

# Module-1 Project Management Foundation:

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1.1 Definition of a project, 1.2 Project Vs Operations, 1.3 Necessity of project management, 1.4 Triple constraints, 1.5 Project life cycles (typical & atypical) Project phases and stage gate process. 1.6 Role of project manager, 1.7 Negotiations and resolving conflicts, 1.8 Project management in various organization structures, 1.9 PM knowledge areas as per Project Management Institute (PMI)

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## 1.1 Definition: -

**1.1.1 Project** is a temporary endeavor undertaken to create a unique product, service, or result. Projects are undertaken to fulfill objectives by producing deliverables.

An objective is defined as an outcome toward which work is to be directed, a strategic position to be attained, a purpose to be achieved, a result to be obtained, a product to be produced, or a service to be performed.

A deliverable is defined as any unique and verifiable product, result, or capability to perform a service that is required to be produced to complete a process, phase, or project. Deliverables may be tangible or intangible.

Fulfillment of project objectives may produce one or more of the following deliverables:

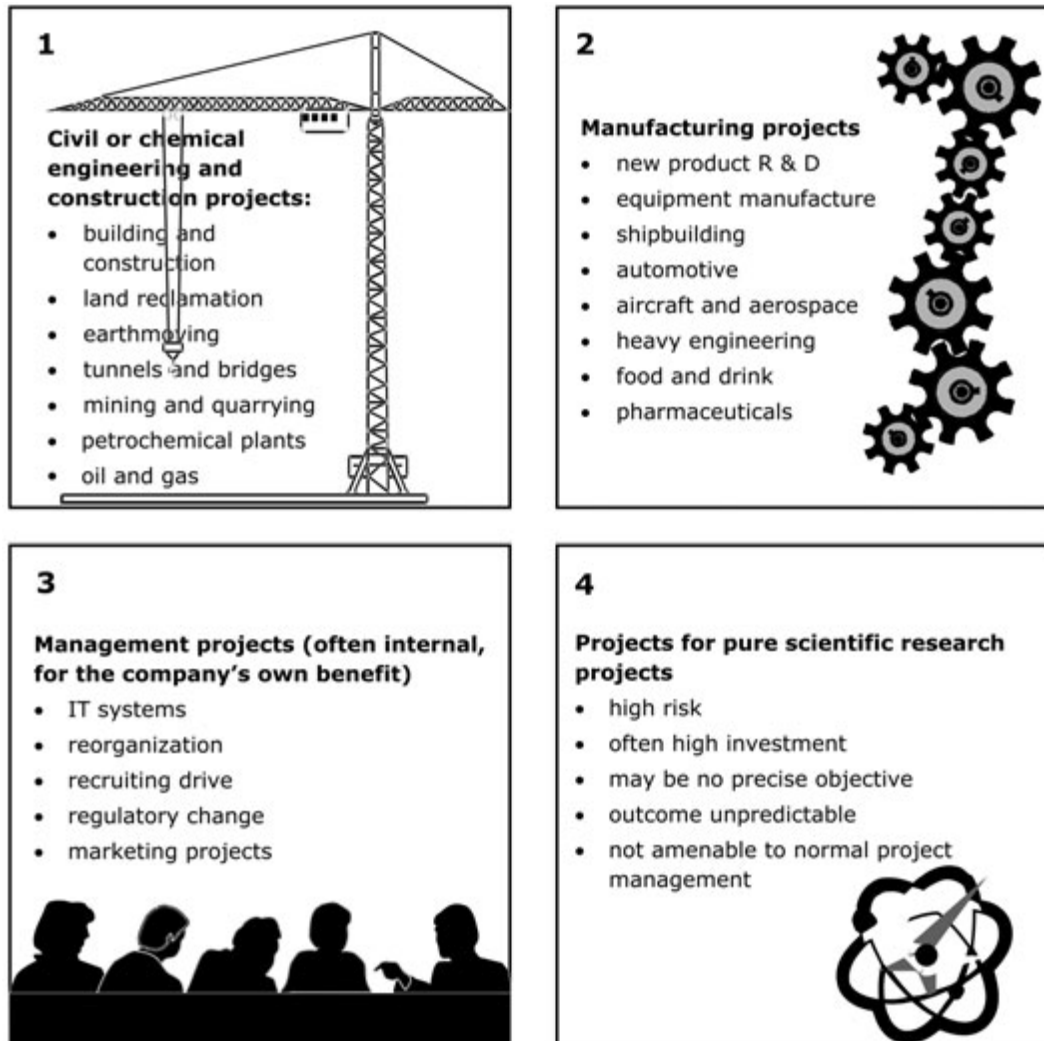
- A unique product that can be either a component of another item, an enhancement or correction to an item, or a new end item in itself (e.g., the correction of a defect in an end item);
- A unique service or a capability to perform a service (e.g., a business function that supports production or distribution);
- A unique result, such as an outcome or document (e.g., a research project that develops knowledge that can be used to determine whether a trend exists or a new process will benefit society); and
- A unique combination of one or more products, services, or results (e.g., a software application, its associated documentation, and help desk services).

Projects are undertaken at all organizational levels. A project can involve a single individual or a group. A project can involve a single organizational unit or multiple organizational units from multiple organizations.

Projects are temporary, but their deliverables may exist beyond the end of the project.

Projects may produce deliverables of a social, economic, material, or environmental nature. For example, a project to build a national monument will create a deliverable expected to last for centuries.

**1.1.1.1 Types of projects:** - The principal identifying characteristic of a project is its novelty. It is a step into the unknown, fraught with risk and uncertainty. No two projects are ever exactly alike: even a repeated project will differ from its predecessor in one or more commercial, administrative or physical aspects. However, it is possible and convenient to classify projects as four different general types. These are shown in Figure 1.1.



**Fig. 1.1 Four types of projects**

### **Type 1 projects: civil engineering, construction, petrochemical, mining and quarrying-**

Projects in this category are those which spring most readily to mind whenever industrial projects are mentioned. One common feature is that the actual work (the fulfillment phase) must be conducted on a site that is exposed to the elements, and usually remote from the contractor's head office. As such they are often open to the public gaze.

These projects incur special risks and problems of organization. They may require massive capital investment, and they deserve (but do not always get) rigorous management of progress, finance and quality. Operations are often hazardous so that health and safety aspects demand special attention, particularly in heavy work such as construction, tunneling and mining.

For very large industrial projects the funding and resources needed can be too great for one contractor to risk or even find. The organization and communications are therefore likely to be complicated by the participation of many different specialists and contractors, possibly with the main players acting together through a consortium or joint venture company established specifically for the project.

### **Type 2 projects: manufacturing**

Manufacturing projects result in the production of a piece of mechanical or electronic equipment, a machine, ship, aircraft, land vehicle, or some other product or item of specially designed hardware. The finished product might be purpose-built for a single customer but internal research and development projects for products to be sold in all market sectors also fall into this manufacturing category.

Manufacturing projects are usually conducted in a laboratory, factory or other home-based environment, where the company should easily be able to exercise on-the-spot management and provide an optimum environment in which to do and manage the work. Of course, these ideal conditions do not always apply. Some manufacturing projects involve work away from the home base, for example in installing and commissioning a machine or equipment on a customer's premises, customer training and post-project service and maintenance.

More difficult is the case of a complex product that is developed and manufactured by a consortium of companies, sometimes with members based in different countries. A common example is aircraft production, where the engines might be developed and manufactured in one country, the wings in another and the final assembly taking place in a third country. Such international manufacturing projects are prone to higher risk and difficulties in control and coordination arising through organizational complexity, national rivalries, contracts, long-distance communications, multiple languages and conflicting technical standards.

### **Type 3 projects: IT projects and projects associated with management change**

This class of project proves the point that every company, whatever its size, can expect to need project management expertise at least once in its lifetime. These are the projects that arise when companies relocate their headquarters, develop and introduce a new computer system, launch a marketing campaign, prepare for a trade exhibition, produce a feasibility or other study report, restructure the organization, mount a stage show, or generally engage in any operation that involves the management and coordination of activities to produce an end result that is not identifiable principally as an item of hardware or construction.

Not all projects are conducted commercially or for profit. Most not-for-profit organizations, including national and local government departments, professional associations, charities and disaster relief agencies conduct projects that fall into this category of management projects. Although management projects do not usually result in a visible, tangible creation such as a piece of hardware, much often depends on their successful outcome and they can require enormous investment. There are several well-known cases where, for instance, failure to implement a new computer system correctly has caused serious operational breakdown, exposing the managers responsible to public discredit. Effective project management is at least as important for these projects as it is for the largest construction or manufacturing project.

