Through IGPS each group may find that their expectations are very different from (and often conflicting with) the expectations of other groups. This realization is a first and necessary step to aligning expectations and planning ways to resolve differences. One caveat is that groups should not be brought together for IGPS until they have first resolved any internal problems. A group that does not have its own internal affairs in order should team-build itself before it tries to resolve its relationship problems with other groups.

Example 2

- Team Building and IGPS at Ruxten Software Corporation Ron Granger is the manager of a 2-year software development project involving six programming teams at three Ruxten sites in California. Each team is headed by a team leader who reports directly to Ron on project matters. Ron also has a support staff of eight systems analysts in the project office whose function is to monitor and integrate the work of the teams. Ron and his support staff spend most of their time traveling between teams and coordinating their work. After 8 months the project is already running 2 months behind schedule. As Ron struggles to get it back on track, he starts to feel that a major obstacle is the conduct of his own staff. Whereas Ron feels it might be better to give the team leaders more autonomy, his staff wants more control over them.
- Ron attends a team building session for project managers at corporate headquarters and decides he should do the same for his staff. He calls in a consultant and they discuss with the staff the possibility of doing team building. The staff agrees, and the consultant's first step is to interview each analyst about changes they want. The first team building session lasts 2 days. It begins with the project manager asking the staff to air their complaints. The main ones are that
 - (1) he does not back their orders to team leaders, and
 - (2) he does not replace team leaders who they feel are "incompetent."
- In their view, he is weak and indecisive. Afterwards, Ron describes his dissatisfaction with their way of working, including their attempts to dominate team leaders. He reasserts that their purpose is to co-ordinate work, not direct it.
- Ron then announces his goal for team building, to get the project back on schedule. The staff agrees that his goal makes sense and discusses ways to reach it. They feel that Ron should have a similar meeting with the team leaders, then a joint meeting with both the leaders and staff members.
- The next team building meeting includes Ron, the project staff, two team leaders, and the consultant. The team leaders agree about the importance of getting the project back on schedule, but they feel it would be impossible given all of the specifications they have to meet. They also feel that their relationship with the staff members has deteriorated and would have to change first. The meeting lasts 1.5 days. The third meeting includes Ron, the six team leaders, and the consultant; it lasts 2 days. Ron asks the team leaders to bring up any issues that bother them, including him. In venting their feelings, the team leaders reveal that they feel harassed by the people who are supposed to be helping them (the staff), but nonetheless are still highly motivated by the project. They discuss ways in which both the staff and members of their own teams could be more helpful to one another. Their solution is that the staff should be made jointly responsible with them

for the performance of their teams, and that only Ron should monitor them through monthly performance reviews. Ron is not yet ready to commit to these suggestions, but after the meeting he meets with the team leaders to discuss performance goals.

- The final meeting is an IGPS session. The eight staff members, six team leaders, Ron, and the consultant meet together for 2 days. Working in separate groups, the team leaders and staff disclose what they like and do not like about their relationship and what they want to change. Each group presents the other with its complaints and suggestions for solutions. After much discussion and argument, they agree on the following solutions:
 1. The staff will have fewer meetings with Ron and instead associate more with the team leaders, working participatively and sharing responsibilities.
 2. The team leaders will involve their own programmers in making more of the decisions.
 3. The staff will cease on-site checking of the teams. Performance will be monitored by weekly written reports from the team leaders to Ron. When necessary, Ron will make inspections and include other team leaders, but not the staff. The purpose of inspections will be to spot and solve problems, not to trap anyone or "point the finger."
 4. Whenever team leader needs help, he can request the project manager to form a task force including other team leaders and members of other teams.
 5. Monthly team reviews with the project manager will be conducted with the total project group so people can learn from each other, help one another, and maintain project team esprit de corps. The reviews will also be used to critique the progress of each team.
- The changes are implemented within 2 months. With them, project members are able to shift their energy and talent away from policing and self-defense to mutual assistance and problem solving. Within the year the project is back on schedule.

7.3 Conflict Resolution and Negotiation Skills

Origins of Conflicts

In all organizations, differences in objectives, opinions, and values lead to conflict. Project organizations are no exception and, if anything, are predisposed to conflict. Conflict arises between customers and contractors, project staff and functional groups, and different contractors and departments. It occurs between people on the same team, people on different teams, and groups in different organizations. Some conflict is natural; too much is destructive.

Between User and Contractor

Seeds of conflict between the user and the contractor are sown early during contract negotiations. People representing the two parties are usually less concerned with developing trust and teamwork than with driving a hard bargain for their own best interests. The customer wants to minimize cost, the contractor to maximize profit. One's gain is the other's loss. In the extreme, each side strives for an agreement that provides an "out" in case it cannot keep its part of the bargain; each makes the other side responsible in case of failure, and each gives itself final rights to all project benefits. In technology-based firms where scientists and engineers rule, the non-

technical, legal "types" who negotiate contracts may try to enlarge their function by using highly legalistic frameworks that try to cover all eventualities. Says one manager, "You start with science and engineering, but a project, once it's decided on, has to be costed. You must select contractors and get budgets approved. Then you turn to the contractors working with you and write contracts that say you don't trust one another. What starts as a fine scientific dream ends up being a mass of slippery eels." After negotiations are completed the contract, itself becomes a source of conflict.

In cost-plus agreements there is little incentive for the contractor to control expenses, and the user must closely supervise and question everything. Such scrutiny is a constant irritant to the contractor. In fixed price contracts, costs may have to be periodically renegotiated and revised upward. This is also a source of friction. Any contract that is vaguely worded or poorly specified in terms of cost, schedule, or performance is likely to have multiple interpretations and lead to disagreements.

Within the Project Organization

- Functionalism is based upon and promotes differences in ideas and objectives. This is good for functional departments because it makes them better at what they do, but bad for projects because the functional areas are somewhat self-serving. High level interdependency between functional areas in projects increases the level of contact between them and, at the same time, the chances of conflict.
- Different functional areas have different ideas, goals, and solutions for similar problems-differences that frequently must be resolved without the benefit of a common superior. In addition, the needs of functional areas are often incompatible with the needs of the project. Functional areas often request changes to the project plan that the project manager must evaluate and sometimes refuse.
- The project manager might have to compromise the high scientific and technical standards of the research and engineering departments with time and cost considerations of the project. Even when project managers defer to the technical judgment of specialists, often they disagree over the means of implementation. Work priorities, schedules, and resource allocations are also sources of conflict.
- Functional areas working in multiple projects might set priorities that conflict with priorities of project managers. Although cost estimates and schedules are originally set by functional areas, they are revised by project managers; often the final schedules of projects conflict, and the resources allocated to a project is insufficient.
- In matrix organizations, functional managers sometimes see project managers as impinging on their territory, and they resent having to share planning and control with them. They might refuse to release certain personnel to projects or try to retain authority over the personnel they do release. Workers with dual reporting relationships are often confused about priorities and loyalties.

Managing Participation, Teamwork, and Conflict

- Moreover, given that projects are temporary, goal-driven systems, workers are under constant pressure to meet time and cost objectives. People are ordinarily reluctant to accept change, yet in projects change is the norm. Expansions and contractions in the labour force make it difficult to establish obligations and reporting relationships once and for all.

- Administrative procedures, group interfaces, project scope, and resource allocations are subject to constant change. Finally, projects inherit feuds that have nothing to do with them. Regardless of the setting, clashes arise from differences in attitudes, personal goals, and individual traits, and from people trying to advance their careers. These create a history of antagonisms that set the stage for conflict well before a project begins.

