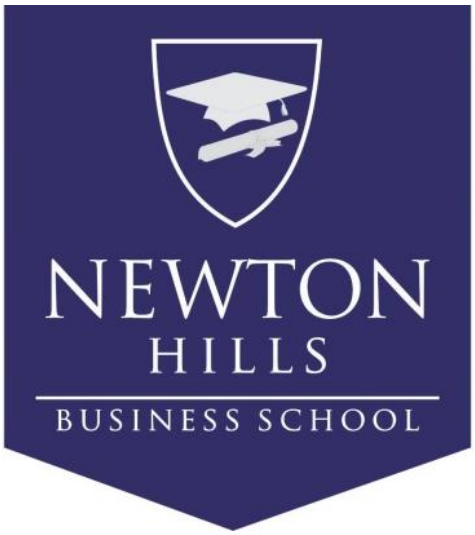


SCHOOL OF PROJECT MANAGEMENT

STUDY PACK

FOR

PROJECT COMMUNICATION MANAGEMENT

AND

PROJECT RISK MANAGEMENT

Table of Content

Chapter 1

An Introduction to Project Management

Objectives

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

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

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

What is a Project?

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

Projects are distinguished from operations and from programs.

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

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

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

Temporary Endeavour

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

Unique Deliverable

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

Progressive Elaboration

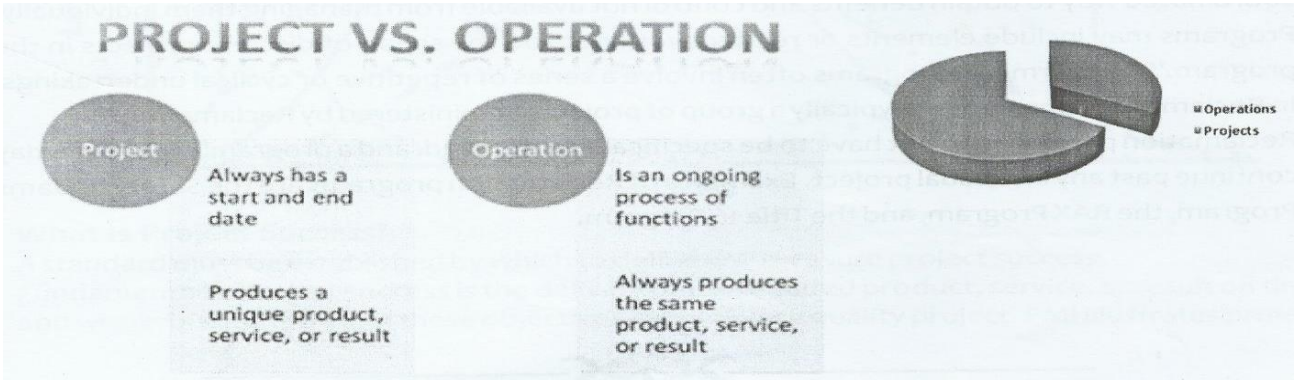
This unique process and deliverable produces the third characteristic of a project: progressive elaboration. Project management is a group of interrelated processes, implemented in a progressively elaborative manner, in which to produce the deliverable. Progressive elaboration is the revealing and focusing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

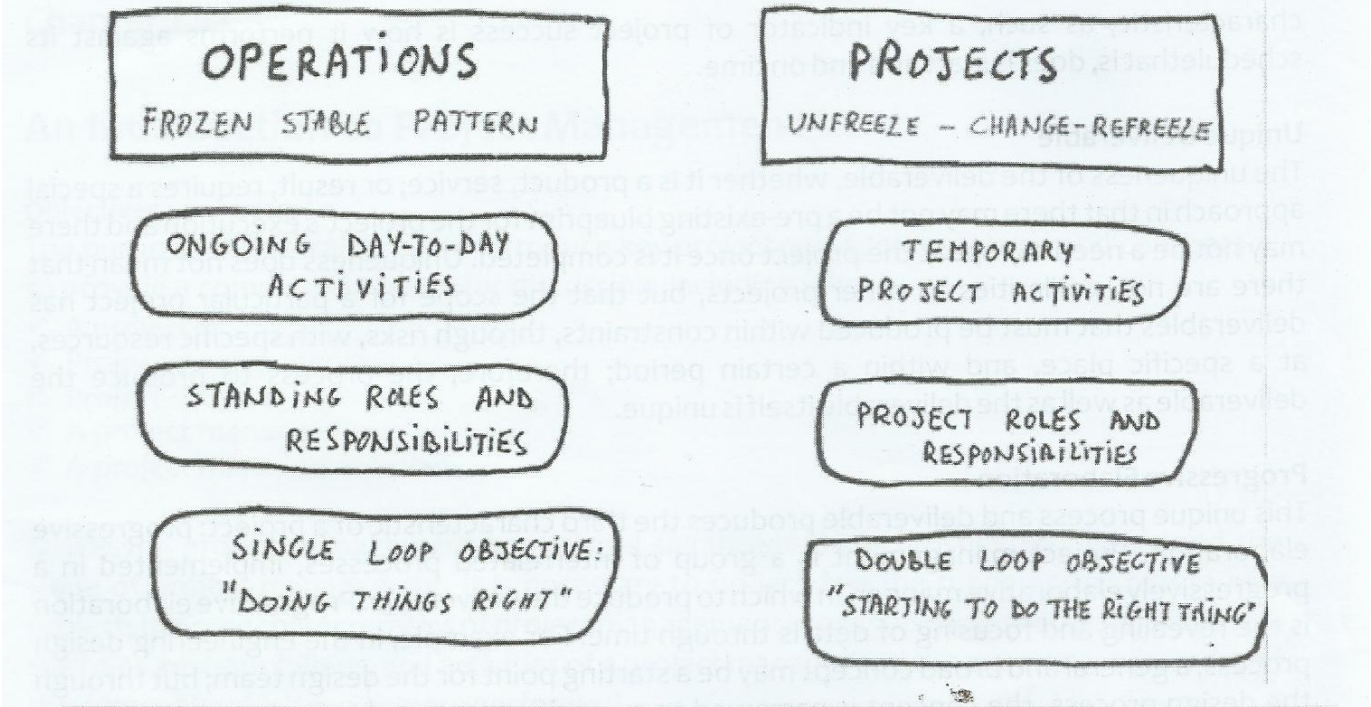
A project can create:

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

A Project Versus an Operation

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



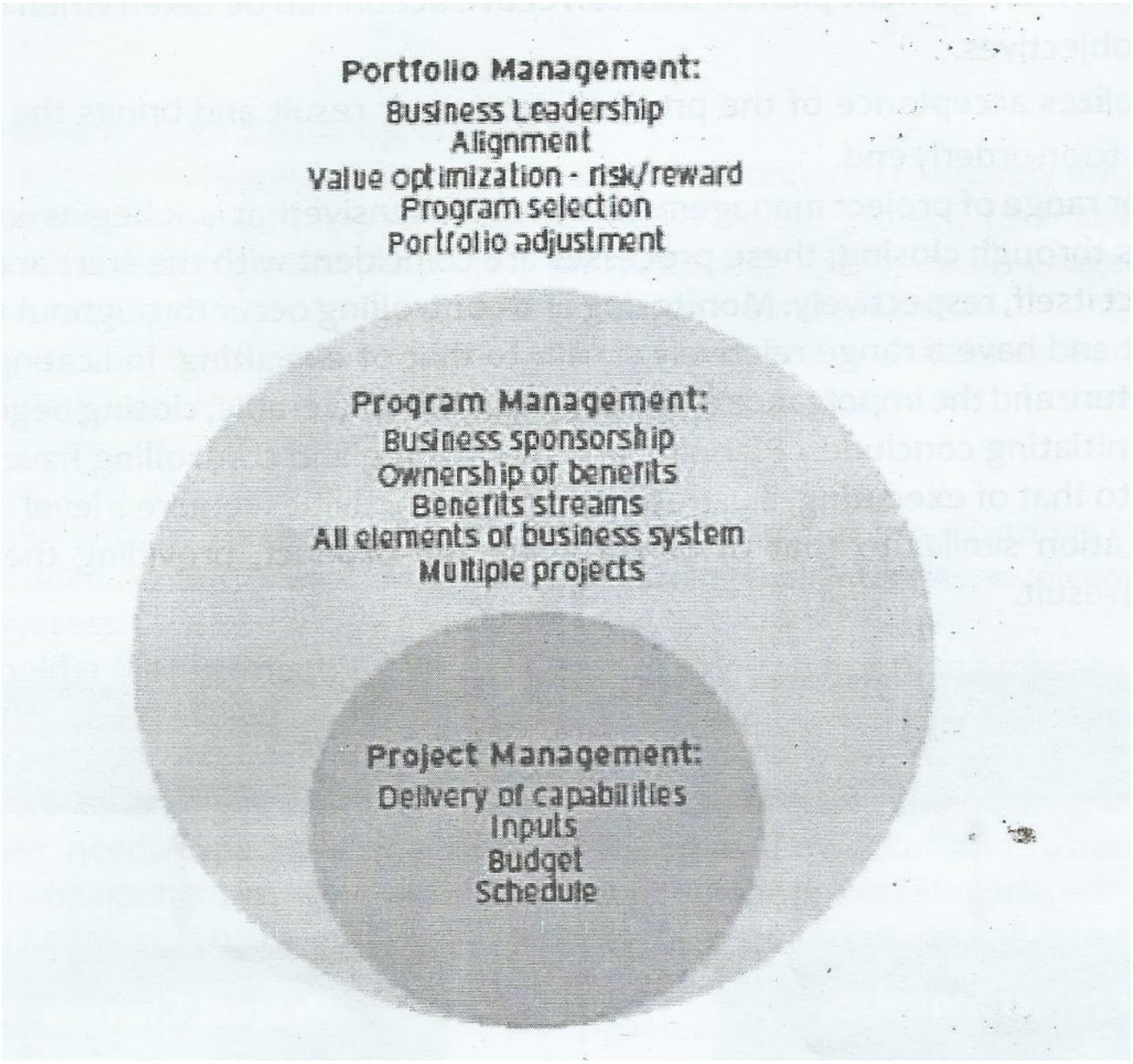


Constraints	Operations	Projects
Existence	Permanent	Temporary and unique
Scope	Continous and repetitive	First time, Terminates after finishing objectives
Time	No Time Span defined. Its ongoing	Definite Time Span
Budget	Operations have to maintain a specific profit margin	Project has to stick with a definite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

A Project Versus a Program

A project differs from a program in that "a program is a group of related projects managed in a coordinated way to obtain benefits and control not available from managing them individually. Programs may include elements or related work outside the scope of discrete projects in the program." Furthermore, programs often involve a series of repetitive or cyclical undertakings. In Reclamation, a program is typically a group of projects administered by Reclamation.