Type 3 projects may be associated with or even depend upon Type 1 or Type 2 projects. For example, if a company decides to relocate to a new, purpose-built office, the overall relocation project is itself a Type 3 management project but its success will depend also on the Type 1 project needed to construct the new building. Thus projects of different types may be associated with each other in a company's project programme or project portfolio.

### Type 4 projects: projects for pure scientific research

Pure scientific research projects (not to be confused with research and development projects) are truly a special case. They occasionally result in dramatically profitable discoveries. On the other hand, they can consume vast amounts of money over many years, yet yield no practical or economic result. Research projects carry the highest risk because they attempt to extend the boundaries of current human knowledge. The project objectives are usually difficult or impossible to define and there may be no awareness of the possible outcome. Therefore, pure research projects are not usually amenable to the project management methods that can be applied to industrial, manufacturing or management projects.

Some form of control over pure research projects must, however, be attempted. Money and other resources cannot be spent without any form of monitoring or restraint. Budgets have to be set in line with available funding.

A sensible method for controlling a pure scientific research project is to conduct regular management reviews and reassessments of the potential value of the project. At each of these reviews, a decision can be taken to stop the project (known colloquially as pulling the plug) or release new funding to allow it to continue at least until the next review. Although this can be unsettling for the scientists involved, the project sponsor is not expected to pour money for ever into a vast hole. This procedure, where continued project funding is dependent upon the outcome of regular reviews, is known as *stage-gate control*.

Although the research activities might themselves lie outside the scope of familiar project management methods, the provision of accommodation, communications, equipment and research materials might well constitute Type 1, 2 or 3 capital investment projects to which proper project management can and must be applied.

**1.1.2 Project management** is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements. Project management is accomplished through the appropriate application and integration of the project management processes identified for the project. Project management enables organizations to execute projects effectively and efficiently. Effective project management helps individuals, groups, and public and private organizations to:

- Meet business objectives;
- Satisfy stakeholder expectations;
- Be more predictable;
- Increase chances of success;
- Deliver the right products at the right time;
- Resolve problems and issues;
- Respond to risks in a timely manner;
- Optimize the use of organizational resources;
- Identify, recover, or terminate failing projects;
- Manage constraints (e.g., scope, quality, schedule, costs, resources);
- Balance the influence of constraints on the project (e.g., increased scope may increase cost or schedule); and
- Manage change in a better manner.

Poorly managed projects or the absence of project management may result in:

- Missed deadlines,
- Cost overruns,

- Poor quality,
- Rework,
- Uncontrolled expansion of the project,
- Loss of reputation for the organization,
- Unsatisfied stakeholders and Failure in achieving the objectives for which the project was undertaken.

Effective and efficient project management should be considered a strategic competency within organizations. It enables organizations to:

- Tie project results to business goals,
- Compete more effectively in their markets,
- Sustain the organization, and
- Respond to the impact of business environment changes on projects by appropriately adjusting project management plans

### **1.2 Project Vs Operations: -**

Operations management is an area that is outside the scope of formal project management as described in this guide. Operations management is concerned with the ongoing production of goods and/or services. It ensures that business operations continue efficiently by using the optimal resources needed to meet customer demands. It is concerned with managing processes that transform inputs (e.g., materials, components, energy, and labor) into outputs (e.g., products, goods, and/or services).

Changes in business or organizational operations may be the focus of a project— especially when there are substantial changes to business operations as a result of a new product or service delivery. Ongoing operations are outside of the scope of a project; however, there are intersecting points where the two areas cross.

Projects can intersect with operations at various points during the product life cycle, such as;

- When developing a new product, upgrading a product, or expanding outputs;
- While improving operations or the product development process;
- At the end of the product life cycle; and
- At each closeout phase.

At each point, deliverables and knowledge are transferred between the project and operations for implementation of the delivered work. This implementation occurs through a transfer of project resources or knowledge to operations or through a transfer of operational resources to the project.

### **1.3 Necessity of project management: -**

Project management has emerged because the characteristics of our contemporary society demand the development of new methods of management. Of the many forces involved, three are paramount:

- (1) The exponential expansion of human knowledge;
- (2) The growing demand for a broad range of complex, sophisticated, customized goods and services; and
- (3) The evolution of worldwide competitive markets for the production and consumption of goods and services.

All three forces combine to mandate the use of teams to solve problems that used to be solvable by individuals. These three forces combine to increase greatly the complexity of goods and services produced plus the complexity of the processes used to produce them. This, in turn, leads to the need for more sophisticated systems to control both outcomes and processes.

The basic purpose for initiating a project is to accomplish specific goals. The reason for organizing the task as a project is to focus the responsibility and authority for the attainment of the goals on an individual or small group. In spite of the fact that the PM often lacks authority at a level consistent with his or her responsibility, the manager is expected to coordinate and integrate all activities needed to reach the project's goals. In particular, the project form of organization allows the manager to be responsive to (1) the client and the environment, (2) identify and correct problems at an early date, (3) make timely decisions about trade-offs between conflicting project goals, and (4) ensure that managers of the separate tasks that comprise the project do not optimize the performance of their individual tasks at the expense of the total project—that is, that they do not sub optimize.

There are also real limitations on project management. For example, the mere creation of a project may be an admission that the parent organization and its managers cannot accomplish the desired outcomes through the functional organization. Further, conflict seems to be a necessary side effect. As we noted, the PM often lacks the authority-of position that is consistent with the assigned level of responsibility. Therefore, the PM must depend on the goodwill of managers in the parent organization for some of the necessary resources. Of course, if the goodwill is not forthcoming, the PM may ask senior officials in the parent organization for their assistance. But to use such power often reflects poorly on the skills of the PM, and while it may get cooperation in the instance at hand, it may backfire in the long run.

#### **1.4 Triple constraints: -** (Three Project Objectives: The “Triple Constraint” or “Iron Triangle”)

PM has general objectives—specified deliverables (**scope**), a specific deadline (**time**), and budget (**cost**). We refer to these as “direct” project objectives or goals.

There is a tendency to think of a project solely in terms of its outcome—that is, its scope. But the time at which the outcome is available is itself a part of the outcome, as is the cost entailed in achieving the outcome. It is also important to recognize that the **expectations of the client** are an inherent part of the project specifications, which unfortunately tend to evolve over time. To consider the client's desires as different from the project specifications is to court conflict between client and project team. All too often projects begin with the client specifying a desired outcome. Then the project team designs and implements the project. Then the client views the result of the team's ideas. In following this approach, differences between the client's expectations and the project team's designs commonly develop as a project proceeds due to both changing expectations on the client's part as they learn new information and limitations on the team's part about what they can deliver. As a result, meeting the client's latest desires may not be well reflected by the initially specified scope of the project. The expectations of client and project team therefore need to be continuously realigned and integrated throughout the entire project, but they frequently are not.

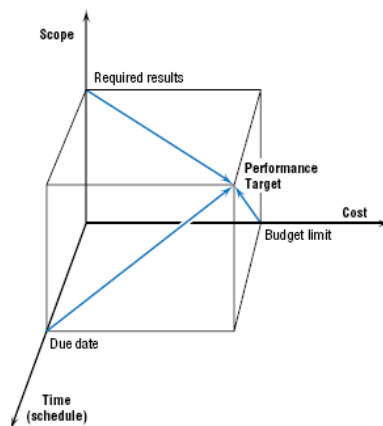
As a result, we believe in making an effort upfront and throughout the project to ensure that the nebulous elements of the client's evolving expectations and desires are identified and realigned with the client's latest scope (though possibly at additional cost).



The three direct project objectives are shown in Figure 1.2, with the specified project objectives on the axes. The two primary tasks of the project manager are to manage the trade-offs (relation of functions) and to anticipate and address risks to the project. In addition to the direct project goals, organizations often have a unique set of ancillary project objectives/goals that are often unarticulated but nevertheless important to the success of the project. Ancillary goals include improving the organization's project management competency and methods, developing individuals' managerial experience through project management, gaining a foothold in a new market, and similar goals. In a more basic sense, those with a stake in the project (the project manager, project team, senior management, the client, and other project stakeholders) have an interest in making the project a success.