7.3.1 The Project Life Cycle

- Thamhain and Wilemon investigated potential causes of conflict in a study of 100 project managers. They determined that, on the average, the three greatest sources of conflict are schedules, project priorities, and the workforce—all areas over which project managers generally have limited control.
- Other sources of conflict identified are technical opinions and performance trade-offs, administrative and organizational issues, interpersonal differences, and costs. Costs are a relatively minor cause of conflict, the authors surmise, not because costs are unimportant but because they are difficult to control and usually dealt with incrementally over a project's life. The study also revealed that the sources of conflict change as projects move from one phase to the next.

Project life cycle			
Start			Finish
Project Conception	Project definition	Project execution	Project closeout
Priorities	Priorities	Schedules	Schedules
Procedures	schedules	Technical	Personality
Schedules	Procedures	Manpower	Manpower
Manpower	Technical	Priorities	Priorities

Adapted with permission from H.J. Thamhain and D.L. Wilemon, Conflict Management in Project Life Cycles, Sloan Management Review [Spring 1975]: 31-50.

Fig. 7.3.1 : Summarizes the major sources of conflict in each phase

- During project conception, the most significant sources of conflict are priorities, administrative procedures, schedules, and labor. Disputes between project and functional areas arise over the relative importance of the project compared to other activities, the design of the project organization, the amount of control the project manager should have, the personnel to be assigned, and scheduling of the project into existing workloads.
- During project definition, the chief source of conflict remains priorities, followed by schedules, procedures, and technical issues. Priority conflicts carry over from the previous phase, but new disputes arise over the enforcement of schedules and functional departments' efforts to meet technical requirements. During the execution phase, friction arises over schedule slippages, technical problems, and labour issues.
- Deadlines become more difficult to meet because of accumulating schedule slippages. Efforts aimed at system integration, technical are vegetarians; developers tend to be male, eat fast food, and talk little except to say "Not true." The way they deal with conflict also differs. Developers are given to bursts of mischievous play and will pepper a designer's door with shots from a Nerf-ball gun. Designers merely complain to their supervisor.

- This adversarial relationship puts a toll on the team, the product, the customers, and the company. Moody quotes the lead programmer on one project, who said, "I've never been through anything like this. This was the project from hell. We made the same mistakes before, and now we're making them again. Every project is like this. We keep saying that we learn from our mistakes, but we keep going through the same [expletive] over and over again."

7.3.2 Managing Conflict

- How do project managers deal with these conflicts? In general there are five ways :
 1. Withdraw or retreat from the disagreement.
 2. Smooth over or de-emphasize the importance of the disagreement (pretend it does not exist).
 3. Force the issue by exerting power.
 4. Compromise or bargain to bring at least some degree of satisfaction to all parties.
 5. Confront the conflict directly; work through the disagreement with problem solving.
- All of these are at times appropriate. In a heated argument it may be best to withdraw until emotions have calmed down, or to de-emphasize the disagreement before it gets distorted out of proportion. But neither of these resolves the problem, which will likely arise again. The project manager might force the issue by using authority; this gets the action done but risks creating hostility.
- As discussed earlier, if authority must be used, it is better that it is based upon knowledge or expertise. To use bargaining or compromising, both sides must be willing to give up something to get something. Ultimately, both sides may feel they lost more than they gained, and the result is not necessarily good for the project. Of the five approaches, the only one that works at resolving the underlying issues is confrontation.

Confrontation

- Confrontation involves identifying potential or existing problems, then facing up to them. At the organization level this happens by all areas involved in the project agreeing on project objectives, administrative plans, labour requirements, and priorities. It requires careful monitoring of schedules, quick reallocation of resources to problem areas, close contact between project groups, and prompt resolution of technical problems. At the individual level, project managers confront conflicts by raising questions and challenges such as:
 - How do you know that this redesign is likely to solve the problem? Prove it to me.
 - What have you done to correct the malfunctions that showed up on the test we agreed to?
 - How do you expect to catch up on lost time when you haven't scheduled overtime or additional staffing?
- Questions like these demonstrate that the project manager is vitally interested and alert, and that everything is subject to question. It is a crucial part of effective project management. However, there is a catch to confrontation: The very process of setting plans, schedules, and priorities, and enforcing them with confronting questions is itself a source of conflict, but at the interpersonal level. Frequently, what begins as a conflict of schedules, priorities, or technical matters degenerates into a conflict over power and "personalities."

- Successful confrontation assumes a lot about the individuals and groups involved. It assumes that they are willing to reveal why they favour a given course of action, and that they are open to and not hostile toward differing opinions. It assumes that they are all working toward a common goal, and that they are willing to abandon one position in favour of another.
- The simple fact is many groups and managers are highly critical of others' differences in opinions. Faced with differences, they tend to operate emotionally, not analytically. For individuals to use confrontation as a way to resolve conflict, they must first be able to manage their emotions. This implies fundamental changes to the interpersonal styles and processes normally used by many groups and individuals. In some cases it requires nothing short of radical change in the way people behave and in the culture of the organization.

Expectation Theory of Conflict

- When two people do not get along it is common to say they have a "personality conflict." The presumption is that features of their attitudes, values, and experiences are so different that they cannot possibly get along. Groups also develop personality conflicts when their values, tasks, or objectives differ. Dyer suggests a more constructive approach is to look at conflict as a violation of expectations. Whenever a person or group violates the expectations of another, there is a negative reaction. Between groups and managers working on a project, some may feel that others are favoured, have better facilities, or get more credit.
- When they expect more equitable treatment and do not get it, they react using verbal attacks, placing blame, or minimizing contact. Negative responses violate the expectations of others, who reciprocate further with more negative reactions.

Team Methods for Resolving Conflict

- Confrontation assumes that parties can discuss issues frankly and level with one another. One way the project manager can make confrontation work is with team building. As discussed earlier, team building helps members develop attitudes more accepting of differences and leads to greater openness and trust.
- It attacks conflict directly by getting to the source and engaging members in problem solving. The following teambuilding methods focus on conflict stemming from work roles and group interaction.

Role Clarification Technique

- Conflict in projects often arises because people have mixed expectations about work plans, roles, and responsibilities. In particular, disagreements arise because of the following:
 - The project is new and people are not clear about what they are supposed to do and what others expect of them.
 - Changes in projects and work reassessments have made it unclear how individuals in the team should interact.
 - People get requests they do not understand, or hear about things in the grapevine that they think they should already know.
 - Everyone thinks someone else is handling a situation that, really, no one is.
 - People do not understand what their group or other groups are doing.

- The role clarification technique (RCT) is a systematic procedure to help resolve these sources of conflict. The title "role clarification" suggests its goals: that everyone should understand their major responsibilities and duties, that others also understand everyone's position and duties, and that everyone knows what others expect of them.
- RCT is similar to team building. It includes data collection, a meeting that lasts for 1 or 2 days, and a consultant who serves as facilitator. When incorporated as part of team building for a new team, it allows the project manager and team to negotiate team member roles. It is especially useful in participative management cases where responsibilities are somewhat ambiguous.