Reclamation programs do not have to be specifically authorized, and a program's schedule may continue past any individual project. Examples of Reclamation programs are the Safety of Dams Program, the RAX Program, and the Title 16 Program.



What Is Project Management?

"Project management is the process of the application of knowledge, skills, tools, and techniques to project activities to meet project requirements." That is, project management is an interrelated group of processes that enables the project team to achieve a successful project. These processes manage inputs to and produce outputs from specific activities; the progression from input to output is the nucleus of project management and requires integration and iteration. For example, a feasibility report could be an input to a design phase; the output of a design phase could be a set of plans and specifications. This progression requires project management acumen, expertise, tools and techniques, including risk management, contingency development, and change control.

Process Groups

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

Initiating defines and authorizes the projector a project phase.

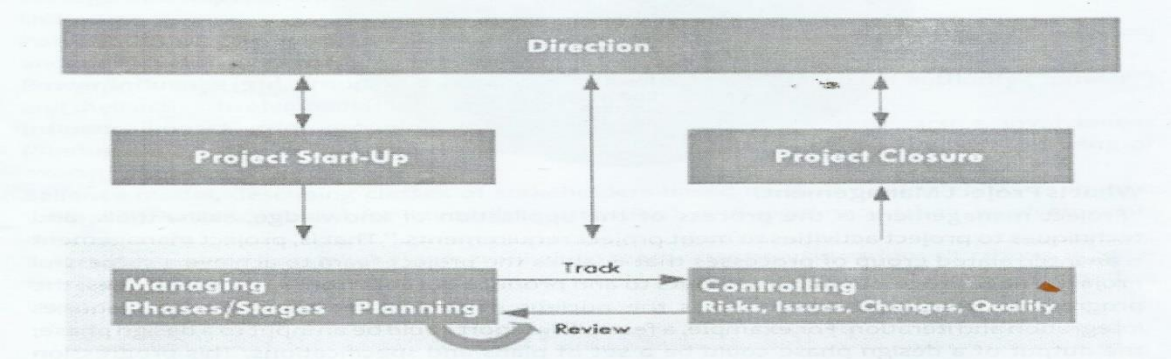
Planning defines and refines objectives and plans the course of action required to attain the objectives and scope that the project was undertaken to address.

Executing integrates people and other resources to carry out the project management plan for the project.

Monitoring and controlling regularly measures and monitors progress to identify variances from the project management plan so that corrective action can be taken when necessary to meet project objectives.

Closing formalizes acceptance of the product, service, or result and brings the project or a project phase to an orderly end.

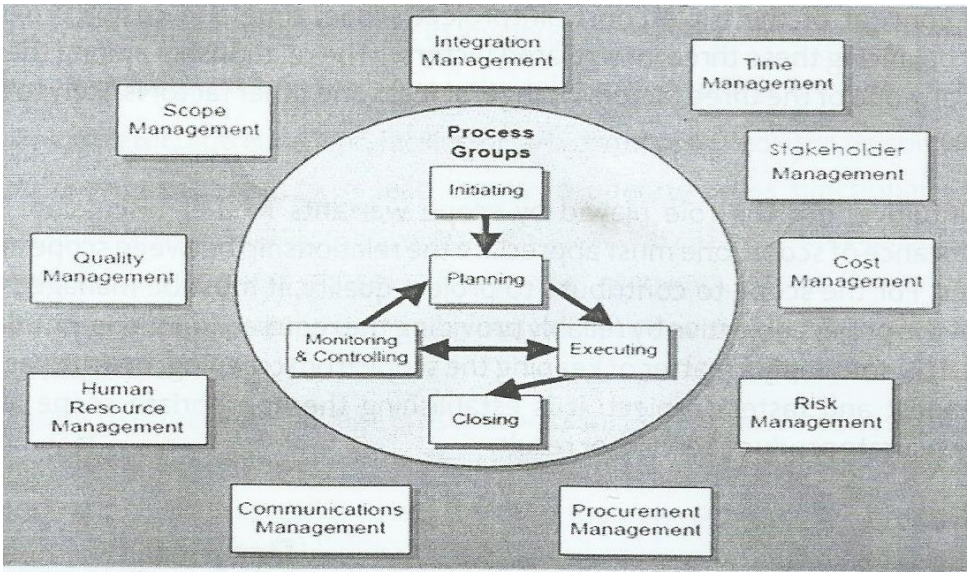
The breadth or range of project management is comprehensive that is, it begins with initiating and continues through closing; these processes are coincident with the start and end of the specific project itself, respectively. Monitoring and controlling occur throughout the duration of the project and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



Process Group Interaction

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

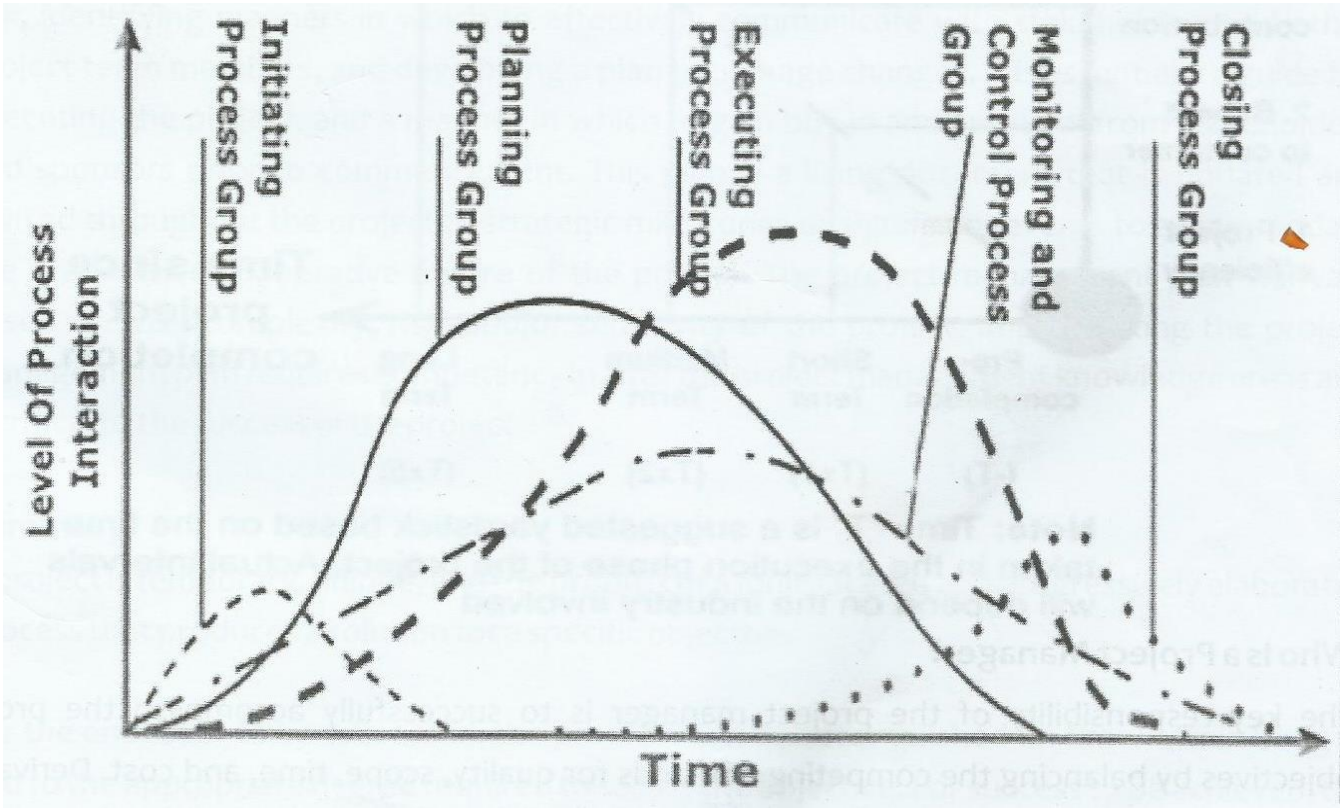
To manage the breadth or range of a project, active and proactive project management is required throughout the duration of the project. It cannot be simply initiated and/or planned and left alone; it must be continually planned and monitored and controlled. Sustained reactive project management is indicative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



Project Phases Versus Process Groups

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

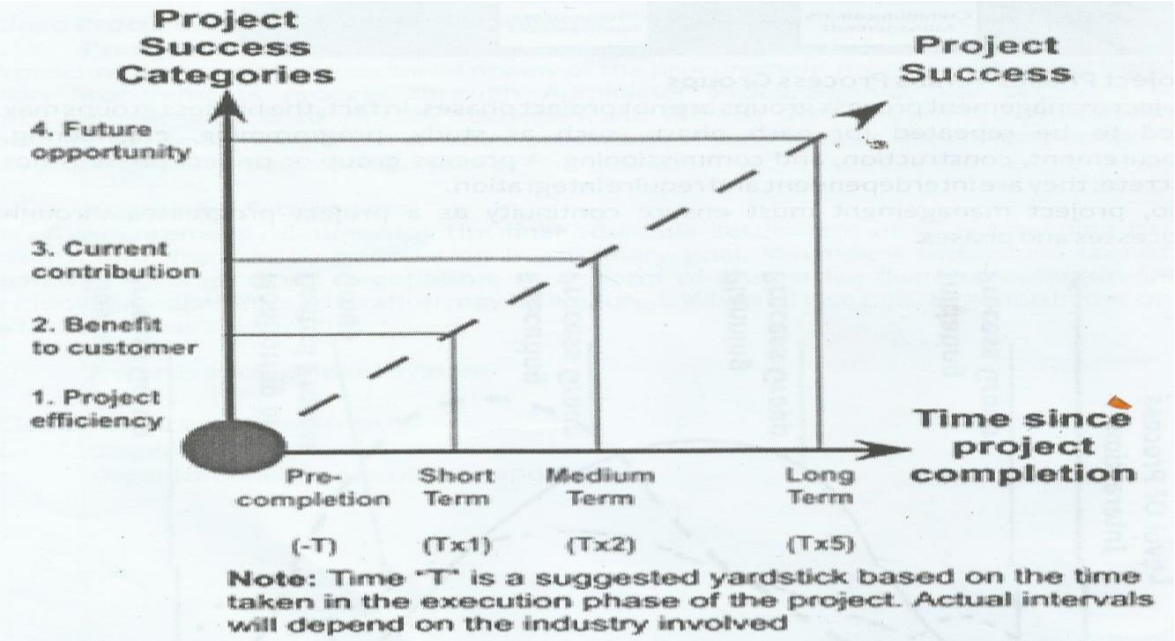
Also, project management must ensure continuity as a project progresses through processes and phases.