Project success has four dimensions:

(1) Project efficiency, (2) Impact on the customer, (3) The business impact on the organization, and (4) opening new opportunities for the future. The first two are clearly part of what we have defined as the project's direct objectives; the last two are typical of what are frequently unspecified ancillary goals. One other crucial, but unstated, trade-off that a project manager must consider is the health of the project team as well as the rest of the organization. The project manager cannot burn out the team in an attempt to achieve the direct objectives, nor destroy the organization's functional departments in an attempt to meet the project's goals. Another factor in making project trade-offs is the project's *environment*, that is, those things or persons outside the project, and often outside the sponsoring organization, that affect the project or are affected by it. Examples of this environment might be environmental groups, trade unions, competitive firms, and the like.



**Fig. 1.2 Direct project goals—scope, cost, and time**

[The term “scope” is typically used when differentiating between what is included and what is excluded in something, but in project management the term has come to mean the specified deliverables. The Project Management Institute's Project Management Body of Knowledge (**PMBOK®**) defines Scope as follows: “The sum of the products, services, and results to be provided as a project.”]

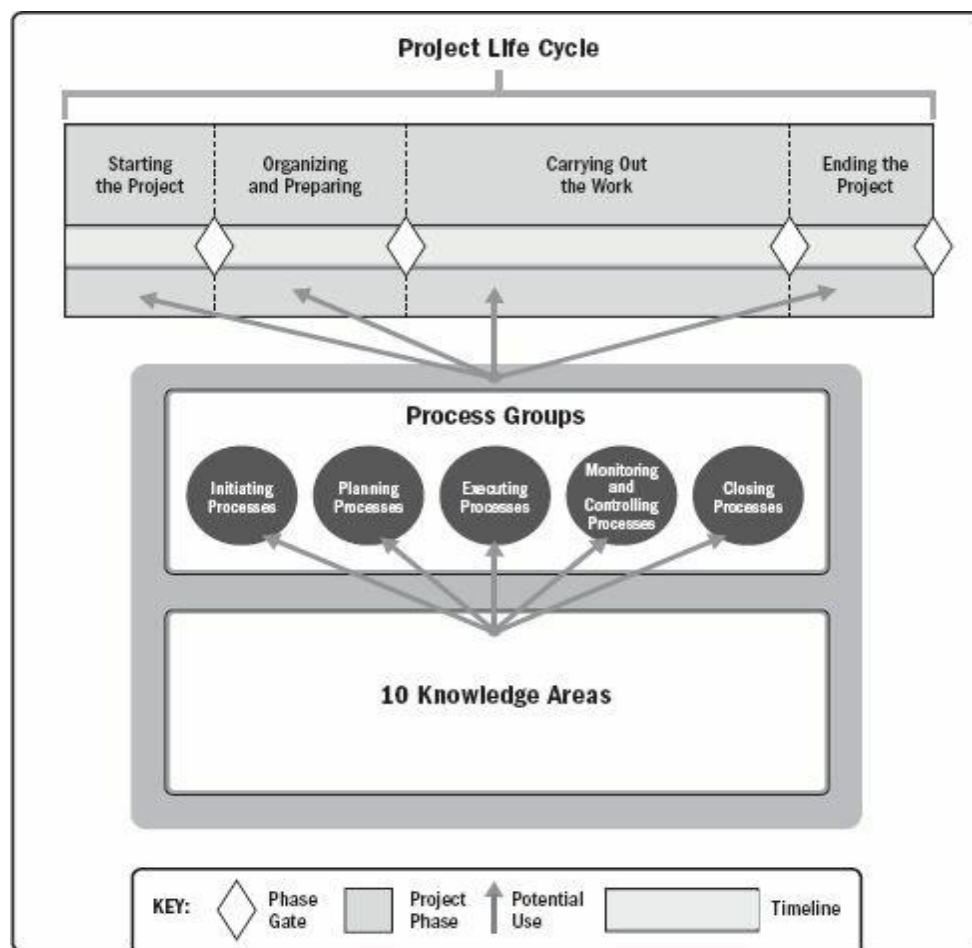
## **1.5 Project life cycles (typical & atypical) Project phases and stage gate process: -**

**1.5.1 Project life cycle** is the series of phases that a project passes through from its start to its completion. It provides the basic framework for managing the project. This basic framework applies regardless of the specific project work involved. The phases may be sequential, iterative, or overlapping. All projects can be mapped to the generic life cycle shown in Figure 1.3.

Project life cycles can be predictive or adaptive. Within a project life cycle, there are generally one or more phases that are associated with the development of the product, service, or result.

These are called a development life cycle. Development life cycles can be predictive, iterative, incremental, adaptive, or a hybrid model:

- In a predictive life cycle, the project scope, time, and cost are determined in the early phases of the life cycle. Any changes to the scope are carefully managed. Predictive life cycles may also be referred to as waterfall life cycles.
- In an iterative life cycle, the project scope is generally determined early in the project life cycle, but time and cost estimates are routinely modified as the project team's understanding of the product increases. Iterations develop the product through a series of repeated cycles, while increments successively add to the functionality of the product.
- In an incremental life cycle, the deliverable is produced through a series of iterations that successively add functionality within a predetermined time frame. The deliverable contains the necessary and sufficient capability to be considered complete only after the final iteration.
- Adaptive life cycles are agile, iterative, or incremental. The detailed scope is defined and approved before the start of iteration. Adaptive life cycles are also referred to as agile or change-driven life cycles. A hybrid life cycle is a combination of a predictive and an adaptive life cycle.



**Fig. 1.3 Interrelationship of key components in projects**



Those elements of the project that are well known or have fixed requirements follow a predictive development life cycle, and those elements that are still evolving follow an adaptive development life cycle.

It is up to the project management team to determine the best life cycle for each project.

The project life cycle needs to be flexible enough to deal with the variety of factors included in the project. Life cycle flexibility may be accomplished by:

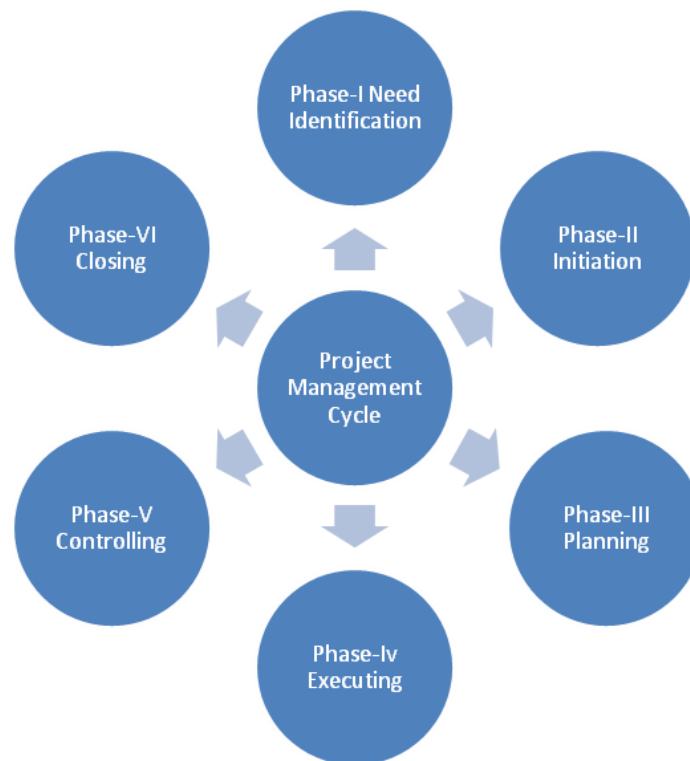
- Identifying the process or processes needed to be performed in each phase,
- Performing the process or processes identified in the appropriate phase,
- Adjusting the various attributes of a phase (e.g., name, duration, exit criteria, and entrance criteria).

Project life cycles are independent of product life cycles, which may be produced by a project. A product life cycle is the series of phases that represent the evolution of a product, from concept through delivery, growth, maturity, and to retirement.

## PROJECT MANAGEMENT CYCLE

Project cycle has six main phases which is given in the form of cycle wheel below. The six various phases of project management cycle are:

- 1) Need Identification
- 2) Initiation
- 3) Planning
- 4) Executing
- 5) Controlling
- 6) Closing



**Fig. 1.4 Project Management Cycle**

**1) Need Identification-** The development of project cycle begins with identification, whether there is a need of development project for a particular sector, area, community, etc. The identification usually comprises two main aspects i.e. situation analysis and problem analysis. Let us discuss these two important aspects in detail.