Clarifying Roles for Members of a Team

- Role clarification for an existing team begins with each person answering a questionnaire prior to a meeting:
 1. What does the organization expect of you in your job?
 2. What do you actually do in your job?
 3. What should others know about your job that would help them?
 4. What do you need to know about others' jobs that would help you?
 5. What difficulties do you experience with others?
 6. What changes in the organization, assignments, or activities would improve the work of the group?
- For a new team the questions would be modified to reflect job expectations and anticipated problems. At the start of the group meeting, ground rules are announced that people be candid, give honest responses, express their concerns, and that everyone agrees to decisions. The meeting begins with each person reading the answers to the first three questions.
- As each person reads, others are given the chance to respond. It is important that each person hears how others see her job and what they expect of her. Each person then reads the answer to Question 4 and hears responses from the people she identified. Issues in Question 5 that have not already been resolved are addressed next. Throughout the process, emphasis is placed on solving problems and not placing blame. The group then discusses Question 6 and tries to reach consensus about needed changes.

Clarifying the Role of One Person

- A similar process is followed for clarifying the role of just one person. It begins with the "focal person" identifying people relevant to her role-anyone who interacts with her and expects certain behaviour from her to meet work obligations (boss, subordinates, members of other departments relating to the focal person). The purpose is for these people to meet together so they can clarify their expectations to the focal person.
- At the meeting the focal person discusses her job responsibilities, covering topics such as those in the first five questions listed above. The other people in the meeting then state their expectations of the focal person. Special attention is given to ambiguities, inconsistencies, or incompatibilities between their expectations. When consensus is reached, the focal person writes a description of her role and gives a copy to everyone.
- The description is reviewed to ensure that it is clear, specific, and as internally consistent as possible.RCT is useful in matrix situations where role ambiguity can lead to power struggles between managers and to role conflict for the workers who report to them. In projects where relationships and job descriptions are in perpetual change, a less formal procedure can be used to help redefine and clarify roles on a frequent basis.

7.3.3 Intergroup Conflict Resolution

- When two or more groups are in conflict because of mixed expectations, a procedure similar to IGPS can be used. The procedure begins by each group preparing a list of what they would like the other groups to start doing, stop doing, and continue doing in order to improve their relations. As a variation, the groups might also guess what others think about them and want from them. Guesses are often accurate and facilitate reaching an agreement.
- The groups share their lists and negotiate an agreement stating what each will do in return for equitable changes on the part of the other. The focus is on finding solutions, not fault. A consultant may facilitate the negotiation. To increase the groups' commitment, the agreements are put in writing. Another approach is to have Team A select a subgroup of members to represent it.
- Names in the subgroup are given to Team B, which selects three or four members from the Team A list. Team B also prepares a list of names and gives it to Team A. This creates a mixed team of representatives that both sides agree to. The mixed team tries to resolve problems between the teams. It can interview people in other teams, invite a facilitator, and so on.
- The mixed team prepares a list of actions, people to be responsible, a time frame, and ways to prevent problems from recurring. This approach is easy to implement without a consultant and requires less involvement from members than the first method, but it also tends to have less impact. There are several preconditions for team building to be effective in resolving conflict. The conflicting parties must agree that they have problems, that the problems should be solved, that they both have a responsibility to work on them, and that they need to come together to solve them. Often it is easier to get people to deal with conflict if they realize that the goal of team building and confrontation is not to get them to like each other but to understand and be able to work with each other.

7.4 Emotional Intelligence in Project Management

- There are numerous downsides to working in projects. Long hours, tight schedules, high risks, and high stakes take a toll on social and family relationships and individual mental and physical health. Projects achieve great things, but they also instigate bankruptcy, divorce, ulcers, mental breakdowns, and heart attacks.
- One of the major problems associated with working in projects-and a contributor to personal, family, and organizational difficulties-is emotional stress. It is a problem that affects the achievement and health of project organizations and their workers, and that at one time or another all project managers have to grapple with.

Factors Influencing Stress

- How much emotional stress a person experiences and whether that experience is positive or negative depends upon the fit between two factors: the demands or threats of the environment and the adaptive capabilities of the person. Work-related stress depends upon a person's perception of the demands or opportunities of the job and his self-perceived abilities, self-confidence, and motivation to perform.
- A manager faced with impending failure to meet a deadline might experience stress if the schedule is supposed to be met, but no stress if he simply assumes the deadline will be missed. Stress is a reaction to

prolonged internal and environmental conditions that overtax a person's adaptive capabilities. To feel distress, an individual's capabilities must be overtaxed for a prolonged period. Even when a person has the ability to handle a situation, he will still feel distress if he lacks self-confidence or cannot make a decision.

7.4.1 Stress in Projects

- Among numerous causes of distress in projects are rapid pace, transient work force, anxiety over discrepancies between project performance and goals, cost overruns, and impending failure to meet schedules or contract requirements. The project manager himself is exposed to considerable stress; for example in construction, in the words of Bryman et al.: "The fact that the [project manager] is in the front line controlling the labor force; he's answerable to the client, to his organization at a high level; he's responsible for millions of pounds [or \$] worth of work . . . In a very fragile environment he is at the mercy of the weather, material deliveries, problems with labor, and problems with getting information." Coping with this stress is an aspect of project management. We will restrict discussion to three main causes of stress in projects: work overload, role conflict, and interpersonal relations. Work overload is experienced in two ways.
- One is simply by having too much work or doing too many things at once, with time pressures, long hours, and no letup. The other is taking on work that exceeds one's ability and knowledge. Overload can be self-induced by an individual's need to achieve, or it can be imposed by managers and the responsibilities of the job. Job-induced work overload is prevalent during crash efforts to recover lost ground and when projects are rushed toward completion. When work overload is in balance with abilities, it is positive and motivating. When it exceeds ability, it is distressful.
- A related problem, work under load, occurs when there is too little work, or the work is beneath a person's ability. Project workers suffer from under load whenever there is a long hiatus between projects. Another cause of stress in projects is role conflict. Two or more people, for instance a functional manager and a project manager, cause a worker in the middle to experience stress when they send contradictory or incompatible expectations.
- Role conflict is also felt when a person has two roles with incompatible requirements. A project manager, for instance, may find that to be a good administrator requires him to do things that conflict with his values as a professional engineer.
- A related source of stress is role ambiguity. This results from inadequate or confusing information about what a person needs to do to fulfil his job, or about the consequences of failing to meet requirements of the job. Role ambiguity is stressful because the person knows neither where he stands nor what to do next.
- Role conflict and role ambiguity are common in projects because people must interact with and satisfy the expectations of many others. Role ambiguity causes greater stress among managers because typically they have lower tolerance for uncertainty. Project managers in particular might find their work frustrating and stressful because the authority they need to carry out project responsibilities is often unclear or inadequate.
- Stress also develops from the demands and pressures of social relations. Having a boss or partner who is self-centered and authoritarian causes stress. Irritable, abrasive, or condescending personalities are hard to work with; they make others feel unimportant and provoke anxiety (which people try to suppress, though it builds up internally) or anger and outbursts (which generate still more tensions).

- In summary, the typical project is a haven of environmental stressors, and emotional stress is inevitable. Like conflict, however, there are ways to reduce its negative consequences.

7.4.2 Stress Management

- Most people accept distress as the price of success. Although stress is inevitable, distress is not. Project managers must be able to anticipate which work demands are most stressful and know how to ameliorate the negative effects. In general, means for reducing negative stress at work are aimed either at changing the organizational conditions that cause stress or at helping people to better cope with stress. Because stress results from the interaction of people with their environment, both are necessary.
- Organizational level means are aimed at task, role, physical, and interpersonal stressors; individual level means are aimed at people's ability to manage and respond to stressful demands. We will focus on organizational level means-methods that can be applied by managers to reduce the stress in project environments; these include:
 1. Setting reasonable work plans and schedules.
 2. Delegating responsibility and increasing individual autonomy.
 3. Clarifying responsibilities, authority, and performance criteria.
 4. Clarifying goals, procedures, and decision criteria.
 5. Giving consideration and support in leadership.