What Is Project Success?

A standard must be established by which to define and measure project success. Fundamentally, project success is the delivery of the required product, service, or result on time and within budget. To meet these objectives is to deliver a quality project. PMI illustrates project quality through the concept of the triple constraint project scope, time and cost.9 Project quality is affected by balancing these three interrelated factors. "The relationship among these factors is such that if any one of the three factors change, at least one other factor is likely to be affected."

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



Who is a Project Manager?

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

The project manager must lead teams to operate cross functionally towards a common objective while assuring cohesiveness and continuity as the project progresses through project processes and project phases. "The project manager acts as the key catalyst to stimulate effective communication and coordination between design, procurement and construction activities."

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

What Is a Project Management Plan (PMP)?

A project management plan is a fundamental tool for the project manager deliver the project successfully. This document is a strategic and formalized roadmap to accomplish the project's objectives by describing how the project is to be executed, monitored and controlled, which includes creating a project work breakdown structure, identifying and planning to mitigate risk, identifying manners in which to effectively communicate with stakeholders and other project team members, and

developing a plan to manage changes. It is essentially a guide for executing the project, and a manner in which to gain buy-in and approval from stakeholders and sponsors prior to commencement. This plan is a living document that is updated and revised throughout the project at strategic milestones or significant events to accommodate the progressive, elaborative nature of the project. The project management plan will vary based on size, complexity, risk, and/or sensitivity of the project. Implementing the project management plan requires competency in all of the project management knowledge areas and is critical to the success of the project

Summary

A project is temporary, unique, and the product of a multifaceted and progressively elaborated process that produces a solution for a specific objective.

For the endeavor to be successful, the project must be accomplished on time, within budget, and to the appropriate degree required to satisfy the objective. For success to be achieved, the project manager must be skilled and operate in an environment which enables a project team to function. Excellence in project management should be viewed as the positive trend in the performance of successful projects.

Chapter 2

Project Life Cycle and Organization

The project life cycle Overview

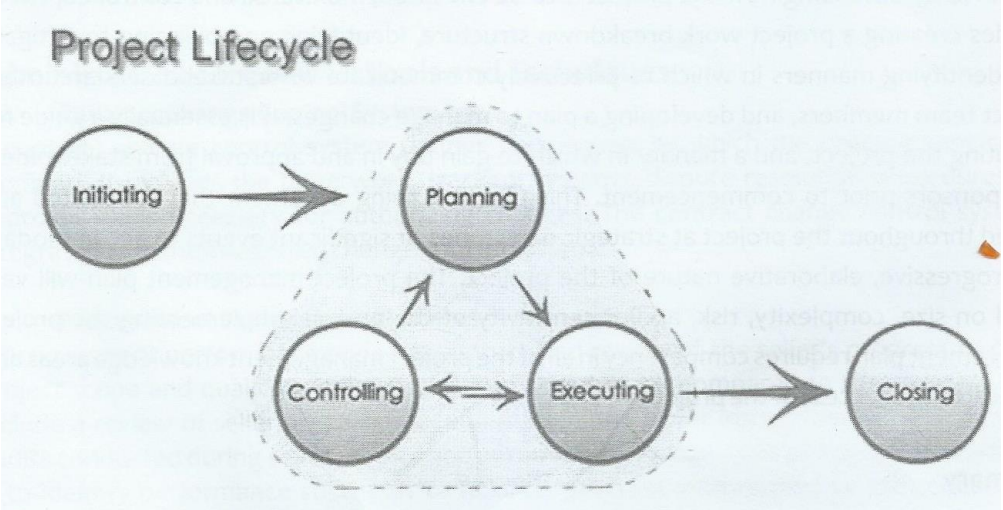
A project life cycle is a collection of generally sequential and sometimes overlapping project phases whose name and number are determined by the management and control needs of the organization or organizations involved in the project, the nature of the project itself, and its area of application.

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

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

Project Life Cycle:

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



Project Management Process

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

Project Phases

- ✓ Project phases are divisions within a project where extra control is needed to effectively manage the completion of a major deliverable.
- ✓ Project phases are typically completed sequentially, but can overlap in some project situations. Project Phase is not a Project Management Process Group.

Project Governance Across the Life Cycle

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

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

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

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

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

Business Value

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

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

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

Stakeholders

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

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

What are stakeholders?
- ✓ Project Sponsor
- ✓ Project Manager
- ✓ Project Management Team
- ✓ Project Team Members
- ✓ Program Manager
- ✓ Portfolio Manager
- ✓ Program manager

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

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

Organizational Structures

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

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

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

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

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

PROJECT ROLES & EXPECTATIONS
- Customer/Business
- Project Sponsor
- Project Manager
- Project Steering Committee
- Project Team Members
- Other Stakeholders

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

Project Sponsor
Manager/Executive with demonstrable interest in the outcome of the project
Responsible for securing spending authority and resources for the project
Ideally, highest-ranking manager possible appropriate for the project size and scope
- ✓ Champions the project.
- ✓ Ultimate decision-maker for the project.
- ✓ Provides support for the Project Manager.
- ✓ Approves major deliverables.
- ✓ Signs off on approvals to proceed to each succeeding project phase.

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

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

Project Team
Responsible for executing tasks and producing deliverable:
- ✓ As outlined in the Project Plan.
- ✓ As directed by the Project Manager.
- ✓ At the level of effort or participation defined for them.

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

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

Chapter 3

PROJECT COMMUNKATIONS MANAGEMENT

Project Communications Management includes the processes required to ensure timely and appropriate generation, collection, distribution, storage, retrieval, and ultimate disposition of project information.

Project managers spend the majority of their time communicating with team members and other project stakeholders, whether they are internal (at all organizational levels) or external to the organization.

Effective communication creates a bridge between diverse stakeholders involved in a project, connecting various cultural and organizational backgrounds, different levels of expertise, and various perspectives and interests in the project execution or outcome.

Project Communications Management processes:

Plan Communications management: The process of developing an appropriate approach and plan for project communications based on stakeholders' information needs and requirements and available organizational assets

Management Communications: The Process and Creating, collecting, distributing, storing retrieving and ultimately disposition of project information in accordance with the communications management plan.

Control Communication: The process of monitoring and controlling communications throughout the entire project life cycle to ensure the information needs of the project stakeholders are met.

Communication activity has many potential dimensions, including:

a. Internal (within the project) and external (customer, other projects, the media, the public),
b. Formal (reports, memos, briefings) and informal (emails, ad-hoc discussions),
c. Vertical (up and down the organization) and horizontal (with peers),
d. Official (newsletters, annual report) and unofficial (off the record communications),
e. Written and oral, and
f. Verbal and non-verbal (voice inflections, body language).

Plan Communication Management

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

Plan Communications

Plan Communications is the process of determining the project stakeholder information needs and defining a communication approach. The Plan Communications process responds to the information and communications needs of the stakeholders; for example, who needs what information, when they will need it, how it will be given to them, and by whom. While all projects share the need to communicate project information, the informational needs and methods of distribution vary widely. Identifying the information needs of the stakeholders and determining a suitable means of meeting those needs are important factors for project success.

Plan Communications management: Inputs

1. Stakeholder Register
2. Project Management Plan
3. Enterprise Environmental Factors
4. Organizational Process Assets

Plan Communications: Tools and Techniques

1. Communication Requirements Analysis

The analysis of the communication requirements determines the information needs of the project stakeholders. These requirements are defined by combining the type and format of information needed with an analysis of the value of that information. Project resources are expended only on communicating information that contributes to success, or where a lack of communication can lead to failure.

The project manager should also consider the number of potential communication channels or paths as an indicator of the complexity of a project's communications. The total number of potential communication channels is ***n(n-1)/2,*** where n represents the number of stakeholders.

Thus, a project with 10 stakeholders has 10(10-1)/2 = 4 potential communication channels. A key component of planning the project's actual communications, therefore, is to determine and limit who will communicate with whom and who will receive what information.

2. Communication Technology

The methods used to transfer information among project stakeholders can vary significantly. For example, a project team may use techniques from brief conversations all the way through to extended meetings or from simple written documents to material (e.g., schedules and databases) that is accessible online as methods of communication.