**i) Situation Analysis**

Understanding situation is the beginning of designing any development project or programme. Situation analysis broadly involves analysis of needs and assets, problem analysis and examining relevant interventions. The situation analysis is an activity which can firmly link planning to the realities in the field and thereby to the implementation of the project. The situation analysis may comprise analysis of the physical, economic, social, cultural and political environment within which the population lives.

**ii) Problem Analysis**

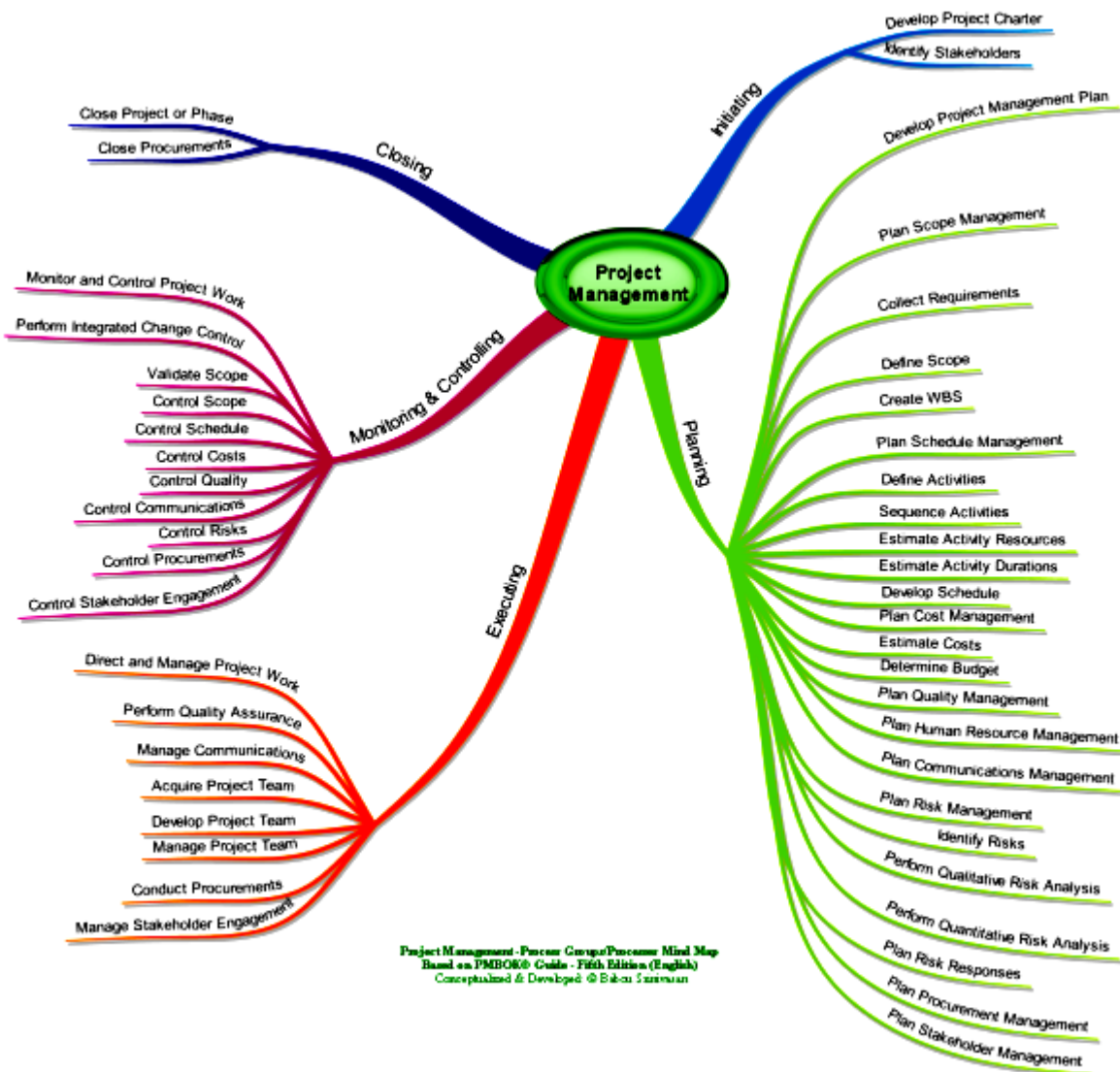
The second step in need identification is problem analysis. For understanding a situation to be influenced by a project, it is essential to know the problem conditions which constitute development constraints as well as their causes. Problem analysis is of prime importance to developmental project planning, as it strongly influences the design of all possible developmental interventions. Problem identification is a deductive process. It is a state of affairs or facts or figures that cause difficulties and sufferings. The problem analysis not only investigates What is wrong ? but also try to understand ‘Why’ and ‘How’ it is wrong ? in order to assign priority to the problem. It seeks to answer several questions these are:

- What is the problem?
- Why is this problem?
  - a) What are the probable causes of the problem?
  - b) How serious is the problem?
- Who are affected by the problem?
  - a) How many are they?
  - b) Where are they located?
  - c) What are their characteristics?

**2) Initiation-** Once the needs of the project are identified and decision is taken to do the project, the second step is to launch or initiate the project. There are number of activities associated in this stage. The project sponsor creates a project charter which delineates authorization of work on the project, define the authority, responsibility and accountability of the project team and establish scope boundaries of the project. The success of the project team veritabily depends upon starting with complete and accurate information, management support and the authorization necessary to manage the project.

**3) Planning-** Planning phase is one of the important phases of the project cycle management. The project planning defines project activities that will be performed; the output that will be produced; and delineate how these activities will be accomplished and managed. Project planning defines each major task, estimates the time, resources and cost required, and provides a framework for management review and control. In other words, planning involves identifying and documenting scope, tasks, schedules, cost, risk, quality and staffing needs.

The project manager, along with his project team prepares project plan and gets it approved from the management. The project plan is a comprehensive document that allows a project team to begin and complete the work necessary to achieve the project goal and objectives. The project plan will address how the project team will manage the project elements.



**4) Executing-** After the project plan is prepared, it gets ready for execution or implementation. The project team acquires all necessary resources required to carry out the project and ready to perform project activities. The project manager along with the project team put their energy and efforts in participating, observing and analyzing the project activities so that the output is produced and goal and objectives of the project achieved. In other words one is to execute the work that must be done to come out with the product of the project. Further, executing also refers to implementing the project plan. In nutshell, executing refers to coordinating and managing the project resources while executing the project plan, performing the planned project activities and ensuring that they are completed efficiently.

**5) Monitoring/Controlling-** The functions of the project manager at this stage is to monitor and compare actual performance with the planned performance and take corrective measures to get the desired outcome when there are significant differences. By monitoring and measuring progress regularly, identifying variances from plan and taking corrective action if required, project control ensures that project activities are met.

**6) Closing out-** Closing out is the last but not the least phase of project cycle management. Once the output is produced to the customer's satisfaction, the project is considered finished. However, this should not be the case. A final lesson-learned review should be done before the project is considered complete. Failing to do the lessons-learned review means that future project will likely to suffer. Although project close out is a routine process, it is an important one. The project closure means formal acceptance of the deliverables and disbanding of all the elements that were required to run the project.

**1.5.2 Project phase** is a collection of logically related project activities that culminates in the completion of one or more deliverables. The phases in a life cycle can be described by a variety of attributes. Attributes may be measurable and unique to a specific phase.

Attributes may include but are not limited to:

- Name (e.g., Phase A, Phase B, Phase 1, Phase 2, proposal phase),
- Number (e.g., three phases in the project, five phases in the project),
- Duration (e.g., 1 week, 1 month, 1 quarter),
- Resource requirements (e.g., people, buildings, equipment),
- Entrance criteria for a project to move into that phase (e.g., specified approvals documented, specified documents completed), and
- Exit criteria for a project to complete a phase (e.g., documented approvals, completed documents, completed deliverables).

Projects may be separated into distinct phases or subcomponents. These phases or subcomponents are generally given names that indicate the type of work done in that phase.

Examples of phase names include but are not limited to:

- Concept development,
- Feasibility study,
- Customer requirements,
- Solution development,
- Design,
- Prototype,
- Build,
- Test,
- Transition,
- Commissioning,
- Milestone review, and
- Lessons learned.