Set Reasonable Plans and Schedules

- The first way calls for preplanning and scheduling to allow for reasonable work hours and time off. Good planning and scheduling helps balance workloads and familiarizes workers with what is expected, and it helps avoid ambiguity in expectations, work overload, and the "crunch" that precedes milestones and project closeout.
- Planning and scheduling are "technical" means for reducing stress; the other ways on the list are "behavioural" means. They consist of ways for altering work demands, relationships, and individual behaviour, and center on participative management, team building, and conflict resolution.

Modify Work Demands Through Participation

- The distressful influence of some kinds of leadership styles is well known. Dictatorial, self-centred leaders (the too bossy boss) cause frustration, annoyance, and stress; the opposite kind, the do-nothing, under-stimulating boss is just as bad. In contrast, it makes sense (and there is supporting research) that the participative style of leaderships the least stressful.
- Projects can be very demanding, and one way to reduce distress is to give project workers decision latitude and autonomy commensurate with work demands and their ability. Participative leaders set goals and define task limits, but allow greater freedom about how goals will be achieved. This latitude gives workers greater flexibility and results in less anxiety and tension.

Modify Work Relationships

- In project environments where there is change and complexity, distress is caused by confusion, ambiguity, and conflict about work roles. One means for reducing role related work stress is the RCT described previously.

- By clarifying role demands and eliminating contradictory role expectations, stress originating from role conflict and role ambiguity is reduced. Like good project planning, this should be done early so that roles and expectations are clear from the beginning.

Social Support

- Another way to reduce stress arising from work roles and relationships is to increase the social support within project teams. Social support is the assistance one gets through interpersonal relationships. Generally, people are better able to cope with stressful situations when they feel others care about and are willing to help them. Social support at work comes in the form of giving emotional support (listening and caring), appraising performance and behaviour, and giving advice, information, and direct assistance in a task.
- Vital sources of social support are family, close friends, a supportive boss, co-workers, and subordinates. Social support from managers and coworkers does not necessarily alter the stressor but it does help people to better cope. Supportive managers act as a barrier against destructive stress, and their subordinates are less likely to suffer harmful consequences than those with unsupportive managers.
- Co-worker social support in groups is equally important, though often group supportiveness correlates with the amount of support modelled by the leader. Caught between the conflicting expectations of a functional manager and project manager, a person who has supportive coworkers will be better able to deal with the conflict and feel less troubled by her inability to meet both expectations. How do people become supportive? Simply telling someone to be supportive does not work. Even when managers try to be supportive by giving advice, they often leave the distressed worker worse off.
- Giving someone physical assistance is easy, but true emotional support is difficult and more subtle. Empathic listening, understanding, and real concern are essential parts of support often missing in naive efforts to help. Usually, it is necessary to provide training in social support skills, then reinforce and reward the usage of these skills.
- Unfortunately, as with many other behaviour aspects of management, empathy and sensitivity are sometimes considered "soft" issues and devalued as "non-productive."

7.5 Stakeholder Identification and Analysis

- The authors denote stakeholder identification based on three variables: power to influence, legitimacy of the stakeholders' relationships with the project, and the urgency of the stakeholders' claim on the project for stakeholder engagement.
- The following definitions are relevant to the Stakeholder Performance Domain:
- **Stakeholder** : An individual, group, or organization that may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project, program, or portfolio.
- **Stakeholder Analysis** : A method of systematically gathering and analyzing quantitative and qualitative information to determine whose interests should be taken into account throughout the project.
- Projects are performed by people and for people. This performance domain entails working with stakeholders to maintain alignment and engaging with them to foster positive relationships and satisfaction. Stakeholders include individuals, groups, and organizations (see Figure 7.4). A project can have a small group

of stakeholders or potentially millions of stakeholders. There may be different stakeholders in different phases of the project, and the influence, power, or interests of stakeholders may change as the project unfolds.

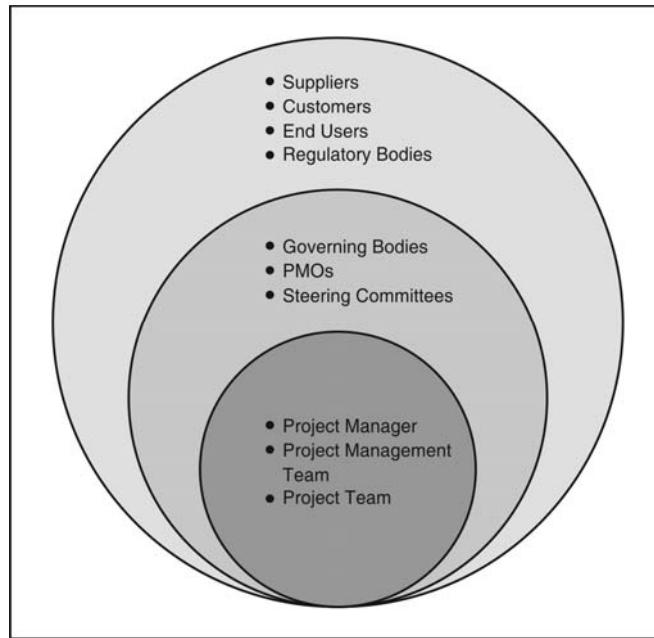


Fig. 7.5.1 : Examples of Project Stakeholders

- Effective stakeholder identification, analysis, and engagement includes stakeholders who are internal and external to the organization, those who are supportive of the project, and those who may not be supportive or are neutral. While having relevant technical project management skills is an important aspect of successful projects, having the interpersonal and leadership skills to work effectively with stakeholders is just as important, if not more so.

7.6 Stakeholder Engagement

- Stakeholder engagement includes implementing strategies and actions to promote productive involvement of stakeholders. Stakeholder engagement activities start before or when the project starts and continue throughout the project.

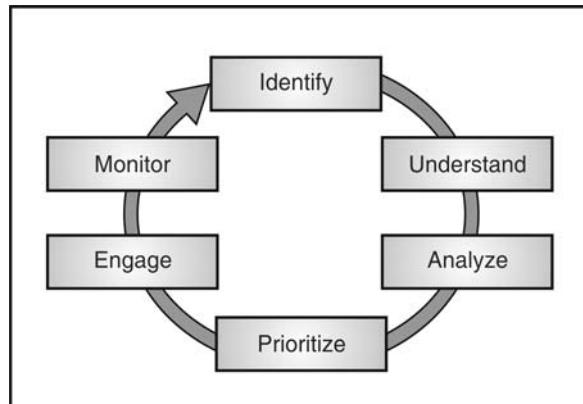


Fig. 7.6.1 : Navigating Effective Stakeholder Engagement

- Defining and sharing a clear vision at the start of the project can enable good relationships and alignment throughout the project. Establishing a clear vision that key stakeholders agree on can entail some challenging negotiations, especially with stakeholders who are not necessarily in favor of the project or its intended outcomes. As shown in Fig. 7.6.1, there are several steps to engage stakeholders effectively.