Factors that can affect the project include:

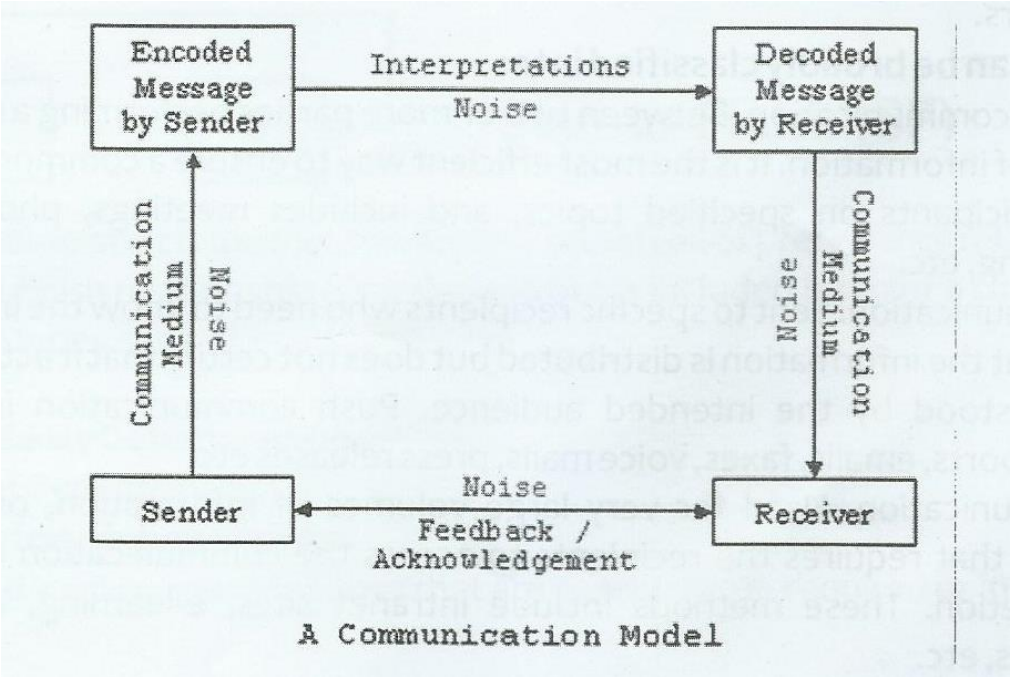
- ✓ Urgency of the need for information. Is project success dependent upon having frequently updated information available on a moment's notice, or would regularly issued written reports suffice?
- ✓ Availability of technology. Are appropriate systems already in place or do project needs warrant change? For example, do the intended stakeholder(s) have access to a selected communications technology?
- ✓ Ease of Use: There is a need to ensure that the choice of communication technology is suitable for project participants and that appropriate training events are planned for, where appropriate.
- ✓ Project Environment: There is a need to determine if the team will meet and operate on a face-to-face basis or in a virtual environment.
- ✓ Sensitivity and Confidentiality of Information. There is a need to determine if the information to be communicated is sensitive or confidential and whether or not additional security measures need to be taken.

3. Communication Models

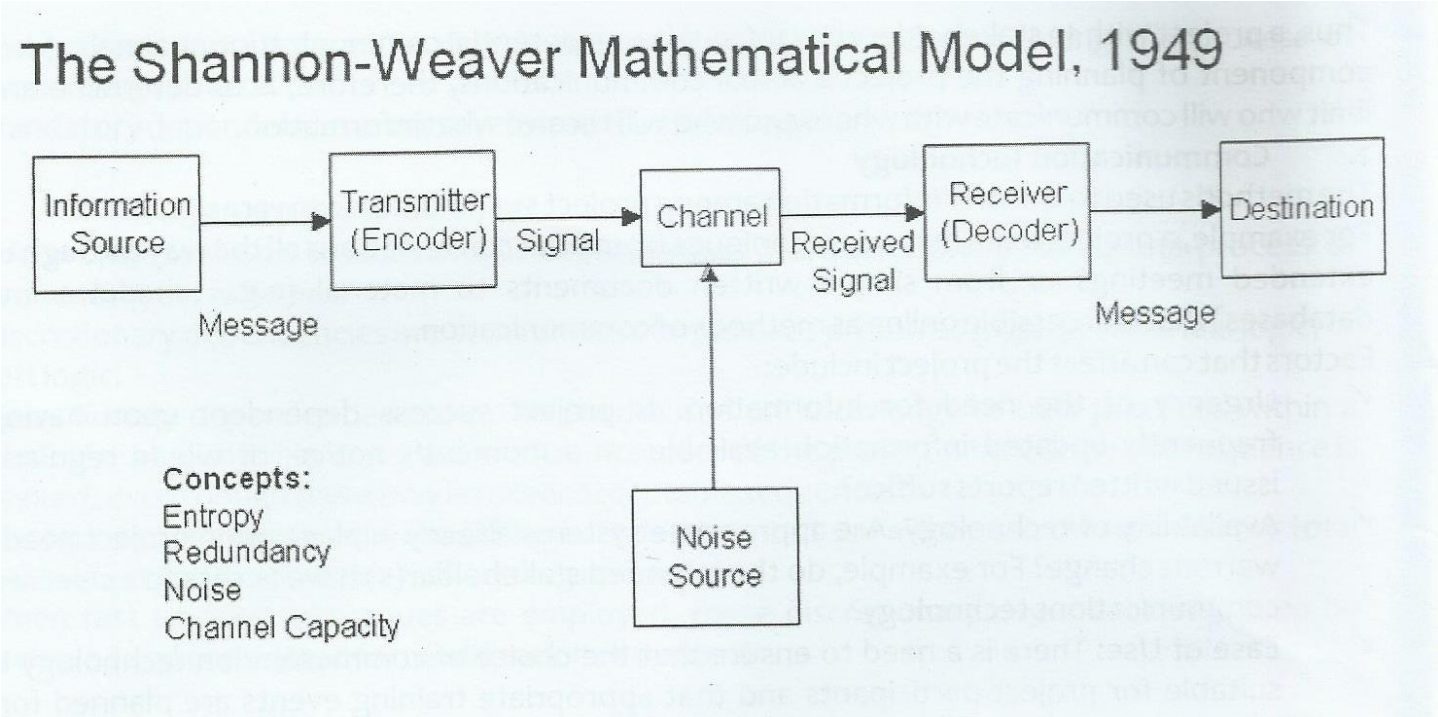
A basic model of communication, shown in Figure 10-8, demonstrates how information is sent and received between two parties, defined as the sender and the receiver. The key components of the model include:

- ✓ Encode. To translate thoughts or ideas into a language that is understood by others.

- ✓ Message and feedback-message. The output of encoding.
- ✓ Medium. The method used to convey the message.
- ✓ Noise. Anything that interferes with the transmission and understanding of the message (e.g., distance, unfamiliar technology, lack of background information).
- ✓ Decode. To translate the message back into meaningful thoughts or ideas.



A Communication Model



The Figures above are basic communication model. Inherent in the model is an action to acknowledge a message. Acknowledgement means that the receiver signals receipt of the message, but not necessarily agreement with the message. Another action is the response to a message, which means that the receiver has decoded, understands, and is replying to the message.

The components in the communications model need to be taken into account when discussing project communications. As part of the communications process, the sender is responsible for making the information clear and complete so that the receiver can receive it correctly, and for confirming that it is properly understood. The receiver is responsible for making sure that the information is received in its entirety, understood correctly, and acknowledged. A failure in communication can negatively impact the project.

1. Communication Methods

There is several communication methods used to share information among project stakeholders.

These methods can be broadly classified into:

a. Interactive communication. Between two or more parties performing a multidirectional exchange of information. It is the most efficient way to ensure a common understanding by all participants on specified topics, and includes meetings, phone calls, video conferencing, etc.

b. Push communication. Sent to specific recipients who need to know the information. This ensures that the information is distributed but does not certify that it actually reached or was understood by the intended audience. Push communication includes letters, memos, reports, emails, faxes, voice mails, press releases etc.

c. Pull communication. Used for very large volumes of information, or for very large audiences, that requires the recipients to access the communication content at their own discretion. These methods include intranet sites, e-Iearning, and knowledge

2. Meetings: this involves discussion and dialogue with the project team to determine the most appropriate way to update and communicate project information, and to respond to requests from various stakeholders for that information.

Plan Communications: Outputs

1. Communications Management Plan
2. Project Document updates

Manage Communications

The Process and Creating, collecting, distributing, storing retrieving and ultimately disposition of project information in accordance with the communications management plan.

This process goes beyond distributing relevant information and seeks to ensure that the information being communicated to the project stakeholders has been appropriately generated, as well as received and understood.

Techniques and considerations for effective communications management include, but are not limited to, the following:

- ✓ Sender-receiver models. Feedback loops and barriers to communication.
- ✓ Choice of media. Situation specifics of when to communicate in writing versus orally, when to write an informal memo versus a formal report, and when to communicate face- to-face versus by e-mail.

- ✓ Writing style. Active versus passive voice, sentence structure, and word choice.
- ✓ Meeting management techniques. Preparing an agenda and dealing with conflicts.
- ✓ Presentation techniques. Body language and design of visual aids.
- ✓ Facilitation techniques. Building consensus and overcoming obstacles.
- ✓ Listening Techniques: listening actively (acknowledging, clarify, and confirming understanding) and removal of barriers that adversely affect compensation.

Manage Communications: Inputs

1. Project Management Plan
2. Work Performance Reports
3. Organizational Process Assets
4. Enterprise environment factors

Manage Communications: Tools and Techniques

1. Communication Technology

The choice of communication technology is an important consideration in the manage communications process. As this can vary significantly from project to project and also throughout the life of the project, the focus is to ensure that the choice is appropriate for the information that is being communicated.

2. Communication Models

The choice of communication models is an important consideration in the process. As the components in the communications all contribute toward an effective and efficient communications process, the focus is to ensure that the choice of communication model is appropriate for the project that is undertaken and that any barriers (noise) are identified and managed.

3. Communication Methods

Individual and group meetings, video and audio conferences, computer chats, and other remote communications methods are used to distribute information.

4. Information Management System

Project information is managed distributed using a variety of tools, including:

- ✓ Hard-copy document distribution, manual filing systems, press releases, and shared- access electronic databases;
- ✓ Electronic communication and conferencing tools, such as e-mail, fax, voice mail, telephone, video and web conferencing, websites and web publishing; and
- ✓ Electronic tools for project management, such as web interfaces to scheduling and project management software, meeting and virtual office support software, portals, and collaborative work management tools

5. Performance Reporting

Report Performance is the process of collecting and distributing performance information, including status reports, progress measurements, and forecasts. The performance reporting process involves the periodic collection and analysis of baseline versus actual data to understand and communicate the project progress and performance as well as to forecast the project results.