The project phases may be established based on various factors including, but not limited to:

- ❖ Management needs;
- ❖ Nature of the project;
- ❖ Unique characteristics of the organization, industry, or technology;
- ❖ Project elements including, but not limited to, technology, engineering, business, process, or legal; and
- ❖ Decision points (e.g., funding, project go/no-go, and milestone review).

Using multiple phases may provide better insight to managing the project. It also provides an opportunity to assess the project performance and take necessary corrective or preventive actions in subsequent phases. A key component used with project phases is the phase review.

**1.5.3 Phase gate** is held at the end of a phase. The project's performance and progress are compared to project and business documents including but not limited to:

- Project business case,
- Project charter,
- Project management plan, and
- Benefits management plan.

A decision (e.g., go/no-go decision) is made as a result of this comparison to:

- ✓ Continue to the next phase,
- ✓ Continue to the next phase with modification,
- ✓ End the project,
- ✓ Remain in the phase, or
- ✓ Repeat the phase or elements of it.

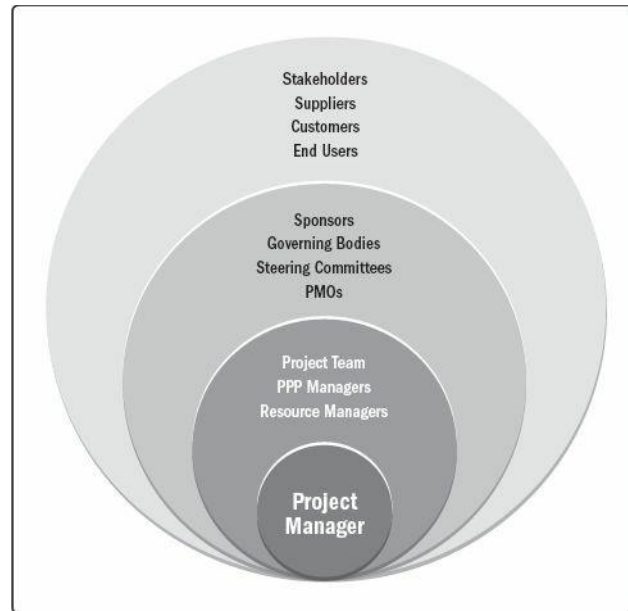
Depending on the organization, industry, or type of work, phase gates may be referred to by other terms such as, phase review, stage gate, kill point, and phase entrance or phase exit. Organizations may use these reviews to examine other pertinent items which are beyond the scope of this guide, such as product-related documents or models.

## **1.6 Role of project manager:-**

The role of a project manager is distinct from that of a functional manager or operations manager. Typically, the functional manager focuses on providing management oversight for a functional or business unit. Operations managers are responsible for ensuring that business operations are efficient. The project manager is the person assigned by the performing organization to lead the team that is responsible for achieving the project objectives.

Project managers fulfill numerous roles within their sphere of influence. These roles reflect the project manager's capabilities and are representative of the value and contributions of the project management profession. This section highlights the roles of the project manager in the various spheres of influence shown in Figure 1.4.

- ❖ **At the organization level**-The project manager proactively interacts with other project managers. Other independent projects or projects that are part of the same program may impact a project due to but not limited to the following: Demands on the same resources, Priorities of funding, Receipt or distribution of deliverables, and Alignment of project goals and objectives with those of the organization. Interacting with other project managers helps to create a positive influence for fulfilling the various needs of the project. These needs may be in the form of human, technical, or financial resources and deliverables required by the team for project completion. The project manager seeks ways to develop relationships that assist the team in achieving the goals and objectives of the project. In addition, the project manager maintains a strong advocacy role within the organization. The project manager proactively interacts with managers within the organization during the course of the project. The project manager also works with the project sponsor to address internal political and strategic issues that may impact the team or the viability or quality of the project. The project manager may work toward increasing the project management competency and capability within the organization as a whole and is involved in both tacit and explicit knowledge transfer or integration initiatives.



**Fig. 1.4 Project managers' sphere of influence**

- ❖ **At the industry level-** The project manager stays informed about current industry trends. The project manager takes this information and sees how it may impact or apply to the current projects. These trends include but are not limited to: Product and technology development; New and changing market niches; Standards (e.g., project management, quality management, information security management); Technical support tools; Economic forces that impact the immediate project; Influences affecting the project management discipline; and Process improvement and sustainability strategies.
- ❖ **Professional discipline-** Continuing knowledge transfer and integration is very important for the project manager. This professional development is ongoing in the project management profession and in other areas where the project manager maintains subject matter expertise. This knowledge transfer and integration includes but is not limited to: Contribution of knowledge and expertise to others within the profession at the local, national, and global levels (e.g., communities of practice, international organizations); and Participation in training, continuing education, and development: In the project management profession (e.g., universities, PMI); In a related profession (e.g., systems engineering, configuration management); and In other professions (e.g., information technology, aerospace).
- ❖ **Across disciplines-** A professional project manager may choose to orient and educate other professionals regarding the value of a project management approach to the organization. The project manager may serve as an informal ambassador by educating the organization as to the advantages of project management with regard to timeliness, quality, innovation, and resource management.

### 1.6.1 Project manager competences-

Requirement of three key skill sets:



- ❖ Technical project management. The knowledge, skills, and behaviors related to specific domains of project, program, and portfolio management. The technical aspects of performing one's role.
- ❖ Leadership. The knowledge, skills, and behaviors needed to guide, motivate, and direct a team, to help an organization achieve its business goals.
- ❖ Strategic and business management. The knowledge of and expertise in the industry and organization that enhanced performance and better delivers business outcomes.

### 1.6.1.1 Technical project management skills-

Technical project management skills are defined as the skills to effectively apply project management knowledge to deliver the desired outcomes for programs or projects. There are numerous technical project management skills. The Knowledge Areas in this guide describe many of these necessary project management skills. Project managers frequently rely on expert judgment to perform well. Being aware of personal expertise and where to find others with the needed expertise are important for success as a project manager. According to research, the top project managers consistently demonstrated several key skills including, but not limited to, the ability to:

- Focus on the critical technical project management elements for each project they manage. This focus is as simple as having the right artifacts readily available. At the top of the list were the following: Critical success factors for the project, Schedule, Selected financial reports, and Issue log.
- Tailor both traditional and agile tools, techniques, and methods for each project.
- Make time to plan thoroughly and prioritize diligently.
- Manage project elements, including, but not limited to, schedule, cost, resources, and risks.

### 1.6.1.2 Strategic and business management skills-

Strategic and business management skills involve the ability to see the high-level overview of the organization and effectively negotiate and implement decisions and actions that support strategic alignment and innovation. This ability may include a working knowledge of other functions such as finance, marketing, and operations. Strategic and business management skills may also include developing and applying pertinent product and industry expertise. This business knowledge is also known as domain knowledge.

Project managers should be knowledgeable enough about the business to be able to:

Explain to others the essential business aspects of a project;

Work with the project sponsor, team, and subject matter experts to develop an appropriate project delivery strategy; and Implement that strategy in a way that maximizes the business value of the project.

In order to make the best decisions regarding the successful delivery of their projects, project managers should seek out and consider the expertise of the operational managers who run the business in their organization. These managers should know the work performed in their organization and how project plans will affect that work. The more the project manager is able to know about the project's subject matter, the better. At a minimum, the project manager should be knowledgeable enough to explain to others the following aspects of the organization:

Strategy; Mission; Goals and objectives; Products and services; Operations (e.g., location, type, technology); The market and the market condition, such as customers, state of the market (i.e., growing or shrinking), and time-to-market factors, etc.; and Competition (e.g., what, who, position in the market place). The project manager should apply the following knowledge and information about the organization to the project to ensure alignment: Strategy, Mission, Goals and objectives, Priority, Tactics, and Products or services (e.g., deliverables). Strategic and business skills help the project manager to determine which business factors should be considered for their project. The project manager determines how these business and strategic factors could affect the project while understanding the interrelationship between the project and the organization. These factors include but are not limited to: Risks and issues, Financial implications, Cost versus benefits analysis (e.g., net present value, return on investment), including the various options considered, Business value, Benefits realization expectations and strategies, and Scope, budget, schedule, and quality. Through the application of this business knowledge, a project manager has the ability to make the appropriate decisions and recommendations for a project. As conditions change, the project manager should be continuously working with the project sponsor to keep the business and the project strategies aligned.