Identify

High-level stakeholder identification may be carried out prior to forming the project team. Detailed stakeholder identification progressively elaborates the initial work and is a continuous activity throughout the project. Some stakeholders are easy to identify, such as the customer, sponsor, project team, end users, and so forth, but others can be difficult to identify when they are not directly connected to the project.

Understand and Analyse

- Once stakeholders are identified, the project manager and the project team should seek to understand stakeholders' feelings, emotions, beliefs, and values. These elements can lead to additional threats or opportunities for the project outcomes. They can also change quickly, and as such, understanding and analysing stakeholders is an ongoing action. Related to understanding the project stakeholders is the need to analyse aspects of each stakeholder's position on and perspective of the project.
- Analysing stakeholders considers several stakeholder aspects, such as:
 - Power,
 - Impact,
 - Attitude,
 - Beliefs,
 - Expectations,
 - Degree of influence,
 - Proximity to the project,
 - Interest in the project, and
 - Other aspects surrounding stakeholder interaction with the project.
- This information helps the project team consider interactions that may influence the motivations, actions, and behaviours of stakeholders. In addition to individual analysis, the project team should consider how stakeholders interact with each other, as they often form alliances that help or hinder the project's objectives. For example, if the project team believes a key business manager is highly influential but has negative perceptions related to the project, they can explore how to detect the business manager's perceptions and respond appropriately as the project unfolds. In all cases, the analysis work should be held in confidence by the project team since the information could be misinterpreted outside the context for the analysis.

Prioritize

On many projects, there are too many stakeholders involved for the project team to engage directly or effectively with all of them. Based on its analysis, the project team can complete an initial prioritization of stakeholders. It is common to focus on stakeholders with the most power and interest as one way to prioritize engagement. As events unfold throughout the project, the project team may need to reprioritize based on new stakeholders or evolving changes in the stakeholder landscape.

Engage

- Stakeholder engagement entails working collaboratively with stakeholders to introduce the project, elicit their requirements, manage expectations, resolve issues, negotiate, prioritize, problem solve, and make decisions. Engaging stakeholders requires the application of soft skills, such as active listening, interpersonal skills, and conflict management, as well as leadership skills such as establishing the vision and critical thinking.

Monitor

- Throughout the project, stakeholders will change as new stakeholders are identified and others cease to be stakeholders. As the project progresses, the attitude or power of some stakeholders may change. In addition to identifying and analysing new stakeholders, there is an opportunity to assess whether the current engagement strategy is effective or if it needs to be adjusted. Therefore, the amount and effectiveness of stakeholder engagement is monitored throughout the project.

7.7 Communication Strategies

- Communication with stakeholders can take place via written or verbal means, and it can be formal or informal. Examples of each type of communication are shown in Table 7.7.1.

Table 7.7.1 : Types of Communications

Type	Formal	Informal
Verbal	Presentations Project reviews Briefings Product demos Brainstorming	Conversations Ad hoc discussions
Written	Progress reports Project documents Business case	Brief notes Email Instant messaging/texting Social media

- Communication methods include push, pull, and interactive communication:
 - Push. Communication sent to stakeholders such as memos, emails, status reports, voice mail, and so forth. Push communication is used for one-way communications with individual stakeholders or groups of stakeholders. Push communication inhibits the ability to immediately gauge reaction and assess understanding; therefore, it should be used deliberately.
 - Pull. Information sought by the stakeholder, such as a project team member going to an intranet to find communication policies or templates, running internet searches, and using online repositories. Pulling information is used for indirect sensing of stakeholder concerns.

- Engagement goes deeper than pushing or pulling communication. Engagement is interactive. It includes an exchange of information with one or more stakeholders such as conversations, phone calls, meetings, brainstorming, product demos, and the like. With all forms of communication, quick feedback loops provide useful information to :
 - Confirm the degree to which the stakeholder(s) heard the message.
 - Determine if stakeholders agree with the message.
 - Identify nuanced or other unintended messages the recipient detected.
 - Gain other helpful insights.
- The degree of stakeholder satisfaction can often be determined by having a conversation with stakeholders to gauge their satisfaction with the project deliverables and the overall management of the project. Project and iteration reviews, product reviews, stage gates, and other methods are ways to obtain periodic feedback. For large groups of stakeholders, a survey can be used to assess the degree of satisfaction. Where necessary, the stakeholder engagement approach can be updated to achieve higher stakeholder satisfaction.

Review Questions

- Q. 1** What is leadership in project management? Explain Leadership Style.
- Q. 2** Explain The Project Life Cycle in detail.
- Q. 3** What are different Communication Strategies?
- Q. 4** Write short note on Stakeholder Identification and Analysis.
- Q. 5** How to handle stress in project management?
- Q. 6** Explain the concept of Teams in Project Management



8

Project Governance and Ethics

Syllabus

Effective People Management in Projects : Project governance structures and accountability, Ethical considerations in project management, Professional responsibility and codes of conduct

8.1 Project Governance and Ethics

- Project governance structures and accountability, Ethical considerations in project management, This chapter develops the principles of effective project governance. In doing so it reflects the solution criteria developed in the previous chapter, ensuring the principles solve the problems that were identified as resulting from ineffective project governance. The principles are then used as the basis of the design of the project governance model. There is a further reason for developing a set of principles, which is closely linked to the fact that this book is written specifically for practitioners, from a practitioner's viewpoint.
- Irrespective of the fact that the project governance model developed later in this book is applicable to any project, there will invariably be factors or influences acting to prevent a clean and direct implementation of the model and necessitating the adoption of a compromise. Personalities and politics will often play a part in the development of a project governance frame work for any significant project.
- Under these circumstances the question becomes how far one can deviate from the model before the battle for effective project governance is lost. The answer lies in remaining consistent with the principles, which provide a broad framework in which to operate.
- Flexibility may require movement away from the model and in fact the book later addresses different ways of flexing the model to meet the needs of projects with different risk profiles. However, once one or more of the principles has been lost in the battle to accommodate the personalities and the politics influencing the project, the effectiveness of the resulting project governance framework will suffer.
- The identification of the principles of effective project governance commences with a discussion on a concept that will be revisited many times in this book – accountability.

8.1.1 Accountability

- If you work for a large organization, spare a few moments to think about a recent large project with which you were associated, perhaps even a current project. In your opinion, who was, or is, accountable for the success of that project? Was it the project manager or the project director? Perhaps it was the project sponsor or even the project steering committee? (Don't worry too much about terminology at this point.)

- If the project was particularly large, perhaps the view was accountability lay with the divisional manager or even the CEO. If government, perhaps it lay at ministerial level, or if in the private sector, at board level. Now ask yourself whether others in the organization would share your opinion. Would there be a common perspective on project accountability across the organization?