Performance reports need to provide information at an appropriate level for each audience. The format may range from a simple status report to more elaborate reports. A simple status report might show performance information, such as percent complete, or status dashboards for each area (i.e., scope, schedule, cost, and quality).

Manage Communications: Outputs

3. Project Communications
4. Project Management plan updates
5. Project Documents Update
6. Organizational Process Assets Updates

Control Communication

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

The control communications process can trigger an iteration of plan communications management and/or manage communications processes.

Control Communication: Input

- ✓ Project Management Plan
- ✓ Project Communication
- ✓ Issue Log
- ✓ Work performance Data
- ✓ Organization process Asset

Control Communication: Tools and Techniques

1. Information Management Systems

An information Management system provides a set of standard tools for project manager to capture, store, and distribute information to stakeholders about the project costs, schedule progress, and performance. Some software packages allow the project manager to consolidate reports from several systems and facilitate report distribution to project stakeholders.

2. Expert Judgment

Expert judgment is often relied upon by the project team to assess the impact of the project communications, need for action or intervention, actions that should taken, responsibility for taking such actions, and the time frame for taking action.

3. Meetings

The control communications process requires discussion and dialogue with the project team to determine the most appropriate way to update and communicate project performance, and to respond to requests from stakeholders for information. These discussions and dialogues are commonly facilitated through meetings, which may be conducted face to face or online and in different locations, such as the project site or the client's site.

PROJECT COMMUNICATIONS MANAGEMENT: Output

- ✓ Work performance Information
- ✓ Change Requests
- ✓ Project Management Plan Updates
- ✓ Project Documents update
- ✓ Organizational Process assets Updates

Chapter 4

PROJECT RISK MANAGEMENT

Risk is an event with some degree of uncertainty

Project Risk Management includes the processes of conducting risk management planning, identification, analysis, response planning, and monitoring and control on a project.

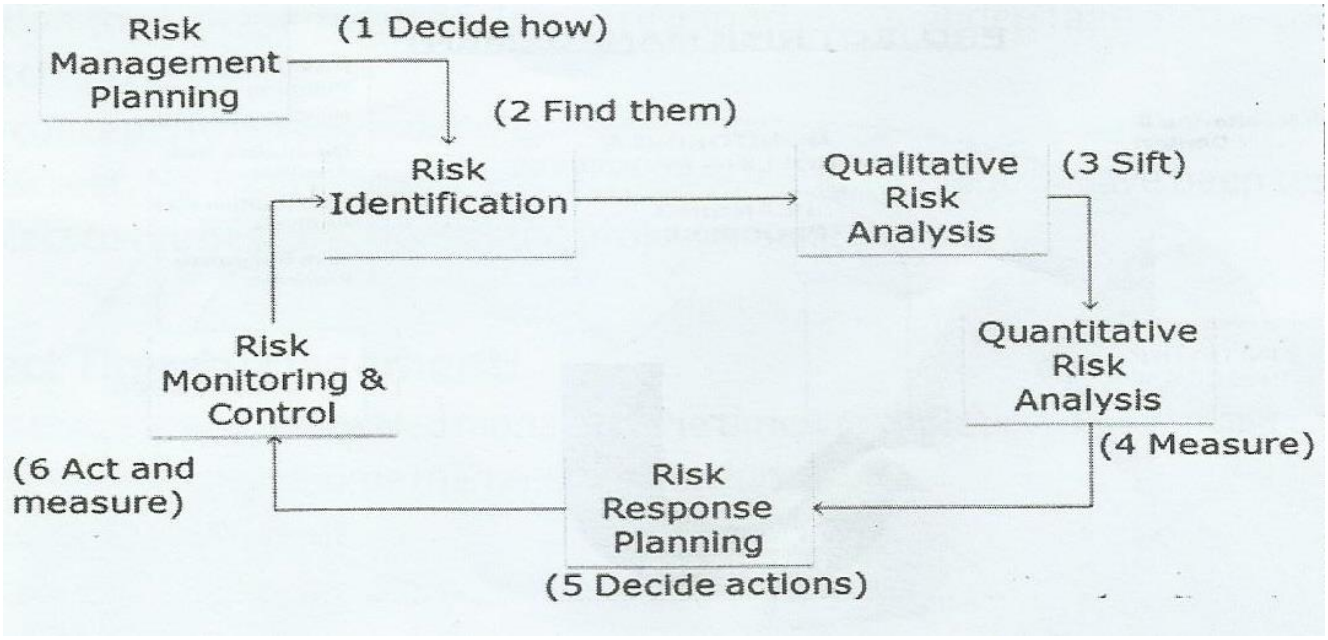
The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of negative events in the project. Project Risk Management processes:

Plan Risk Management: The process of defining how to conduct risk management activities for a project.

Identify Risks: The process of determining which risks may affect the project and documenting their characteristics.

Perform Qualitative Risk Analysis: The process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact. Perform Quantitative **Risk Analysis:** The process of numerically analyzing the effect of Identified risks on overall project objectives.

Plan Risk Responses: The process of developing options and actions to enhance opportunities.



Project risk is always in the future. Risk is an uncertain event or condition that, if it occurs, has an effect on at least one project objective. Objectives can include scope, schedule, cost, and quality.

A risk may have one or more causes and, if it occurs, it may have one or more impacts. A cause may be a requirement, assumption, constraint, or condition that creates the possibility of negative or positive outcomes.

BUSINESS RISK VS INSURABLE RISK

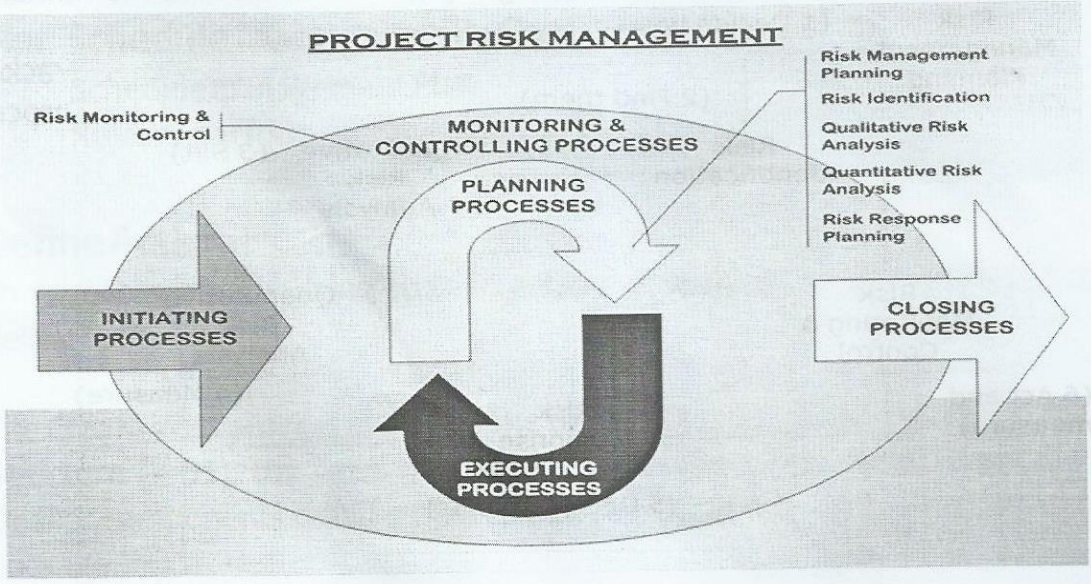
BUSINESS RISK	INSURABLE RISK
Inherent in Business	Only the Potential for Loss
All Projects have potential for loss or Profit	No potential for Profit Insurance may be purchased to offset losses
Example: Purchasing goods without guaranteed sales	Example: loss of inventory due file

LEVELS OF UNCERTAINTY

Known: Events that you are aware of and that will affect the Project, but you have no control over

Known Unknown: Events that will affect the project, although you are not able to predict How or how much they will affect it

Unknown Unknown: Events beyond your ability to see.



Plan Risk Management

Plan Risk Management is the process of defining how to conduct risk management activities for a project. Careful and explicit planning enhances the probability of success for the five other risk management processes. Planning risk management processes is important to ensure that the degree, type, and visibility of risk management are commensurate with both the risks and the importance of the project to the organization. Planning is also important to provide sufficient resources and time for risk management activities, and to establish an agreed-upon basis for evaluating risks. The Plan Risk Management process should begin as a project is conceived and should be completed early during project planning.

Plan Risk Management: Inputs

5. Project scope statement
6. Cost Management Plan
7. schedule Management Plan
8. Communications Management Plan
9. Enterprise Environmental Factors
10. Organizational Process Assets

Plan Risk Management: Tools and Techniques

1. Planning Meetings and Analysis

Project teams hold planning meetings to develop the risk management plan. Attendees at these meetings may include the project manager, selected project team members and stakeholders, anyone in the organization with responsibility to manage the risk planning and execution activities, and others, as needed.

High-level plans for conducting the risk management activities are defined in these meetings. Risk management cost elements and schedule activities will be developed for inclusion in the project budget and schedule, respectively. Risk contingency reserve application approaches may be established or reviewed. Risk management responsibilities will be assigned. General organizational templates for risk categories and definitions of terms such as levels of risk, probability by type of risk, impact by type of objectives, and the probability and impact matrix will be tailored to the specific project.

If templates for other steps in the process do not exist they may be generated in these meetings. The outputs of these activities will be summarized in the risk management plan.

Plan Risk Management: Outputs

4. Risk Management Plan

Identify Risks

Identify Risks is the process of determining which risks may affect the project and documenting their characteristics. Participants in risk identification activities can include the following: project manager, project team members, risk management team (if assigned), customers, subject matter experts from outside the project team, end users, other project managers, stakeholders, and risk management experts. While these personnel are often key participants for risk identification, all project personnel should be encouraged to identify risks.