### 1.6.1.3 Leadership skills-

Leadership skills involve the ability to guide, motivate, and direct a team. These skills may include demonstrating essential capabilities such as negotiation, resilience, communication, problem solving, critical thinking, and interpersonal skills. Projects are becoming increasingly more complicated with more and more businesses executing their strategy through projects. Project management is more than just working with numbers, templates, charts, graphs, and computing systems. A common denominator in all projects is people. People can be counted, but they are not numbers.

- **Dealing with people-** A large part of the project manager's role involves dealing with people. The project manager should study people's behaviors and motivations. The project manager should strive to be a good leader, because leadership is crucial to the success of projects in organizations. A project manager applies leadership skills and qualities when working with all project stakeholders, including the project team, the steering team, and project sponsors.
- **Qualities and skills of a leader-** Research shows that the qualities and skills of a leader include but are not limited to: Being a visionary (e.g., help to describe the products, goals, and objectives of the project; able to dream and translate those dreams for others); Being optimistic and positive; Being collaborative; Managing relationships and conflict by: Building trust; Satisfying concerns; Seeking consensus; Balancing competing and opposing goals; Applying persuasion, negotiation, compromise, and conflict resolution skills; Developing and nurturing personal and professional networks; Taking a long-term view that relationships are just as important as the project; and Continuously developing and applying political acumen. Communicating by: Spending sufficient time communicating (research shows that top project managers spend about 90% of their time on a project in communicating); Managing expectations; Accepting feedback graciously; Giving feedback constructively; and Asking and listening. Being respectful (helping others retain their autonomy), courteous, friendly, kind, honest, trustworthy, loyal, and

ethical; Exhibiting integrity and being culturally sensitive, courageous, a problem solver, and decisive; Giving credit to others where due; Being a life-long learner who is results- and action-oriented; Focusing on the important things, including: Continuously prioritizing work by reviewing and adjusting as necessary; Finding and using a prioritization method that works for them and the project; Differentiating high-level strategic priorities, especially those related to critical success factors for the project; Maintaining vigilance on primary project constraints; Remaining flexible on tactical priorities; and Being able to sift through massive amounts of information to obtain the most important information. Having a holistic and systemic view of the project, taking into account internal and external factors equally; Being able to apply critical thinking (e.g., application of analytical methods to reach decisions) and identify him or herself as a change agent. Being able to build effective teams, be service-oriented, and have fun and share humor effectively with team members.

- **Politics, power, and getting things done**-Leadership and management are ultimately about being able to get things done. The skills and qualities noted help the project manager to achieve the project goals and objectives. At the root of many of these skills and qualities is the ability to deal with politics. Politics involves influence, negotiation, autonomy, and power. Politics and its associated elements are not “good” or “bad,” “positive” or “negative” alone. The better the project manager understands how the organization works, the more likely he or she will be successful. The project manager observes and collects data about the project and organizational landscapes. The data then needs to be reviewed in the context of the project, the people involved, the organization, and the environment as a whole. This review yields the information and knowledge necessary for the project manager to plan and implement the most appropriate action. The project manager's action is a result of selecting the right kind of power to influence and negotiate with others. Exercise of power also carries with it the responsibility of being sensitive to and respectful of other people. The effective action of the project manager maintains the autonomy of those involved. The project manager's action results in the right people performing the activities necessary to fulfill the project's objectives. Power can originate with traits exhibited by the individual or the organization. Power is often supported by other people's perception of the leader. It is essential for project managers to be aware of their relationships with other people. Relationships enable project managers to get things done on the project. There are numerous forms of power at the disposal of project managers. Power and its use can be complex given its nature and the various factors at play in a project. Various forms of power include but are not limited to: Positional (sometimes called formal, authoritative, legitimate) (e.g., formal position granted in the organization or team); Informational (e.g., control of gathering or distribution); Referent (e.g., respect or admiration others hold for the individual, credibility gained); Situational (e.g., gained due to unique situation such as a specific crisis); Personal or charismatic (e.g., charm, attraction); Relational (e.g., participates in networking, connections, and alliances); Expert (e.g., skill, information possessed; experience, training, education, certification); Reward-oriented (e.g., ability to give praise, monetary or other desired items); Punitive or coercive (e.g., ability to invoke discipline or negative consequences); Ingratiating (e.g., application of flattery or other common ground to win favor or cooperation); Pressure-based (e.g., limit freedom of choice or movement for the purpose of gaining compliance to desired action); Guilt-

based (e.g., imposition of obligation or sense of duty); Persuasive (e.g., ability to provide arguments that move people to a desired course of action); and Avoiding (e.g., refusing to participate). Top project managers are proactive and intentional when it comes to power. These project managers will work to acquire the power and authority they need within the boundaries of organizational policies, protocols, and procedures rather than wait for it to be granted.

## 1.7 Negotiations and resolving conflicts-

### 1.7.1 Negotiation-

In order to meet the demands of the job of a PM—acquiring adequate resources, acquiring and motivating personnel, dealing with obstacles, making project goal tradeoffs, maintaining a balanced outlook, and establishing a broad network of communication—the PM must be a highly skilled negotiator. There is almost no aspect of the PM's job that does not depend directly on this skill.

There are three situations commonly arising during projects that call for the highest level of negotiating skill the PM can muster: the use of subcontractors, the use of input from two or more functional units to design and develop the project's mission, and the management of changes ordered in the project's deliverables and/or priorities after the project is underway.

#### 1.7.1.1 Partnering-

The parent organization's objective is to get the deliverable at the lowest possible cost, as soon as possible. The subcontractor's objective is to produce the deliverable at the highest possible profit with the least effort. These conflicting interests tend to lead both parties to work in an atmosphere of mutual suspicion and antagonism. Indeed, it is almost axiomatic that the two parties will have significantly different ideas about the exact nature of the deliverable itself. The concept of "partnering" has been developed to replace this atmosphere with one of cooperation and mutual helpfulness, but the basically adversarial relationship makes cooperation difficult in the best of cases. Partnering requires strong support from senior management of all participants, and it requires continuous support of project objectives and partnering agreements. Above all, and most difficult of all, it requires open and honest communication between the partners. With all of its problems, however, partnering yields benefits great enough to be worth the efforts required to make it work correctly.

#### 1.7.1.2 Chartering-

The agreements between groups partnering on large endeavors are often referred to as *charters*. A project (program, etc.) charter is a detailed written agreement between the stakeholders in the project, that is, the client or sponsor, the PM, senior management, the functional managers who are committing resources and/or people to a specific project (program, etc.), and even possibly others such as community groups or environmental entities. Bear in mind, the charter may take many different forms. Typically, it gives an overview of the project and details the expected deliverables, including schedules, personnel, resource commitments, risks, and evaluation methods. It attests to the fact that all the stakeholders are "on the same page," agreeing about what is to be done, when, and at what cost. Note that if there is such an agreement, there is also

an implication that none of the parties will change the agreement unilaterally, or, at least, without prior consultation with the other stakeholders.

### 1.7.2 Resolving conflicts-

Conflict is inevitable in a project environment. Sources of conflict include scarce resources, scheduling priorities, and personal work styles. Team ground rules, group norms, and solid project management practices, like communication planning and role definition, reduce the amount of conflict.

Successful conflict management results in greater productivity and positive working relationships. When managed properly, differences of opinion can lead to increased creativity and better decision making. If the differences become a negative factor, project team members are initially responsible for their resolution. If conflict escalates, the project manager should help facilitate a satisfactory resolution. Conflict should be addressed early and usually in private, using a direct, collaborative approach. If disruptive conflict continues, formal procedures may be used, including disciplinary actions.

The success of project managers in managing their project teams often depends on their ability to resolve conflict. Different project managers may use different conflict resolution methods. Factors that influence conflict resolution methods include:

- Importance and intensity of the conflict,
- Time pressure for resolving the conflict,
- Relative power of the people involved in the conflict,
- Importance of maintaining a good relationship, and
- Motivation to resolve conflict on a long-term or short-term basis.