An exercise in accountability

- I once ran a workshop for the executive team of a government organization that I suspected did not have an appreciation of the importance of project accountability. I took them through a very simple scenario where I described the governance arrangements of an imaginary large and high-risk project that they, as the project executive, had just been informed was well over budget and running significantly behind schedule – a scenario not uncommon in their experience.
- I provided minimal information that nevertheless implied that the project manager was largely responsible for the dire situation the project found itself in and asked them who they held accountable for the failure of the project. Some duly nominated the project manager, while some nominated others. I then provided further information which suggested that the overruns were largely due to a major scope change demanded by the project director and that the project manager had acted correctly, and indeed had indicated to the project direct or the likely impact in terms of delivery time frames and project cost. I again asked them who they held accountable. With the situation now clearer and with more information to hand, many considered the project director to be accountable. And again, there were a few nonconforming votes.
- Then, I provided the final piece of intelligence regarding the budget and schedule overruns on this fictitious project. They were indeed the result of a scope change; however, the scope change was driven by a politician who had done so for political purposes and had demanded the project director follow their instructions. On this basis, despite some misgivings, one or two considered the politician accountable, while others spread the accountability across other role holders in the project.
- In my debrief to the executive team I pointed out that the organization had a very large capital budget and that this exercise seemed to indicate that the executive team weren't really sure who was accountable for it. On the one hand their responses to the various scenarios seemed to indicate that they considered accountability varied according to the information to hand - a novel concept. However, even when they had the same information, they didn't hold a common view as to who was accountable, since for each scenario a variety of positions were nominated as accountable.
- They agreed that this did not seem reasonable or sustainable. If an organization is to have proper control over its capital budget it is necessary that there be clear accountability for each project within that budget. Using this exercise as the starting point, I was able to develop an appreciation of the importance of accountability within the organization and as the foundation for a new project governance framework.
- If the answer is 'yes', then from a project accountability perspective you're in good shape. If the answer is 'no', then you're in good company because many organizations experience difficulty and confusion in this area. One reason for confusion regarding project accountability is that an organization's structure reflects its operational activity, not the capital activity.
- Were someone to be asked who was accountable for any particular operational activity, it's likely the organizational structure would provide some strong clues since that is the basis of its formulation. The capital side of the business doesn't have that advantage, so assigning accountability for a project requires a little more thought.

Defining accountability

- Accountability means being answerable to your superiors. A person held accountable for achieving an outcome on a project, for instance, is answerable in the event the desired outcome is not achieved. Everyone in a project or an organization is accountable for something, irrespective of their level in the organization. There is a tendency in some quarters towards a view that the CEO (or divisional manager or minister – anyone perceived to be 'at the top') is 'ultimately accountable'. 'Well yes, that is true up to a point. However, the higher in the organizational structure you go, the broader the accountability becomes.'
- So, for instance, a CEO's accountability may be for the ongoing effective operation of the company. If one small group within the company is not operating effectively, this does not imply the CEO should be held directly accountable. The accountability is more likely to lie with the officer running that group.
- Similarly, if a project within an overall programme fails, accountability does not necessarily rest with the programme manager. Only when there is systemic failure of projects within a programme could the programme manager be considered accountable.

8.1.2 Programmes Versus Projects

- Programmes are groups of interrelated projects that, in combination, produce benefits for an organization. Current theory proposes that programmes produce outcomes, which lead to benefits, whereas projects produce outputs (OGC, 2007). However, not all projects are necessarily part of a programme, which suggests that projects too must be able to produce outcomes and benefits. When projects are part of a programme, the programme management function has an overarching coordination and management role.
- Different organizations have very different approaches to the programme management role. In order to address their accountability, individuals undertake certain tasks. The requirement to undertake these tasks defines their responsibilities. Without becoming too prescriptive or theoretical, a person's accountabilities should encompass all their responsibilities since there is little point in making someone responsible for an activity if there is no associated accountability. Thus, an individual may have many responsibilities in the organization that relate to only a few accountabilities. Accountability must be twinned with the necessary level of authority.
- Authority empowers a person to achieve an outcome for which they are accountable. Accountability for the outcome must reside with an individual who has vested in them the necessary authority required to achieve that outcome. Accountability cannot be shared without being blurred. This means that a committee cannot be held jointly accountable. Each member of the committee will have individual accountability but the committee as a whole is not accountable.
- Accountability in the project governance sense is important because it provides clarity of decision making. Clear accountability ensures that any individual in the project governance arrangements, and for that matter the organization, understands which decisions fall within their remit and which decisions will be made by their colleagues.
- This doesn't mean that an executive sitting on the project decision-making forum only has input to decisions that fall within their accountability remit, but rather that they know where the accountability for the various decisions lies. Any number of persons can have input to any decision, but only one person is accountable for the outcome that the decision delivers.

8.2 The Principles of Effective Project Governance

Principle 1: Ensure a Single Point of Accountability for the Success of the Project

It's not unusual for projects to have no clear statements of accountability for the various project roles, such as the project manager and team leaders. Even statements of key responsibilities for these role holders tend to be the exception rather than the rule. Whilst this may not be ideal, the lack of accountability and responsibility statements may not significantly impact either the project or officers' ability to perform on it. This is because the project team, that is, the project manager and those who report to the project manager, usually work together on a daily basis. With teamwork and cooperation, it normally becomes apparent when there are either overlaps or gaps, providing of course the project team has been organized into an effective and workable delivery structure. So, while the ideal is always to have comprehensive role statements, experienced project people and their projects are unlikely to suffer for the lack of them. Contrast this with the situation of those involved in the decision-making forum. Their opportunity for teamwork and cooperation is severely curtailed by the infrequency of governance meetings. They maybe meeting only once per month, and that may only be for one to two hours. In this situation, a lack of clarity regarding relative accountabilities and responsibilities is not so easily overcome. Coupled with that is the significant resources they are directing on the project that require clarity of decisions and direction, clear objectives, etc., and if the executive son the decision-making forum are unclear of their responsibilities itis likely to be translated into wasted effort on the project. At the project governance level, it is imperative that all concerned have role clarity. One accountability within the project governance framework is more important than any other accountability for the success of the project. The importance of this concept to the project, and indeed the organization, cannot be overstated. A project without a clear understanding of who assumes accountability for its success has no clear leadership. With no clear accountability for project success, there is no one driving the solutions to the difficult issues that beset all projects at some point in their life. Instead, the project proceeds along the previously discussed consensus-building approach to decision making with all its attendant inefficiencies. It also slows the project during the crucial project initiation phase, since there is no one person to take the important decisions necessary to place the project on a firm footing. This concept is the first principle of effective project governance.

Although this is a necessary requirement, it is insufficient on its own. It is not enough to nominate someone to be accountable - the right person must be made accountable. There are two aspects to this. As discussed above, the person who is accountable must hold sufficient authority within the organization to ensure they are empowered to make the decisions necessary for the project's success. Beyond this, however, is the fact that the right person from the correct area within the organization must be held accountable. If the wrong person is selected, the project is no better placed than if no one was accountable for its success. To determine the single person who will assume accountability for the success of the project requires a more detailed understanding of the relationship between service delivery and asset delivery.

Principle 2 : Service Delivery Ownership Determines Project Ownership

In order to be effective or in some cases even survive, organizations must constantly focus on the service that they are providing. Most organizations deliver services. They either deliver the service first hand, or do so indirectly through the products they produce. Thus, a maker of automotive components provides a service to a car-maker through the products they provide and the manner in which they provide them –quality, timeliness and so on. Similarly, a government roads department builds roads, bridges, interchanges and tunnels. However, these

assets are not in themselves fundamentally useful. They are useful only as a means to an end, and that end is the service they provide – access, reduction in travel times, increased driver comfort levels, reduced accident rates, and so on.

It is therefore the service that the bridge delivers or enables that defines its worth. If the bridge isn't built in the optimum position or is incorrectly sized, then the service level is compromised, irrespective of the quality of the asset itself. The same can be seen in ICT systems, which are platforms for the delivery of services. It is when ICT organizations or business units forget that they are providing a service and not a system that the relationship between them and the business and business managers fails. The point is it's not so much the product but rather the service the product provides or enables that is the important and fundamental output. The specification of the services being delivered cannot remain static because the environment within which the organization operates is itself dynamic. There are many factors at play that are acting to diminish the level of service or cause it to deteriorate or become less effective, efficient or competitive. These factors are a function of the broader environment in which the organization operates and will include economic trends, demographics, social trends, legislative changes, etc.