Identify Risks is an iterative process because new risks may evolve or become known as the

project progresses through its life cycle. The frequency of iteration and who participates in each cycle will vary by situation. The format of the risk statements should be consistent to ensure the ability to compare the relative effect of one risk event against others on the project. The process should involve the project team so they can develop and maintain a sense of ownership and responsibility for the risks and associated risk response actions. Stakeholders outside the project team may provide additional objective information.

Identify Risks: Inputs

1. Risk Management Plan
2. Activity Cost Estimates
3. Activity Duration Estimates
4. scope Baseline
5. stakeholder Register
6. Cost Management Plan
7. schedule Management Plan
8. Quality Management Plan
9. Project Documents
10. Enterprise Environmental Factors
11. Organizational Process Assets

Identify Risks: Tools and Techniques

1. Documentation Reviews

A structured review may be performed of project documentation, including plans, assumptions, previous project files, contracts, and other information. The quality of the plans, as well as consistency between those plans and the project requirements and assumptions, can be indicators of risk in the project.

2. Information gathering Techniques

Examples of information gathering techniques used in identifying risk can include:

- ✓ Brainstorming. The goal of brainstorming is to obtain a comprehensive list of project risks. The project team usually performs brainstorming, often with a multidisciplinary set of experts who are not part of the team. Ideas about project risk are generated under the leadership of a facilitator; either in a traditional free-form brainstorm session with ideas contributed by participants, or structured using mass interviewing techniques such as the nominal group technique. Categories of risk, such as a risk breakdown structure, can be used as a framework.
- ✓ Delphi technique. The Delphi technique is a way to reach a consensus of experts. Project risk experts participate in this technique anonymously. A facilitator uses a questionnaire to solicit ideas about the important project risks. The responses are summarized and are then reticulated to the experts for further comment. Consensus may be reached in a few rounds of this process. The Delphi technique helps reduce bias in the data and keeps any one person from having undue influence on the outcome.
- ✓ Interviewing. Interviewing experienced project participants, stakeholders, and subject matter experts can identify risks.

- ✓ Root cause analysis. Root cause analysis is a specific technique to identify a problem, discover the underlying causes that lead to it, and develop preventive action.

3. Checklist Analysis

Risk identification checklists can be developed based on historical information and knowledge that has been accumulated from previous similar projects and from other sources of information. The lowest level of the RBS can also be used as a risk checklist. While a checklist can be quick and simple, it is impossible to build an exhaustive one. The team should make sure to explore items that do not appear on the checklist. The checklist should be reviewed during project closure to incorporate new lessons learned and improve it for use on future projects.

4. Assumptions Analysis

Every project and every identified project risk is conceived and developed based on a set of hypotheses, scenarios, or assumptions. Assumptions analysis explores the validity of assumptions as they apply to the project. It identifies risks to the project from inaccuracy, instability, inconsistency, or incompleteness of assumptions.

5. Diagramming Techniques

Risk diagramming techniques may include:

- ✓ Cause and effect diagrams. These are also known as lshikawa or fishbone diagrams, and are useful for identifying causes of risks.
- ✓ System or process flow charts. These show how various elements of a system interrelate, and the mechanism of causation.
- ✓ Influence diagrams. These are graphical representations of situation showing causal influences, time ordering of events, and other relationships among variables and outcomes.

6. SWOT Analysis

This technique examines the project from each of the SWOT (strengths, weaknesses, opportunities, and threats) perspectives to increase the breadth of identified risks by including internally generated risks. The technique starts with identification of strengths and weaknesses of the organization, focusing on either the project organization or the wider business. These factors are often identified using brainstorming. SWOT analysis then identifies any opportunities for the project that arise from organizational strengths and any threats arising from organizational weaknesses.

SWOT analysis also examines the degree to which organizational strengths offset threats and opportunities that may serve to overcome weaknesses.

7. Expert judgment

Risks can be identified directly by experts with relevant experience of similar projects or business areas. Such experts should be identified by the project manager and invited to consider all aspects of the project and suggest possible risks based on their previous experience and areas of expertise.

The experts' bias should be taken into account in this process.

Identify Risks: Outputs

The main outputs from Identify Risks are typically contained in the risk register.

1. Risk Register

Perform Qualitative Risk Analysis

Perform Qualitative Risk Analysis is the process of prioritizing risks for further analysis or action by assessing and combining their probability of occurrence and impact. Organizations can improve the project's performance by focusing on high-priority risks. Perform Qualitative Risk Analysis assesses the priority of identified risks using their relative probability or likelihood of

occurrence, the corresponding impact on project objectives if the risks occur, as well as other factors such as the time frame for response and the organization risk tolerance associated with the project constraints of cost, schedule, scope, and quality. Such assessments reflect the attitude of the project team and other stakeholders to risk. Effective assessment therefore requires explicit identification and management of the risk attitudes of key participants in the Perform Qualitative Risk Analysis process. Where these risk attitudes introduce bias into the assessment of identified risks, attention should be paid to evaluating bias and correcting for it.

Establishing definitions of the levels of probability and impact can reduce the influence of bias. The time criticality of risk-related actions may magnify the importance of a risk. An evaluation of the quality of the available information on project risks also helps clarify the assessment of the risk's importance to the project.

Perform Qualitative Risk Analysis is usually a rapid and cost-effective means of establishing priorities for Plan Risk Responses and lays the foundation for Perform Quantitative Risk Analysis, if required. The Perform Qualitative Risk Analysis process should be revisited during the project's life cycle to stay current with changes in the project risks. This process can lead into Perform Quantitative Risk Analysis or directly into

Plan Risk Responses.

Qualitative Risk Analysis for Baking Cookies

Risk Name	Probability	Impact	P x I
Forget Sugar	.02	.90	0.018
Burn cookies	.15	.85	0.128
Dough Not Mixed Thoroughly	.10	.20	0.020
Break When Removed from Sheet	.35	.50	0.175

Performances

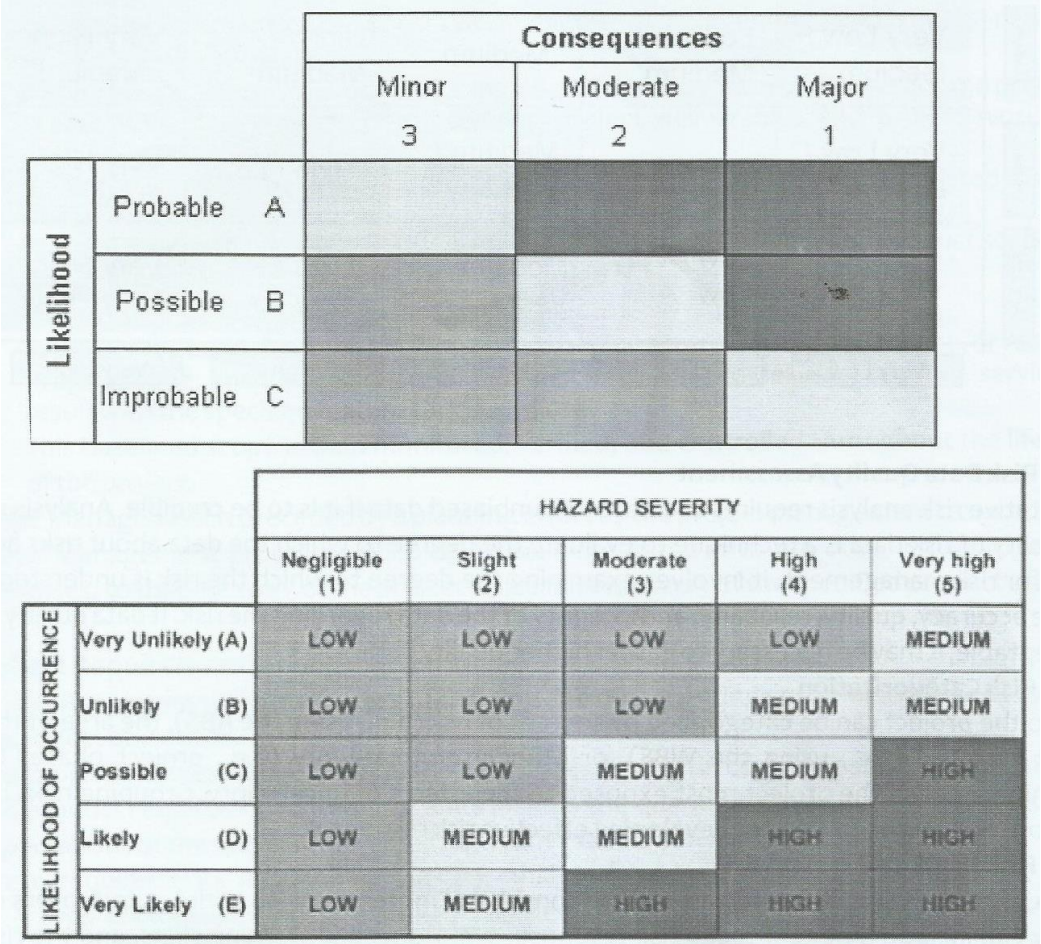
1. Risk Register
2. Risk Management Plan
3. Project scope statement
4. Organizational Process Assets

Perform Qualitative Risk Analysis: Tools and Techniques

1. Risk Probability and lmpact Assessment

Risk probability assessment investigates the likelihood that each specific risk will occur. Risk impact assessment investigates the potential effect on a project objective such as schedule, cost, quality, or performance, including both negative effects for threats and positive effects for opportunities.

Probability and impact are assessed for each identified risk. Risks can be assessed in interviews or meetings with participants selected for their familiarity with the risk categories on the agenda. Project team members and, perhaps, knowledgeable persons from outside the project, are included.
The level of probability for each risk and its impact on each objective is evaluated during the interview or meeting. Explanatory detail, including assumptions justifying the levels assigned, is also recorded. Risk probabilities and impacts are rated according to the definitions given in the risk management plan.
Risks with low ratings of probability and impact will be included on a watch-list for future monitoring.