There are five general techniques for resolving conflict. Each technique has its place and use:

- ❖ *Withdraw/avoid*. Retreating from an actual or potential conflict situation; postponing the issue to be better prepared or to be resolved by others.
- ❖ *Smooth/accommodate*. Emphasizing areas of agreement rather than areas of difference; conceding one's position to the needs of others to maintain harmony and relationships.
- ❖ *Compromise/reconcile*. Searching for solutions that bring some degree of satisfaction to all parties in order to temporarily or partially resolve the conflict. This approach occasionally results in a lose-lose situation.
- ❖ *Force/direct*. Pushing one's viewpoint at the expense of others; offering only win-lose solutions, usually enforced through a power position to resolve an emergency. This approach often results to a win-lose situation.
- ❖ *Collaborate/problem solve*. Incorporating multiple viewpoints and insights from differing perspectives; requires a cooperative attitude and open dialogue that typically leads to consensus and commitment. This approach can result in a win-win situation.

## 1.8 Project management in various organization structures-

The three major organizational forms commonly used to house projects are- Functional organization, Projectized organization and Matrixed organization. Beside these, there are virtual and hybrid organizations.

**Table- 1.1 Project Characteristics and Project Home**

Project Characteristics	Project Home				
	Functional Organization	Matrixed Organization			Projectized
		Weak	Balanced	Strong	
Authority of PM	Little to None	Low	Low to Moderate	Moderate to High	High to Complete
Availability of Resources	Little to None	Low	Low to Moderate	Moderate to High	High to Complete
Ownership of Project Budget	Functional Manager	Functional Manager	Shared	PM	PM
Role of PM	Part-time	Part-time	Full-time	Full-time	Full-time
Project Administrative Staff	Part-time	Part-time	Part-time	Full-time	Full-time

### 1.8.1 Projects in a Functional Organization-

As one alternative for giving the project a “home” in a functionally structured organization, we can make it a part of one of the functional divisions of the firm, usually the function that has the most interest in ensuring its success or can be most helpful in implementing it. Another way a project may be organized in a functional organization is to assign the work to all the relevant functional divisions with either top management overseeing the effort or else someone assigned to coordinate their efforts, perhaps as a project manager or possibly as just a facilitator.

#### Advantages:

1. There is maximum flexibility in the use of staff
2. Individual experts can be utilized by many different projects
3. Specialists in the division can be grouped to share knowledge and experience.
4. The functional division also serves as a base of technological continuity when individuals choose to leave the project.
5. The functional division contains the normal path of advancement for individuals whose expertise is in the functional area.

#### Disadvantages:

1. A primary disadvantage of this arrangement is that the client is not the focus of activity and concern. The functional unit has its own work to do.
2. The functional division tends to be oriented toward the activities particular to its function. It is not usually problem oriented in the sense that a project should be to be successful.
3. Occasionally in functionally organized projects, no individual is given full responsibility for the project.



4. The same reasons that lead to lack of coordinated effort tend to make response to client needs slow and arduous. There are often several layers of management between the project and the client.
5. There is a tendency to sub optimize the project
6. The motivation of people assigned to the project tends to be weak.
7. Such an organizational arrangement does not facilitate a holistic approach to the project.

### 1.8.2 Projects in a Projectized Organization-

Each project has a full complement of the functions needed for its operation, though some members may serve on two or more projects. Each standalone project is a self-contained unit with its own technical team, its own staff, and so on. Some parent organizations prescribe administrative, financial, personnel, and control procedures in detail. Others allow the project almost total freedom within the limits of final accountability.

#### **Advantages:**

1. The project manager has full line authority over the project.
2. All members of the project work force are directly responsible to the Project Manager.
3. When the project is removed from the functional division, the lines of communication are shortened. The entire functional structure is bypassed, and the PM communicates directly with senior corporate management. The shortened communication lines result in faster communications with fewer communication failures.
4. When there are several successive projects of a similar kind, the projectized organization can maintain a more or less permanent cadre of experts who develop considerable skill in specific technologies.
5. The project team that has a strong and separate identity of its own tends to develop a high level of commitment from its members. Motivation is high and acts to foster the task orientation.
6. Because authority is centralized, the ability to make swift decisions is greatly enhanced.
7. Unity of command exists.
8. Projectized organizations are structurally simple and flexible, which makes them relatively easy to understand and to implement.
9. The organizational structure tends to support a holistic approach to the project.

#### **Disadvantages:**

1. When the parent organization takes on several projects, it is common for each one to be fully staffed. This can lead to considerable duplication of effort in every area from clerical staff to the most sophisticated (and expensive) technological support units.
2. In fact, the need to ensure access to technological knowledge and skills results in an attempt by the PM to stockpile equipment and technical assistance in order to be certain that it will be available when needed.
3. Removing the project from technical control by a functional department has its advantages, but it also has a serious disadvantage if the project is characterized as “high technology.” Though individuals engaged with projects develop considerable depth in the technology of the project, they tend to fall behind in other areas of their technical expertise.

4. Projectized project teams seem to foster inconsistency in the way in which policies and procedures are carried out. In the relatively sheltered environment of the project, administrative corner-cutting is common and easily justified as a response to the client or to technical exigency. “They don’t understand our problems” becomes an easy excuse for ignoring dicta from headquarters.
5. In projectized organizations, the project takes on a life of its own. Team members form strong attachments to the project and to each other. A disease known as *projectitis* develops. A strong “we–they” divisiveness grows, distorting the relationships between project team members and their counterparts in the parent organization. Friendly rivalry may become bitter competition, and political infighting between projects is common.
6. Another symptom of projectitis is the worry about “life after the project ends.”

### 1.8.3 Projects in a Matrixed Organization-

In an attempt to couple some of the advantages of the standalone project in the Projectized organization with some of the desirable features of the functional project, and to avoid some of the disadvantages of each, the Matrixed project organization was developed. In effect, the functional and the Projectized organizations represent extremes. The Matrixed project organization is a combination or *hybrid* of the two.

Being a combination of standalone Projectized and functional organization structures, a matrix organization can take on a wide variety of specific forms, depending on which of the two extremes (functional or standalone) it most resembles. The “Projectized” or “strong” matrix most resembles the Projectized organization. The “functional” or “weak” matrix most resembles the functional form of organization. Finally, the “balanced” matrix lies in between the other two. In practice, there is an almost infinite variety of organizational forms between the extremes, and the primary difference between these forms has to do with the relative power/decision authority of the project manager and the functional manager.

#### Advantages:

1. The project is the point of emphasis. One individual, the PM, takes responsibility for managing the project, for bringing it in on time, within cost, and to specification (scope). The matrix organization shares this virtue with the standalone project organization.
2. Because the project organization is overlaid on the functional divisions, temporarily drawing labor and talent from them, the project has reasonable access to the entire reservoir of technology in all functional divisions. When there are several projects, the talents of the functional divisions are available to all projects, thus sharply reducing the duplication required by the standalone project structure.
3. There is less anxiety about what happens when the project is completed than is typical of the standalone project organization. Even though team members tend to develop a strong attachment for the project, they also feel close to their functional “home.”
4. Response to client needs is as rapid as in the standalone project case, and the matrix organization is just as flexible. Similarly, the matrix organization responds flexibly and rapidly to the demands made by those inside the parent organization. A project nested within an operating firm must adapt to the needs of the parent firm or the project will not survive.

5. With matrix management, the project will have—or have access to—representatives from the administrative units of the parent firm.
6. Where there are several projects simultaneously under way, matrix organization allows a better companywide balance of resources to achieve the several different time/cost/ scope targets of the individual projects. This holistic approach to the total organization's needs allows projects to be staffed and scheduled in order to optimize total system performance rather than to achieve the goals of one project at the expense of others.
7. While standalone projects and functionally organized projects represent extremes of the organizational spectrum, matrix organizations cover a wide range in between. We have differentiated between strong and weak matrices in terms of whether the functional units supplied individuals or capacity to projects. Obviously, some functional units might furnish people and others only supply capacity. There is, therefore, a great deal of flexibility in precisely how the project is organized—all within the basic matrix structure—so that it can be adapted to a wide variety of projects and is always subject to the needs, abilities, and desires of the parent organization.