There are plenty of examples of environmental factors that can have an impact on an organization's service offerings :

- Technological advances may render the service, or the asset that provides the service, obsolete a constant concern in the high technology consumer sectors; • the regulatory environment may change and necessitate an increase in service level.
- New environmental factors or laws may have an impact on the delivery of the service, such as the law that required the phasing out of Chlorofluorocarbons (CFCs) from refrigeration products;
- Population increase can have an impact on the level of service provided, with levels deteriorating as assets reach or exceed their capacity. Growing cities face this problem in respect of traffic flows.

So, organizations must constantly be planning ahead to maintain service at acceptable levels. When the environment changes, the organization must change with it. If the change within the environment is small, the service may only need tweaking to once again meet the particular needs of the organization's customers. When the environmental change is significant, however, a step response is required from the organization. This may involve the delivery and integration of any combination of new assets, new business processes, new systems and/or new personnel.

Significant change in an organization is best achieved with a project or a programme of related projects with an end date determined by the timing of the need for the new service. The project is the organization's response to the change in the service need, and the project is defined by the service need it enables. The project's primary objective is therefore to deliver a service. In order to achieve this, the project may need to also deliver an asset, but this is only as a means to an end. Fundamentally, projects deliver services, not assets. Assets are enablers of service delivery; they are the platform from which services are delivered. This concept is displayed in Figure 8.2.1. The starting point is an organization delivering a level of service. The end point is the organization delivering a new, higher level of service. The transition between the two is effected by a project. The project is the means by which the organization introduced the new service level. This concept is important because it places the project in the context of the service that will be enabled through the asset the project will deliver. The fact that projects primarily deliver services has implications in terms of their ownership and the decision-making framework. Both

of these factors determine the project's direction and definition, and drive its delivery. Ownership of the business service confers the right of ownership of the project that will deliver the service. With project ownership comes project accountability. This has major implications when choosing the individual to be held accountable for the success of the project. The owner of services within an organization is of course from the operational side of the business. Accountability for the success of the project must therefore reside with those business owners who have service delivery responsibility. This logic dictates that both the ownership of the project and its decision-making framework should reflect a service delivery focus rather than an asset delivery focus, and that ownership should reside within the operational business unit.

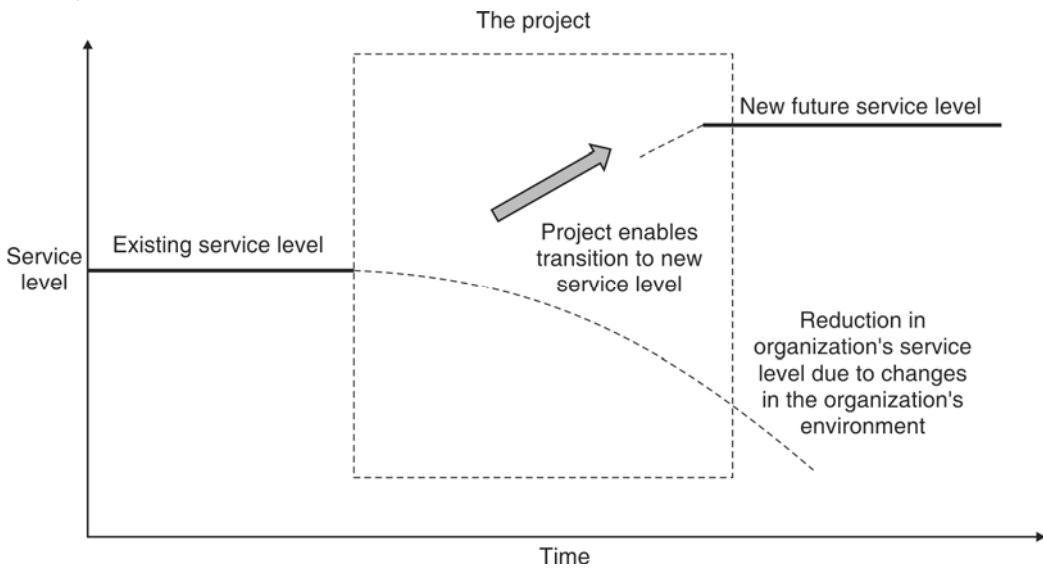


Fig. 8.2.1 : The project as a transition mechanism

The corollary to this is that the ownership of the project does not reside with those delivering the asset. While the asset may be central to the provision of the services, it does not in itself constitute the service. This concept has implications in important aspects of the project. For instance, a service delivery focus necessitates a whole-of life project cost perspective since the service itself will have an associated ongoing, post-project, operational cost. A service delivery focus also recognizes that at commissioning the asset must integrate into the existing service regime. On the other hand, if a project is viewed as delivering an asset, the focus is on the capital cost of the asset and operational costs become a secondary consideration, as does serviceability of the outcome.

When the delivery arm of the organization has greater stewardship and ownership of the project than those who will have responsibility for the ongoing operation of the service that the asset enables, project outcomes and service requirements can be mismatched.

For example

- If you consider a project's objective is to deliver a new hospital rather than the provision of health services, then the outcome is potentially a building that doesn't meet the needs of health care professionals, exhibiting high operational costs, and therefore potentially higher whole-of-life costs, due to poor workflow considerations;
- If you consider a project's objective is to deliver an IT system for document and records management, then the outcome may well be a cutting-edge electronic document and records management system (eDRMS) but one with which business users won't engage;

- If you believe a project's objective is to deliver a new roundabout to reduce congestion at an intersection rather than a reduction in urban travel times, the outcome may be a congestion problem transferred a few miles further down the road, with no savings in travel time.

The intention therefore is to determine the ownership of the project by identifying the owner of the service the project will deliver. This approach places the business at the heart of project delivery.

Projects deliver services rather than just assets. Assets are enablers of service delivery

While the business may be unable to deliver the project without assistance, it nevertheless is in the role of primary project decision maker, albeit supported as necessary by project delivery specialists. This ensures the project governance framework maintains a service delivery focus. This then is the second principle of effective project governance. It is important to remember that this discussion is purely about project ownership. It does not imply a lesser role on the part of the asset delivery arm of the organization just a different role. The service delivery arm of the organization must work hand-in-glove with the asset delivery arm for a successful project outcome. How this occurs, and the responsibility breakdown, is discussed in coming chapters.

Principles 1 and 2 are focused on the project's major stakeholder – the owner of the project. Projects have many stakeholders and an effective project governance framework must address their needs. The next principle deals with the manner in which this should occur.

Principle 3: Ensure Separation of Stakeholder Management and Project Decision Making Activities

If this separation can be achieved, it will avoid clogging the decision-making forum with numerous stakeholders by constraining its membership to only those select stakeholders absolutely central to its success. There is always the possibility that this solution will lead to a further problem if disgruntled stakeholders do not consider their needs are being met. Whatever stakeholder management mechanism is put in place will have to adequately address the needs of all project stakeholders. It will need to capture their input and views and address their concerns to their satisfaction. These stakeholders must also be confident they have a champion in the decision-making forum who will represent their cause.

Principle 4 : Ensure Separation of Project Governance and Organizational Governance Structures

When the causes of ineffective project governance were discussed earlier in this book, the problems associated with multi-layered or hierarchical decision making were raised. These problems were often associated with the melding of project governance and organizational governance. Project governance is established precisely because it is recognized that the organization governance structure does not provide the necessary framework to deliver a project. Unless, then, it is felt that the project governance framework established for a project is inadequate in some way, there should be no need to integrate it within the organization structure. It is recognized that the organization has valid requirements in terms of reporting and stakeholder involvement. However, dedicated reporting mechanisms established by the project can address the former and the project governance framework must itself address the latter. What should be avoided is the situation where the decisions of the steering committee, project board or project control group are required to be ratified by one or more persons in the organization outside of that project decision-making forum. This becomes the final principle of effective project governance.

Following this principle will minimize multi-layered decision making and the time delays and inefficiencies associated with it. It will ensure a project decision-making body is empowered to make decisions in a timely

manner. This completes the four principles of effective project governance. They will serve as a guide in the development of a project governance model. Also, in the event that circumstances force the modification of the model, the principles will provide the ultimate constraints to the modifications.

Executive Summary : The four principles of effective project governance

- Ensure a single point of accountability for the success of the project. This ensures clarity of leadership, plus clarity and timeliness of decision making.
- Service delivery ownership determines project ownership. This places the business at the heart of project delivery and ensures the project governance framework maintains a service delivery focus.
- Ensure separation of stakeholder management and project decision-making activities. This will prevent decision-making forums from becoming clogged with stakeholders, which would result in laboured or ineffective decision making.
- Ensure separation of project governance and organization a governance structures. This will reduce the number of project decision layers, since the project decision path will not follow the organizational line of command.
- Confusing them results in organizational role accountabilities sitting uneasily alongside project governance accountability needs.

8.3 Professional Responsibility

8.3.1 Description of 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.

Responsibility: Aspirational Standards

As practitioners in the global project management community:

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.

Comment : Where developmental or stretch assignments are being considered, we ensure that key holders receive timely and complete information regarding the gaps in our qualifications so that they may make informed decisions regarding our suitability for a particular assignment. In the case of a contracting arrangement, we only bid on work that our organization is qualified to perform and we assign only qualified individuals to perform the work.

3. We fulfil the commitments that we undertake – we do what we say we will do.
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 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.

Responsibility: Mandatory Standards

As practitioners in the global project management community, we require the following of ourselves and our fellow practitioners:

8.3.2 Regulations and Legal Requirements

1. We inform ourselves and uphold the policies, rules, regulations and laws that govern our work, professional, and volunteer activities.
2. We report unethical or illegal conduct to appropriate management and, if necessary, to those affected by the conduct.

Comment : These provisions have several implications. Specifically, we do not engage in any illegal behaviour, including but not limited to: theft, fraud, corruption, embezzlement, or bribery. Further, we do not take or abuse the property of others, including intellectual property, nor do we engage in slander or libel. In focus groups conducted with practitioners around the globe, these types of illegal behaviours were mentioned as being problematic. As practitioners and representatives of our profession, we do not condone or assist others in engaging in illegal behaviour. We report any illegal or unethical conduct. Reporting is not easy and we recognize that it may have negative consequences. Since recent corporate scandals, many organizations have adopted policies to protect employees who reveal the truth about illegal or unethical activities. Some governments have also adopted legislation to protect employees who come forward with the truth.

Ethics Complaints

- We bring violations of this Code to the attention of the appropriate body for resolution.
- We only file ethics complaints when they are substantiated by facts.

Comment : These provisions have several implications. We cooperate with PMI concerning ethics violations and the collection of related information whether we are a complainant or a respondent. We also abstain from accusing others of ethical misconduct when we do not have all the facts. Further, we pursue disciplinary action against individuals who knowingly make false allegations against others.

- We pursue disciplinary action against an individual who retaliates against a person raising ethics concerns.

8.4 Codes of Conduct

A code of ethics helps prevent a conflict of interest between individuals by putting the best interests of stakeholders and the organization first. 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. Responsibility covered in above section 8.3 and remaining codes of conduct are covered in following subsection.

8.4.1 RESPECT

Description of 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. An environment of respect engenders trust, confidence, and performance excellence by fostering mutual cooperation-an environment where diverse perspectives and views are encouraged and valued.

Respect : Aspirational Standards

As practitioners in the global project management community:

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

Comment : An implication of these provisions is that we avoid engaging in gossip and avoid making negative remarks to undermine another person's reputation. We also have a duty under this Code to confront others who engage in these types of behaviours.

Respect : Mandatory Standards

As practitioners in the global project management community, we require the following of ourselves and our fellow practitioners:

- We negotiate in good faith.
- 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.
- We do not act in an abusive manner toward others.
- We respect the property rights of others.

8.4.2 FAIRNESS

Description of Fairness

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

Fairness : Aspirational Standards

As practitioners in the global project management community:

- We demonstrate transparency in our decision-making process.
- We constantly reexamine our impartiality and objectivity, taking corrective action as appropriate.

Comment : Research with practitioners indicated that the subject of conflicts of interest is one of the most challenging faced by our profession. One of the biggest problems practitioners' reports is not recognizing when we have conflicted loyalties and recognizing when we are inadvertently placing ourselves or others in a conflict-of-interest situation.

- We as practitioners must proactively search for potential conflicts and help each other by highlighting each other's potential conflicts of interest and insisting that they be resolved.
- We provide equal access to information to those who are authorized to have that information.
- We make opportunities equally available to qualified candidates.

Comment : An implication of these provisions is, in the case of a contracting arrangement, we provide equal access to information during the bidding process.

Fairness : Mandatory Standards

As practitioners in the global project management community, we require the following of ourselves and our fellow practitioners :

Conflict of Interest Situations

- We proactively and fully disclose any real or potential conflicts of interest to the appropriate stakeholders.
- 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.

Favouritism and Discrimination

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

8.4.3 HONESTY**Description of Honesty**

Honesty is our duty to understand the truth and act in a truthful manner both in our communications and in our conduct.

Honesty : Aspirational Standards

As practitioners in the global project management community:

- We earnestly seek to understand the truth.
- We are truthful in our communications and in our conduct.
- We provide accurate information in a timely manner.

Comment : An implication of these provisions is that we take appropriate steps to ensure that the information we are basing our decisions upon or providing to others is accurate, reliable, and timely. This includes having the courage to share bad news even when it may be poorly received. Also, when outcomes are negative, we avoid burying information or shifting blame to others. When outcomes are positive, we avoid taking credit for the achievements of others. These provisions reinforce our commitment to be both honest and responsible.

- We make commitments and promises, implied or explicit, in good faith.
- We strive to create an environment in which others feel safe to tell the truth.

Honesty : Mandatory Standards

As practitioners in the global project management community, we require the following of ourselves and our fellow practitioners:

- We do not engage in or condone behaviour that is designed to deceive others, including but not limited to, making misleading or false statements, stating half-truths, providing information out of context or withholding information that, if known, would render our statements as misleading or incomplete.
- We do not engage in dishonest behaviour with the intention of personal gain or at the expense of another.

Comment : The aspirational standards exhort us to be truthful. Half-truths and non disclosures intended to mislead stakeholders are as unprofessional as affirmatively making misrepresentations. We develop credibility by providing complete and accurate information.

Review Questions

- Q. 1** What are Project Governance and Ethics?
- Q. 2** Give the difference between Programmes & Projects
- Q. 3** Explain the Principles of Effective Project Governance.
- Q. 4** Write short note on Honesty,Fairness & Respect.



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