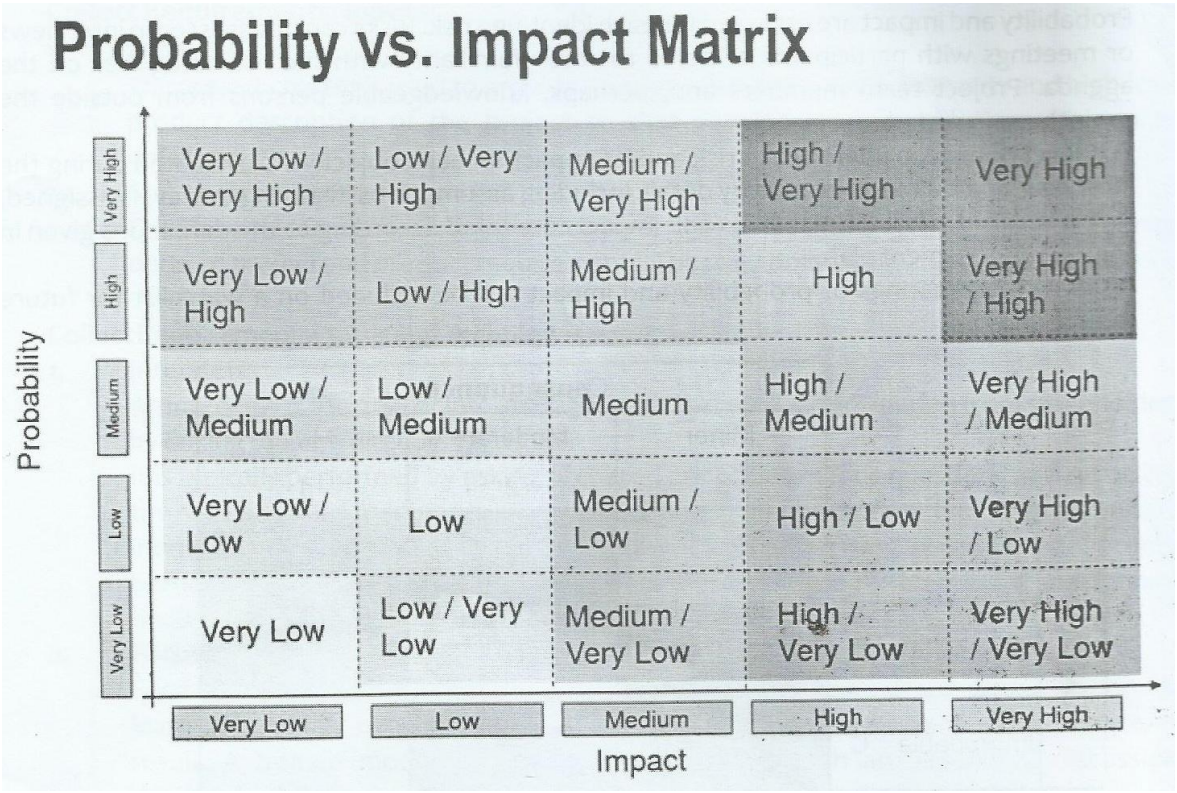


Likelihood	Consequences: Minor 3	Moderate 2	Major 1
Probable A			
Possible B			
Improbable C			

LIKELIHOOD OF OCCURRENCE	HAZARD SEVERITY: Negligible (1)	Slight (2)	Moderate (3)	High (4)	Very high (5)
Very Unlikely (A)	LOW	LOW	LOW	LOW	MEDIUM
Unlikely (B)	LOW	LOW	LOW	MEDIUM	MEDIUM
Possible (C)	LOW	LOW	MEDIUM	MEDIUM	HIGH
Likely (D)	LOW	MEDIUM	MEDIUM	HIGH	HIGH
Very Likely (E)	LOW	MEDIUM	HIGH	HIGH	HIGH

2. Probability and Impact Matrix

Risks can be prioritized for further quantitative analysis and response based on their risk rating. Usually, these risk-rating rules are specified by the organization in advance of the project and included in organizational process assets. Risk-rating rules can be tailored to the specific project in the Plan Risk Management process. Evaluation of each risk's importance and, hence, priority for attention, is typically conducted using a look-up table or a probability and impact matrix Such a matrix specifies combinations of probability and impact that lead to rating the risks as low, moderate, or high priority. The dark gray area (with the largest numbers) represents high risk, the medium gray area (with the smallest numbers) represents low risk, and the light gray area (with in-between numbers) represents moderate risk.



1. Risk Data Quality Assessment

A qualitative risk analysis requires accurate and unbiased data if it is to be credible. Analysis of the quality of risk data is a technique to evaluate the degree to which the data about risks are useful for risk management. It involves examining the degree to which the risk is understood and the accuracy, quality, reliability, and integrity of the data regarding the risk. If data quality is unacceptable, it may be necessary to gather higher-quality data.

2. Risk Categorization

Risks to the project can be categorized by sources of risk (e.g., using the RBS), the area of the project affected (e.g., using the WBS), or other useful category (e.g., project phase) to determine areas of the project most exposed to the effects of uncertainty. Grouping risks by common root causes can lead to developing effective risk responses.

3. Risk Urgency Assessment

Risks requiring near-term responses may be considered more urgent to address. Indicators of priority can include time to affect a risk response, symptoms and warning signs, and the risk rating.

In some qualitative analyses the assessment of risk urgency can be combined with the risk ranking determined from the probability and impact matrix to give a final risk severity rating.

4. Expert judgment

Expert judgment is required to assess the probability and impact of each risk to determine its location in the matrix shown in Figure 11-10. Experts generally are those having experience with similar projects that occurred in the not-too-distant past. In addition, those who are planning and managing the specific project are experts, particularly about the specifics of that project. Securing expert judgment is often accomplished with the use of risk facilitation workshops or

interviews. The experts' bias should be taken into account in this process.

Perform Qualitative Risk Analysis: Outputs

1. Risk Register Updates

Perform Quantitative Risk Analysis

Perform Quantitative Risk Analysis is the process of numerically analyzing the effect of identified risks on overall project objectives. Perform Quantitative Risk Analysis is performed on risks that have been prioritized by the Perform Qualitative Risk Analysis process as potentially and substantially impacting the project's competing demands. The Perform Quantitative Risk Analysis process analyzes the effect of those risk events. It may be used to assign a numerical rating to those risks individually or to evaluate the aggregate effect of all risks affecting the project. It also presents a quantitative approach to making decisions in the presence of uncertainty.

Perform Quantitative Risk Analysis generally follows the Perform Qualitative Risk Analysis process. In some cases, Perform Quantitative Risk Analysis may not be required to develop effective risk responses. Availability of time and budget, and the need for qualitative or quantitative statements about risk and impacts, will determine which method(s) to use on any particular project. Perform Quantitative Risk Analysis should be repeated

Plan Risk Responses, as well as part of Monitor and Control Risks, to determine if the overall project risk has been satisfactorily decreased. Trends can indicate the need for more or less risk management action.

Perform Quantitative Risk Analysis: Inputs

1. Risk Register
2. Risk Management Plan
3. Cost Management Plan
4. schedule Management Plan
5. Organizational Process Assets

Perform Quantitative Risk Analysis: Tools and Techniques

1. Data gathering and Representation Techniques

a. **Interviewing:** Interviewing techniques draw on experience and historical data to quantify the probability and impact of risks on project objectives. The information needed depends upon the type of probability distributions that will be used. For instance, information would be gathered on the optimistic (low), pessimistic (high), and most likely scenarios for some commonly used distributions. Additional information on three point estimates is in Estimate Activity Durations. Documenting the rationale of the risk ranges and the assumptions behind them are important components of the risk interview because they can provide insight on the reliability and credibility of the analysis.

b. **Probability distributions:** Continuous probability distributions used extensively in modeling and simulation represent the uncertainty in values such as durations of schedule activities and costs of project components. Discrete distributions can be used to represent uncertain events such as the outcome of a test or a possible scenario in a decision tree. These distributions depict shapes that are compatible with the data typically developed during the quantitative risk analysis. Uniform distributions can be used only if there is no obvious value that is more likely than

any other between specified high and low bounds, such as in the early concept stage of design.

2. Quantitative Risk Analysis and Modeling Techniques

- ✓ Commonly used techniques include both event-oriented and project-oriented analysis approaches including:
- ✓ **Sensitivity analysis:** Sensitivity analysis helps to determine which risks have the most potential impact on the project. It examines the extent to which the uncertainty of each project element affects the objective being examined when all other uncertain elements are held at their baseline values. One typical display of sensitivity analysis is the tornado diagram, which is useful for comparing relative importance and impact of variables that have a high degree of uncertainty to those that are more stable.
- ✓ **Expected monetary value analysis:** Expected monetary value (EMV) analysis is a statistical concept that calculates the average outcome when the future includes scenarios that may or may not happen (i.e., analysis under uncertainty). The EMV of opportunities will generally be expressed as positive values, while those of threats will be negative. EMV requires a risk neutral assumption, neither risk averse, nor risk seeking. EMV for a project is calculated by multiplying the value of each possible outcome by its probability of occurrence and adding the products together. A common use of this type of analysis is in decision tree analysis
- ✓ **Modeling and simulation:** A project simulation uses a model that translates the specified detailed uncertainties of the project into their potential impact on project objectives. Iterative simulations are typically performed using the Monte Carlo technique. In a simulation, the project model is computed many times (iterated), with the input values (e.g., cost estimates or activity durations) chosen at random for each iteration from the probability distributions of these variables. A probability distribution (e.g., total cost or completion date) is calculated from the iterations. For a cost risk analysis, a simulation uses cost estimates. For a schedule risk analysis, the schedule network diagram and duration estimates are used. The output from a cost risk simulation is shown in Figure 11-16. It illustrates the respective likelihood of achieving specific cost targets. Similar curves can be developed for schedule outcomes.