**Disadvantages:**

1. In the case of functionally organized projects, there is no doubt that the functional division is the focus of decision-making power. In the standalone project case, it is clear that the PM is the power center of the project. With matrix organizations, the power is more balanced. Often, the balance is fairly delicate. When doubt exists about who is in charge, the work of the project suffers. If the project is successful and highly visible, doubt about who is in charge can foster political infighting for the credit and glory. If the project is a failure, political infighting will be even more brutal to avoid blame.
2. While the ability to balance time, cost, and scope between several projects is an advantage of matrix organizations, that ability has its dark side. The set of projects must be carefully monitored as a set, a tough job. Further, the movement of resources from project to project in order to satisfy the several schedules may foster political infighting among the several PMs, all of whom tend to be more interested in ensuring success for their individual projects than in helping the total system optimize organization-wide goals.
3. For strong matrices, problems associated with shutting down a project are almost as severe as those in standalone project organizations. The projects, having individual identities, resist death. Even in matrix organizations, projectitis is still a serious disease.
4. In matrix-organized projects, the PM controls administrative decisions and the functional heads control technological decisions. The distinction is simple enough when writing about project management, but for the operating PM the division of authority and responsibility inherent in matrix management is complex. The ability of the PM to negotiate anything from resources to technical assistance to delivery dates is a key contributor to project success. Success is doubtful for a PM without strong negotiating skills.
5. Matrix management violates the management principle of unity of command. Project workers have at least two bosses, their functional heads and the PM. There is no way around the split loyalties and confusion that result. Anyone who has worked under such an arrangement understands the difficulties. Those who have not done so cannot

appreciate the discomforts it causes. To paraphrase Plato's comment on democracy, matrix management "is a charming form of management, full of variety and disorder."

### 1.8.4 Virtual Projects-

Virtual projects are those in which work on the project team crosses time, space, organizational, or cultural boundaries. Thus, a virtual team may work in different time zones, be geographically dispersed, work in different organizations, or work in different cultures. In all cases, the rise of virtual projects has been facilitated by the use of the Internet and other communication technologies. In many of these cases, the project team is often organized in some matrix type of structure rather than a functional or standalone project form.

Rules for success when organizations find they must use geographically dispersed virtual teams for some of their projects.

- Only use virtual teams for projects that are challenging and interesting. But also be sure the project is meaningful to the company as well as the team.
- Solicit volunteers as much as possible—they'll be more enthusiastic and dedicated to the success of the project.
- Include a few members in the team who already know each other, and make sure one in every six or seven are "boundary spanners" with lots of outside contacts.
- Create an online resource for team members to learn about each other (especially how they prefer to work), collaborate, brainstorm, and draw inspiration.
- Encourage frequent communication, but not social gatherings (which will occur at more natural times anyway).
- Divide the project work into geographically independent modules as much as possible so progress in one location isn't hampered by delays in other locations.

### 1.8.5 Projects in Composite Organizational Structures-

The complexities of the real world rarely lead firms to organize their projects in any of the previous "pure" forms, so what we tend to see in practice is some combination of two or three or more different forms. In a functional organization, there may be project divisions along with marketing and finance, or in a matrix division there may be a staff project reporting to the CEO (or treasurer, or . . .), and so on. If both functional and projectized divisions coexist in a firm this would result in the composite form. This form is rarely observed for a long duration. What is done, instead, is to spin off the large, successful, long-run projects as subsidiaries or independent operations. Many firms nurture young, unstable, smaller projects under the wing of an existing division, then wean them to standalone projects with their own identity, and finally allow the formation of a *venture team*—or, for a larger project, *venture firm*—within the parent company.

The composite form leads to flexibility. It enables the firm to meet special problems by appropriate adaptation of its organizational structure. There are, however, distinct dangers involved in using the composite structure. Dissimilar groupings within the same accountability center tend to encourage overlap, duplication, and friction because of incompatibility of interests. Again, we have the conditions that tend to result in conflict between functional and project managers.

Firm sets up what appears to be a standard form of functional organization, but it adds a staff office to administer all the projects. This frees the functional groups of administrative problems

while it uses their technical talents. In a large specialty chemical firm, this organizational form worked so well that the staff office became the nucleus of a full-scale division of the firm whose sole purpose was to administer projects. For single projects, this is basically the functional organization described earlier, but if used for multiple projects, and particularly if a PMO is used, this organization is similar to the matrix form. The main difference is that this form would typically be used for small, short-term projects where the formation of a full-fledged matrix system is not justified. This mixed form shares several advantages and disadvantages of the matrix structure, but the project life is usually so short that the disease of projectitis is rarely contracted. If the number or size of the projects being staffed in this way grows, a shift to a formal matrix organization naturally evolves. Though the ways of interfacing project and parent organization are many and varied, most firms eventually adopt the matrix form as the basic method of housing their growing number of projects. To this base, occasional standalone, functional, and composite projects may be added if these possess special advantages; otherwise, they will be added to the matrix due to the relatively low cost of managing them and their enhanced ability to get access to broad technical support.

### **1.9 PM knowledge areas as per Project Management Institute (PMI): -**

The Project Management Knowledge Areas are fields or areas of specialization that are commonly employed when managing projects. A Knowledge Area is a set of processes associated with a particular topic in project management. These 10 Knowledge Areas are used on most projects most of the time. The needs of a specific project may require additional Knowledge Areas. The 10 Knowledge Areas are:

- ❖ Project Integration Management. Includes the processes and activities to identify, define, combine, unify, and coordinate the various processes and project management activities within the Project Management Process Groups.
- ❖ Project Scope Management. Includes the processes required to ensure the project includes all the work required, and only the work required, to complete the project successfully.
- ❖ Project Schedule Management. Includes the processes required to manage the timely completion of the project.
- ❖ Project Cost Management. Includes the processes involved in planning, estimating, budgeting, financing, funding, managing, and controlling costs so the project can be completed within the approved budget.
- ❖ Project Quality Management. Includes the processes for incorporating the organization's quality policy regarding planning, managing, and controlling project and product quality requirements, in order to meet stakeholders' expectations.
- ❖ Project Resource Management. Includes the processes to identify, acquire, and manage the resources needed for the successful completion of the project.
- ❖ Project Communications Management. Includes the processes required to ensure timely and appropriate planning, collection, creation, distribution, storage, retrieval, management, control, monitoring, and ultimate disposition of project information.
- ❖ Project Risk Management. Includes the processes of conducting risk management planning, identification, analysis, response planning, response implementation, and monitoring risk on a project.

**Table 1-1 Project Management Process Groups and Knowledge Areas mapping.**

Knowledge Areas	Project management process groups				
	Initiating Group	Planning Group	Executing Group	Monitoring and Controlling Group	Closing Group
Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	
Project Schedule Management		6.1 Plan Schedule Management 6.2 Define Activities 6.3 Sequence Activities 6.4 Estimate Activity Durations 6.5 Develop Schedule		6.6 Control Schedule	
Project Cost Management		7.1 Plan Cost Management 7.2 Estimate Costs 7.3 Determine Budget		7.4 Control Costs	
Project Quality Management		8.1 Plan Quality Management	8.2 Manage Quality	8.3 Control Quality	
Project Resource Management		9.1 Plan Resource Management 9.2 Estimate Activity Resources	9.3 Acquire Resources 9.4 Develop Team 9.5 Manage Team	9.6 Control Resources	
Project Communications Management		10.1 Plan Communications Management	10.2 Manage Communications	10.3 Monitor Communications	
Project Risk Management		11.1 Plan Risk Management 11.2 Identify Risks 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses	11.6 Implement Risk Responses	11.7 Monitor Risks	
Project Procurement Management		12.1 Plan procurement Management	12.2 Conduct Procurements	12.3 Control Procurements	
Project Stakeholder Management.	13.1 Identify Stakeholders	13.2 Plan Stakeholder Engagement	13.3 Manage Stakeholder Engagement	13.4 Monitor Stakeholder Engagement	



- ❖ Project Procurement Management. Includes the processes necessary to purchase or acquire products, services, or results needed from outside the project team.
- ❖ Project Stakeholder Management. Includes the processes required to identify the people, groups, or organizations that could impact or be impacted by the project, to analyze stakeholder expectations and their impact on the project, and to develop appropriate management strategies for effectively engaging stakeholders in project decisions and execution.

The needs of a specific project may require one or more additional Knowledge Areas, for example, construction may require financial management or safety and health management.

Table 1-1 maps the Project Management Process Groups and Knowledge Areas.

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**Module-1 Project Management foundation (Question Bank)**

1. What are the three basic goals of a project and how project manager achieves them in the conditions of uncertainty?
  2. What are the knowledge areas and process groups in Project Management as per PMI?
  3. What is a project life cycle. How does percentage completion with respect to time vary in case of typical and atypical project life cycles explain using examples.
  4. What is the staffing level and cost at different stages of a typical life cycle?
  5. How does cost of change, risk and influence of stakeholders are affected with project time during the life cycle of a project?
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