3. **Expert judgment:** Expert judgment (ideally using experts with relevant, recent experience) is required to Identify potential cost and schedule impacts, to evaluate probability, and to define inputs (such as probability distributions) into the tools.
   Expert judgment also comes into play in the interpretation of the data. Experts should be able to identify the weaknesses of the tools as well as their relative strengths. Experts may determine when a specific tool may or may not be more appropriate given the organization's capabilities and culture.

Perform Quantitative Risk Analysis: Outputs

1. Risk Register Updates

Plan Risk Responses

Plan Risk Responses is the process of developing options and actions to enhance opportunities and to reduce threats to project objectives. It follows the Perform Qualitative Risk Analysis process and the Perform Quantitative Risk Analysis process (if used). It includes the identification and assignment of one person (the "risk response owner") to take responsibility for each agreed-to and funded risk response. Plan

Risk Responses addresses the risks by their priority, inserting resources and activities into the budget, schedule and project management plan as needed.
Planned risk responses must be appropriate to the significance of the risk, cost effective in meeting the challenge, realistic within the project context, agreed upon by all parties involved, and owned by a responsible person. They must also be timely. Selecting the best risk response from several options is often required.

Impact	Risk Management Actions		
Significant	Considerable management required	Must manage and monitor risks	Extensive management essential
Moderate	Risks may be worth accepting with monitoring	Management effort worthwhile	Management effort required
Minor	Accept risks	Accept, but monitor risks	Manage and monitor risks
	Low	Medium	High
	Likelihood		

Risks include threats and opportunities that can affect project success, and responses are discussed for each.

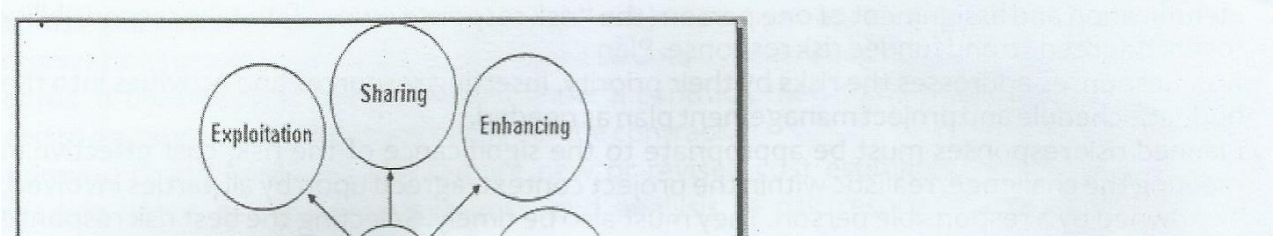
Inputs Tools &Techniques Outputs

Plan Risk Responses: Inputs

1. Risk Register
2. Risk Management Plan

Plan Risk Responses: Tools and Techniques

Several risk response strategies are available. The strategy or mix of strategies most likely to be effective should be selected for each risk. Risk analysis tools, such as decision tree analysis, can be used to choose the most appropriate responses. Specific actions are developed to implement that strategy, including primary and backup strategies, as necessary. A fall back plan can be developed for implementation if the selected strategy turns out not to be fully effective or if an accepted risk occurs. Secondary risks (risks driven by the strategies) should also be reviewed. A contingency reserve is often allocated for time or cost. If developed, it may include identification of the conditions that trigger its use.



1. Strategies for negative Risks or Threats

Three of the following strategies typically deal with threats or risks that may have negative impacts on project objectives if they occur. The fourth strategy, accept; can be used for negative risks or threats as well as positive risks or opportunities. These strategies, described below, are to avoid, transfer, mitigate, or accept.

- Avoid. Risk avoidance involves changing the project management plan to eliminate the threat entirely. The project manager may also isolate the project objectives from the risk's impact or change the objective that is in jeopardy. Examples of this include extending the schedule, changing the strategy, or reducing scope. The most radical avoidance strategy is to shut down the project entirely. Some risks that arise early in the project can be avoided by clarifying requirements, obtaining information, improving communication, or acquiring expertise.
- Transfer. Risk transfer requires shifting some or all of the negative impact of a threat, along with ownership of the response, to a third party. Transferring the risk simply gives another party responsibility for its management it does not eliminate it. Transferring liability for risk is most effective in dealing with financial risk exposure. Risk transference nearly always involves payment of a risk premium to the party taking on the risk. Transference tools can be quite diverse and include, but are not limited to, the use of insurance, performance bonds, warranties, guarantees, etc. Contracts may be used to transfer liability for specified risks to another party.

For example, when a buyer has capabilities that the seller does not possess, it may be prudent to transfer some work and its concurrent risk contractually back to the buyer.

- Mitigate. Risk mitigation implies a reduction in the probability and/or impact of an adverse risk event to be within acceptable threshold limits. Taking early action to reduce the probability and/or impact of a risk occurring on the project is often more effective than trying to repair the damage after the risk has occurred. Adopting less complex processes, conducting more tests, or choosing a more stable supplier are examples of mitigation actions. Mitigation may require prototype development to reduce the risk of scaling up from a bench-scale model of a process or product.

✓ Accept. This strategy is adopted because it is seldom possible to eliminate all threats from a project. This strategy indicates that the project team has decided not to change the project management plan to deal with a risk, or is unable to identify any other suitable response strategy. This strategy can be either passive or active. Passive acceptance requires no action except to document the strategy, leaving the project team to deal with the risks as they occur. The most common active acceptance strategy is to establish a contingency reserve, including amounts of time, money, or resources to handle the risks.

2. Strategies for Positive Risks or Opportunities

Three of the four responses are suggested to deal with risks with potentially positive impacts on project objectives. The fourth strategy, accept; can be used for negative risks or threats as well as positive risks or opportunities. These strategies, described below, are to exploit, share, enhance, or accept.

- ✓ Exploit. This strategy may be selected for risks with positive impacts where the organization wishes to ensure that the opportunity is realized. This strategy seeks to eliminate the uncertainty associated with a particular upside risk by ensuring the opportunity definitely happens. Examples of directly exploiting responses include assigning an organization's most talented resources to the project to reduce the time to completion or to provide lower cost than originally planned.
- ✓ Share. Sharing a positive risk involves allocating some or all of the ownership of the opportunity to a third party who is best able to capture the opportunity for the benefit of the project.

  Examples of sharing actions include forming risk-sharing partnerships, teams, special- purpose companies, or joint ventures, which can be established with the express purpose of taking advantage of the opportunity so that all parties gain from their actions.
- ✓ Enhance. This strategy is used to increase the probability and/or the positive impacts of an opportunity. Identifying and maximizing key drivers of these positive-impact risks may increase the probability of their occurrence. Examples of enhancing opportunities include adding more resources to an activity to finish early.
- ✓ Accept. Accepting an opportunity is being willing to take advantage of it if it comes along, but not actively pursuing it.

3. Contingent Response strategies

Some responses are designed for use only if certain events occur. For some risks, it is appropriate for the project team to make a response plan that will only be executed under certain predefined conditions, if it is believed that there will be sufficient warning to implement the plan. Events that trigger the contingency response, such as missing intermediate milestones or gaining higher priority with a supplier, should be defined and tracked.

4. Expert judgment

Expert judgment is input from knowledgeable parties pertaining to the actions to be taken on a specific and defined risk. Expertise may be provided by any group or person with specialized education, knowledge, skill, experience, or training in establishing risk responses.

Plan Risk Responses: Outputs

1. Risk Register Updates

2. Risk-Related Contract Decisions
3. Project Management Plan Updates
4. Project Document Updates

Monitor and Control Risks

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

Planned risk responses that are included in the project management plan are executed during the life cycle of the project, but the project work should be continuously monitored for new, changing, and outdated risks.

The Monitor and Control Risks process applies techniques, such as variance and trend analysis, which require the use of performance information generated during project execution.

Monitor and Control Risks: Inputs

1. Risk Register
2. Project Management Plan
3. Work Performance Information
4. Performance Reports

Monitor and Control Risks: Tools and Techniques

1. Risk Reassessment

Monitor and Control Risks often results in identification of new risks, reassessment of current risks, and the closing of risks that are outdated. Project risk reassessments should be regularly scheduled.

The amount and detail of repetition that is appropriate depends on how the project progresses relative to its objectives.

2. Risk Audits

Risk audits examine and document the effectiveness of risk responses in dealing with identified risks and their root causes, as well as the effectiveness of the risk management process. The project manager is responsible for ensuring that risk audits are performed at an appropriate frequency, as defined in the project's risk management plan. Risk audits may be included during routine project review meetings, or separate risk audit meetings may be held. The format for the audit and its objectives should be clearly defined before the audit is conducted.

3. Variance and Trend Analysis

Many control processes employ variance analysis to compare the planned results to the actual results. For the purposes of monitoring and controlling risk events, trends in the project's execution should be reviewed using performance information. Earned value analysis and other methods of project variance and trend analysis may be used for monitoring overall project performance.

Outcomes from these analyses may forecast potential deviation of the project at completion from cost and schedule targets. Deviation from the baseline plan may indicate the potential impact of threats or opportunities.

4. Technical Performance Measurement

Technical performance measurement compares technical accomplishments during project execution to the project management plan's schedule of technical achievement. It requires definition of objective quantifiable measures of technical performance which can be used to compare actual results against targets. Such technical performance measures might include weight, transaction times, number of delivered defects, storage capacity, etc. Deviation, such as demonstrating more or less functionality than planned at a milestone, can help to forecast the degree of success in achieving the project's scope, and it may expose the degree of technical risk faced by the project.

5. Reserve Analysis

Throughout execution of the project some risks may occur, with positive or negative impacts on budget or schedule contingency reserves. Reserve analysis compares the amount of the contingency reserves remaining to the amount of risk remaining at any time in the project in order to determine if the remaining reserve is adequate.

6. Status Meetings

Project risk management should be an agenda item at periodic status meetings. The amount of time required for that item will vary, depending upon the risks that have been identified, their priority, and difficulty of response. Risk .m becomes easier the more often it is practiced. Frequent discussions about risk makes it more likely that people will identify risks and opportunities.

Monitor and Control Risks: Outputs

1. Risk Register Updates

Note: