



BACHELOR OF COMPUTER APPLICATIONS
SEMESTER 6
DCA3245
SOFTWARE PROJECT MANAGEMENT

Unit 2

Overview of Project Management

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1. INTRODUCTION

Every project that an organization plans to run is executed using the available resources. The project management is art of managing the resources in such a way that the project gets completed within the scope, time, and constraints defined for the project. Project is a one-time activity to create a unique product or service. Project aims to complete the product or service development as per requirement with added value. Project Management requires a different skill set based on the technicality of the project and resource handling philosophy based on the type of resources who work on the project.

As mentioned earlier, the prime objective of the project management is to deliver the project within the defined constraints with proper allocation of resources and inputs. Hence, the project can be considered as an ordered set of activities using the resources (both human as well as machine, network etc.) to deliver the high quality product or service as per the pre-defined objectives.

There are many software engineers, involved in the development of software product. Their work must be coordinated and managed. It is a traditional engineering practice to define a project manager, responsible for the total project management. Large projects may consist of several subprojects, and each of which may be subdivided into further sub projects, if necessary. Overall, the project manager has to ensure that the project is completed.

1.1 Objectives:

After studying this unit, you should be able to:

- ❖ Define project management
- ❖ Explain the three factors influencing project management
- ❖ List and explain various project development phases
- ❖ Discuss project charter and statement of work
- ❖ Describe project management associations

2. PROJECT MANAGEMENT – DEFINITIONS

You may be aware that a lot of professional bodies are engaged in defining standards for Project Management. Every professional body will have their own definitions. Here are some of them:

By Harrison, “Project is a non routine, non repetitive, one-off undertaking, with well defined time, financial and technical performance goal”

According to Project Management Institute (PMI), “Project can be defined as a temporary endeavour undertaken to accomplish a unique objective at goal”

According to PMBOK (Project Management Institute – PMI), “Project Management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements”.

According to DIN 69901 (Deutsches Institute for Normung – German organization for standardization), “Project Management is the complete set of tasks, techniques, tools applied during project execution”.

3. FACTORS INFLUENCING PROJECT MANAGEMENT

In the previous section, we looked into the prime objective of project management – delivering the quality product as per the defined constraints. The same is represented in the form of a triangle as shown in Fig. 2.1 depicting the factors influencing the project management. These three factors are the time, cost, and the scope represented as the vertices of the triangle. The importance of quality of the product being built is represented as the central theme of the triangle.



Fig. 2.1: Project Management Triangle

The project management triangle emphasizes on following aspects

- 1) Projects must be delivered on time
- 2) Projects must be delivered within the cost that was estimated for the project initially.
- 3) Projects must satisfy the scope of the work agreed upon before starting the project
- 4) Deliverables of the project must meet customer's quality requirements.

Alternatively, the project management can also be represented as a diamond with the four vertices being represented by cost, time, scope, and quality respectively. The central theme represents the customer expectation. This is to indicate that expectations set by customers will be unique and project deliverables will have to be tuned in as per the set expectations. Hence, customer expectations play a major role in influencing the project management and the same is represented through central theme of the diamond.

Characteristics of a project: The following are the two main characteristics that a project should possess

1. **Temporary:** Has definite Start and Finish, One technique to more accurately define the application profile of a system development project is through the use of a project characteristic. This allows for the unique characteristics of a project to be defined through the selection of fixed parameters. It has a finite timeframe with a beginning and an end. Within such bounds, it imposes its own restrictions. This is something that will only happen once. It's not a constant or recurring occurrence.
2. **Unique:** Product/Service is different in some distinguishing way, Costs can be reduced and outcomes enhanced with proper project management. It could be a means to

accomplish the aforementioned goals with less effort and at lower cost. Organization-wide project management yields strategic value that sets businesses apart from the competition. Whether or not a business gets the next contract depends on its track record of completing projects on time and under budget.

Various stages of a project:

The word 'project' came from the Latin word projectum derived from the Latin verb proicese (to throw something forwards) which in turn comes from 'pro' which denote something that proceeds the action of the next part of the word.

There are the various stages of project those are:

1. Thinking
2. Planning and Scheduling
3. Data collection
4. Status updating through network
5. Early warnings
6. Pave path for successful completion.

Every project that an organization plans to run is executed using the available resources. The project management is art of managing the resources in such a way that the project gets completed within the scope, time, and constraints defined for the project. Project is a one-time activity to create a unique product or service. Project aims to complete the product or service development as per requirement with added value. Project Management requires a different skill set based on the technicality of the project and resource handling philosophy based on the type of resources who work on the project.

1. **Project Management:** It is defined as "The application of knowledge, skills, tools and techniques to project activities in order to meet project requirement."

Project management is a system of methods, practices, technologies and mechanisms that enables the planning, organising, staffing, directing and controlling of project activities to successfully manage a project. It is described for relatively short period of time to achieve the project objectives within laid down constraints. Alternatively, the project management can also be represented as a diamond with the four vertices being represented by cost, time,

scope, and quality respectively. The central theme represents the customer expectation. This is to indicate that expectations set by customers will be unique and project deliverables will have to be tuned in as per the set expectations. Hence, customer expectations play a major role in influencing the project management and the same is represented through central theme of the diamond.

It is defined as "The application of knowledge, skills, tools and techniques to project activities in order to meet project requirement.

"Project Management is the art of directing and coordinating human and material resources throughout life of a project by using modern management techniques to achieve pre-determined objectives of scope, cost, time, quality to the equal satisfaction of those involved."

- Project management institute of USA

Terminologies used in Project Management:

A project is a planned undertaking, a project manager is a person who causes things to happen. Therefore, project management is causing a planned undertaking to happen. Let us discuss the various terminologies used in project management which we have to understand in detail

- **Management:** is the mechanism of understanding the problems, requirements and managing the use of Resources, Cost, Time, Scope and Quality. Management entails arranging a company's resources and operations so that they work together to accomplish set objectives. Project management is defined as the application of processes, methods, skills, knowledge, and experience to accomplish defined project goals in accordance with established criteria for project acceptability. The time and money available to complete a project's final deliverables is limited.
- **Project Management:** Application of knowledge, skills, tools & techniques to project activities in order to satisfy the stakeholder requirements & expectations from a project. Project management, put simply, is the process of managing a team to achieve its objectives or finish its deliverables within a certain time limit. Project management is the process of documenting, planning, tracking, and communicating projects to ensure they are completed on time and within budget.

- **Needs:** stated part of the project, Project requirements analysis, often known as a needs assessment, is a crucial aspect of any project's early planning stages. This is a crucial stage since it lays the groundwork for the rest of the project. What's the point of stopping to consider what your project actually requires? Determining the scope of a project is an important first step in any endeavour, whether it's outsourced to a third party or initiated inside. All that work, All of the time, energy, and money that will be put into the project, How long it will take to do the job, The amount of money that should be spent on the venture.
- **Expectations:** unstated part of the project. Schedule, cost, quality, scope, deliverables, team performance, project benefits, and life after the project are just few of the many areas in which stakeholders have expectations. The expert project manager pays attention to, analyses, and controls these factors to keep the project in good health.

Objective of Project Management:

A project manager must formulate the list of objectives for the project and decide on what resources are needed to achieve the objectives of the project. A project manager must formulate the list of objectives for the project and decide on what resources are needed to achieve the objectives of the project.

The following are the objectives of project management

- To Do exhaustive research – on time
- To Ensure that customers remain happy
- To Keep the team focused on the goal
- To Ensure that team members work properly
- To Make sure that load is shared by everyone.

Why Project Management:

Most important function of project management is to lead a project team effectively and communicate well among team members.

- To effectively handle the projects in an organization.
- To give proper definition of the project and reach an agreement with the customer.
- To plan and consider resource requirements for the project.
- To estimate project cost and formulate proposals.

- To plan & schedule activities and resource allocation in a project.
- To evaluate risk and failure points and state backup plans.

Why do People Learn Project Management

Learning project management has endless possibilities and benefits. let us discuss one by one

- To explore the latest concepts and techniques of project management.
- To increase value/contribution to the organization.
- To prove oneself skilful in managing projects.
- To learn a new thought process that helps organized thinking and structured approach.
- To acquire a professional degree/ recognition and increase job prospects.
- To acquire a new way of thinking that promotes orderliness and methodicism in one's approach to problems.
- To better one's employment prospects by earning a recognized degree or certification in one's field.

Role of 3W's in Project Management:

Let us see in detail what are the effects of W's in project management

Why : 'Why' is from the business case

Who : 'Who' will do the work and stakeholder awareness of the project

When : 'When' deals with schedules and phasing for the project

How : 'How' which is the project manager vision to implement project from beginning to end

Why: There are instances when the reasoning behind something is obvious. The introduction of a new company calls for the development of an entire brand identity, or the reintroduction of an outmoded website. On the other hand, there are occasions when you have to put your back into the digging. The effort put into determining the why often reveals the necessity of a different strategy than was originally planned.

Who: Your advertising is ineffective if "a tree falls in the forest and no one is there to hear it." We can yell from the rooftops if we want, but if we don't reach the proper individuals, our message will fall on deaf ears. When we know our audience, we can craft our words to convey more information while using fewer of them.

'Why' & 'What' are management statement of the success criteria and should be agreed with the project sponsor

- What: Scientific application of modern techniques and tools. It defines
- Whom: In planning, financing, implementing, monitoring, controlling and coordinating unique activities of project
- Why: To produce desirable outputs in accordance with predetermined objectives within constraints of time and cost.

When : 'When' deals with schedules and phasing for the project

When: There are instances when the reasoning behind something is obvious. The introduction of a new company calls for the development of an entire brand identity, or the reintroduction of an outmoded website. On the other hand, there are occasions when you have to put your back into the digging. The effort put into determining the why often reveals the necessity of a different strategy than was originally planned.

How: 'How' which is the project manager vision to implement project from beginning to end

When are you planning on arriving? Where do you find the how? Construct your argument. You won't be able to persuade or even interest anyone in your cause until you can clearly explain who you are and what you bring to the table. Keep your offer in mind. What do you offer to the discussion? When compared to the plethora of rapid gratification options, your service stands out for what?

Importance of Project Management:

The success of a project depends on a number of internal and external elements, including project management. Even if a project is well-managed, it may nevertheless fall short of the mark set by the client or customer. The growth in project size and complexity The Role of Financial Controls is growing in Importance. Timeliness in finishing quickly More and more laws are being passed. Let us see why the project management is so important, because of following reasons

- Increasing size and complexity of projects
- Increasing importance of financial controls
- Urgency of early completion

- Growing amount of statutory regulations
- Increased sophistication of technology
- Inability of managers and architects to manage the things
- Shortening of product life cycle
- Global competition

Project management plays a role in project success but that role is affected by many other factors outside .A project may be successfully managed but not meet the client or customer expectation. Effective project management is crucial because it lays forth a road map for reaching overarching objectives. Where project management is left up to the team, teams often operate without clear goals or a standardised approach to getting things done. It's no secret that industries like cost management and control rely heavily on data and analysis, which is why automation has found a home in this space.

Benefits of project Management:

Project management plays a role in project success but that role is affected by many other factors outside .A project may be successfully managed but not meet the client or customer expectation. The term "cost control" refers to the practise of lowering operational costs by monitoring and adjusting monetary data. Organisations can improve their forecasting, cost-cutting, and money management by collecting costs in a centralised repository. Because optimising your interactions with vendors can result in considerable cost savings for your firm, cost management and vendor management are often seen as inseparable. Simplifying price-locking contract renegotiations is one strategy; establishing long-term connections with suppliers and consumers is another; and forming mutually beneficial collaborations is still another.

- Cost control
- Explosion of knowledge
- Focus on customers
- Clearly describe the work to be performed
- Responsibilities and assessment of tasks
- Time limit for task completion
- Measurement of accomplishment against plans is possible

- Problems are exposed in advance allowing timely corrective action
- Early identification of objectives that cannot be met

Project success and project management success are different. Project success deals with the impacts of a project's final product or service on stakeholders. Project management success focuses on the processes of a project including successful accomplishment of the scope, within budget (cost), within time (schedule), and quality aspects.

Elements of a successful Project:

A successful project is one that meets or exceeds the expectations of the stakeholders. The Project Management Institute defines a "project" as "a temporary group activity designed to produce a unique product, service, or result." When a project modifies the way a company operates, the results are permanently incorporated into the company's standard operating procedures. It seems simple, but in reality it is not. It's hard to adapt, and it's easy for initiatives to go off the tracks. Every day presents new obstacles that can derail a project's development and success. Certain necessities are required for projects to counter this threat.

The following conditions increase the likelihood of a successful project's completion. In the words of the Project Management Institute, a "project" is "a temporary group activity designed to produce a unique product, service, or result." When a project improves how a business functions, the changes are made to the SOPs that everyone follows going forward. It appears easy, but it's actually quite complicated. Adapting is challenging, and it is simple for projects to veer off course. There are always fresh challenges that might derail progress on a project. There are some prerequisites for projects aimed at mitigating this danger. Success in finishing a project depends on the following factors

- Successful project finishes on time.
- Successful project is within its cost budget.
- Meet the technical and performance standards up to the satisfaction of the end user.

Steps to improve the concept of project Management:

A project manager should constantly strive to identify uncertainties and reduce them, with emphasis on the more threatening uncertainties.

- Find a Project plan that fits your style of project management needs

- It may be as simple as creating templates, forms and spreadsheets to track tasks
- Formation of a Project Management committee
- Listing out all the tasks and sub-tasks to accomplish a goal
- Jot down the time period and person responsible against each task/sub-task
- Identify a Project Manager
- Identify Task Managers
- Sequence the activities in relation to time period
- Present to the PMC
- Finalize by reaching an agreement and start work.....

Present challenges in Project Management:

We will see the present challenges we deal with project management is been discussed below:

You'll agree that being a project manager is not easy, whether you're just starting out or have years of expertise in the area. Constantly studying the fundamentals of project management and keeping the project within its predetermined boundaries (time, budget, etc.) is required. Space-Time Scope-Budget Companies continue to waste millions of dollars annually due to ineffective project management despite the availability of numerous resources, project management tools, training materials, and flexible techniques.

- Inaccurate scope definition and /or no project plans to achieve it
- Scope not tightly controlled leading to team goals unmet
- Lack of visibility on resource demands and /or loads
- Lack of proper project planning and/or an incorrectly defined scope
- Lack of focus on the details prevents the team from achieving its objectives.
- Inability to see the needs and/or usage of resources
- In ability to review existing projects against changing priorities , conditions
- No or irregular checkups carried out
- Inability to achieve on time, within budget and quality of deliverables due to lack of controls
- Lack of visibility on project procurement and /or contract management
- Inadequate risk management

- Poor or no documentation and record management

What is considered to be Project's success:

Let us start with a short definition of successful project and understand what makes the project a sucessful one .

- A project is considered successful if the project goal is achieved. That implies that one has achieved measurable goals.Several project managers simply fail here.
- They do not clearly define project goals or state goals which can only be reviewed after several years.

Success is a matter of perspective. Depending on the stakeholder you question, you will get a different answer.But even if measurable project goals are clearly established, several problems may arise. It is seen that, achieving the project goals is not sufficient to consider a project successful. It may happen that even after reaching the project goals one may fail to achieve several other expectations which were tied to the project completion. Even if the client was satisfied but more projects did not happen as were expected because of this success.

Success can be considered subjective. Its all about one's perspective. Few more examples to discuss the project's success are as follows:

- To get a more measurable metrics to evaluate project's success one can use time, cost and quality as metrics.
- Whether the project is completed on or before specified deadline and budget can be evaluated and whether all quality requirements were met can also be verified.

Factors influencing the project success:

There are lots of studies on success factors in project management. Depending on the participants, the size of the study and the industry, results do vary. Projects are inherently chaotic. It's easy to lose sight of the big picture when you're swimming in a sea of tasks, priorities, and deliverables. Here, you'll learn how to single out the most important aspects of every project you're in charge of to ensure its ultimate success. Critical and crucial success elements in project management can also be analyzed using a paradigm that places an emphasis on the project's deliverables. The deliverable's critical success factors (CSF) outline what's needed and what makes the deliverable a success. Your deliverable can be a

house, for instance. The employees and supplies used in the construction project would be crucial to your achievement.

- Experienced project managers & skilled project team
 - Methodical approach
 - Planning
 - Follow best practices
 - Controlling
 - Software
 - Communication
1. Experienced project managers & Skilled project team: One can have a managerial degree from a good university, but in the end, success comes with experience. The more experienced a project manager, the more confidence and skill she will have to overcome the challenges of the daily project business requirements. Clearly defined roles and responsibilities to prevent misunderstandings and mismanagement. Successful project managers not only impress with technical expertise but also exhibit very good leadership traits.
 - Project manager must ensure that team members have the required skill set to deliver the desired results and bring a positive attitude to the project. The project team must function as a whole. So, it is necessary to build a team which is motivated to work together towards achieving a common goal. It does not matter that most advanced methods, and tools are used by the project manager, if the members are not skilled to use the tools and/or the methods.
 - Even if the project manager is a prolific leader, without a professional and skilled project team, project will not be a success. Project manager must ensure that team members have the required skill set to deliver the desired results and bring a positive attitude to the project. The project team must function as a whole. So, it is necessary to build a team which is motivated to work together towards achieving a common goal.
 2. Methodical Approach: To be successful it is critically important to select an appropriate project management methodology. Selected tools and techniques of the framework must be properly followed to make sure that the process is clear, reliable and efficient.

As discussed invest time in defining a clear project goal that is understood by all stakeholders and agreed upon.

3. Planning: Many project managers don't spend required time to prepare a solid plan in an eagerness to start the execution phase of the project. Avoid this mistake. Invest enough time and resources in thorough planning. As the saying goes : "If you fail to plan, you plan to fail." by Benjamin Franklin Managers need to be more effective and goal-oriented.
4. Best Practices for Project Management: Emphasizing on the right aspects of a project will make all the difference by following Follow best practices, which is listed below:

Project management is itself a challenging task. There is no need to reinvent anything new.

Use available frameworks and best practices wherever possible.

Take guidance from the experience of past successes and follow proven strategies to an individual case instead of building everything from scratch. This enables the project managers to focus on resources on the truly unique aspects of the project.

5. Controlling: To begin, it's recommended that you outline your objectives using the SMART framework. All projects need to aim to: Specific Measurable Achievable Relevant Time-bound. Therefore, instead of saying, "Improve the way we hire," a more appropriate goal would be: "Expand our pool of qualified applicants by 100 within two months through targeted social media advertising." Then, you must ensure that everyone involved knows and appreciates the significance of this objective. For instance, this objective may be deemed significant by upper management if a positive correlation is seen between the calibre of the candidate pipeline and financial performance. The employees and supplies used in the construction project would be crucial to your achievement. Controlling
 - Do periodic Check on the progress and evaluate results on a regular basis.
 - Define key performance indicators (KPI) and with the help of reports one will be able to quickly grasp if the project is on track.
 - If things go off the track it will be easily detected early on and be able to take countermeasures before bigger damage is done.

6. Software: instead of working with Excel or other spreadsheet programs which are not created to serve project management needs, invest in a professional and specific tool. It will simplify your work and it will impact your project success.

The role, project management software, plays is generally underestimated even though the quality of the chosen tools has a direct effect on the quality of management.

- Professional and intuitive software reduces the risk of mistakes and miscalculation and generates the best possible overview of all relevant KPI and displays important data reliably on all needed devices.
- Software supports secure and simplify team collaboration and is the basis to give each team member access to their required information. Software supports secure and simplify team collaboration and is the basis to give each team member access to their required information. With the help of software, team members can work together safely and efficiently, and everyone can easily have access to the data they need to do their jobs.

Successful project management relies heavily on clear and constant lines of communication between all parties involved. To keep all interested parties informed and engaged, timely and open channels of communication are essential. According to Deloitte, 32% of professionals rank poor communication as the primary challenge in project management. As with individual members, project teams are vulnerable to the negative effects of poor communication. It has the ability to disrupt team dynamics and slow down progress on the project.

7. Communication:

Proper communication will prevent lots of undesirable developments in projects or at least be discovered earlier. Make sure to implement and use formal communication processes (meetings, documentation) as well as informal processes. The communication between team member's plays an important part.

The Overall glimpse of Project Management

If you consider the seven factors mentioned in your own management style, chances are very likely for you to fit your own definition of project success. Project management's overarching

purpose is the successful completion of a project in accordance with its defined parameters, including but not limited to its scope, timeline, quality standards, and budget. Find out who has a stake in the matter. Determine who is responsible for what. Walk us through the steps and means of contact. The overall glimpse of project management is

- Risks and uncertainties are part of project management.
- Success does not automatically happen by accident.
- It can be planned by properly doing the project management.

3.1 Project Manager

Project Manager is overall responsible for the successful planning and execution of a project. The title, project manager, is used not only for IT projects but also used in different occupations that are based on production of a product or service like construction industry, architecture as well.

Following are major tasks of the project manager planning

- Staffing (acquiring human resource)
- Execution (putting the plan into action)
- Monitoring the progress of the project

Other than following up on the tasks on individual projects as listed above, the project managers also holds responsibility of organizational structure. Their responsibility spans the overall organizations life cycle. Managers continuously monitor and assess the capabilities of the organization. For those, managers follows CMM (Capability Maturity Model) model. CMM can also be used to assess software organizations as part of software acquisition policy and to qualify contractors by requiring them to be certified according to CMM maturity levels.

The **Capability Maturity Model (CMM)** is a process improvement method or framework defined for software projects. CMM is developed by Software Engineering Institute (SEI) at Carnegie Mellon University. CMM provides a set of best practices that can be followed for software development by observing the best practices followed by software and other organizations. CMM represents the collective process experience that represents the best practices to be followed. The CMM aims at bringing in the process maturity so that the

outcome of the project is less dependent on the people who follow the ad-hoc or immature processes. The CMM model is divided into key process areas (KPAs) that define specific goals and practices to be followed in specific area of software life cycle. The KPAs are defined separately for different levels of maturity. These KPAs acts as guideline for organization to achieve higher level of maturity through the process improvement and to help organizations to move from immature processes to highly mature processes.

Variables of project Control:

Project management tries to gain control over four variables that is time, cost, quality, scope, risk, Absolutely, you're referring to the four primary constraints in project management, often referred to as the "Project Management Quadruple Constraint" or the "Iron Triangle." These constraints are interconnected and form the foundation for managing any project effectively. Successful project management involves finding the right balance among these constraints to achieve the project's objectives while effectively managing risks and meeting stakeholder expectations. It requires continuous monitoring, adjustment, and effective communication with stakeholders throughout the project lifecycle.

3.2 Project Management Activities

Project Management is composed of several different types of activities such as:

- 1) **Planning the work or objectives:** A project manager must formulate the list of objectives for the project and decide on what resources are needed to achieve the objectives of the project. Project manager also decide on when and how to get the resources into the project and how to achieve the objectives set for the project.
- 2) **Assessing and controlling risk (or Risk Management):** Risk is associated with several issues. It can be technical risk, methodology risk and financial risk etc. Manager needs to analyze and plan from the starting of the project, to handle unexpected or sudden occurrence of risks.
- 3) **Estimating resources:** Resource estimation is another crucial task to the project manager. A resource can be software, hardware, human personnel, capital etc. Resource estimation involves the planning of required resources for the given tasks in the given period of time. Optimum utilization of these resources is the ultimate goal of manager.

- 4) **Allocation of resources and assigning tasks:** This involves identification of task and allocation of required resources to fulfill the given task. For example, identification of skilled personal to solve the given task.
- 5) **Organizing the work:** Organizing involves clear lines of authority and responsibility for groups of activities that achieve the goals of the enterprise.
- 6) **Acquiring human resources (staffing):** Staffing deals with hiring personnel, which involves recruiting, compensating, developing and promoting employees.
- 7) **Directing activities:** Directing involves leading subordinates. The goal of directing is to guide the subordinates and to understand and identify the organizational structure and goals of the enterprise.
- 8) **Controlling project execution:** Controlling consists of measuring and correcting activities to ensure that the goals are achieved. Controlling requires the measurement against plans and taking corrective action when development occurs.
- 9) **Tracking and reporting progress:** After assigning the tasks to the team members, it is essential to track and monitor the work progress. The work progress is documented at regular intervals.
- 10) **Forecasting future trends in the project:** The project must be designed to facilitate extensibility of new features in the forth coming days. This is very crucial task of manager or designer. Designers have to keep this point in mind, while designing architecture for the system.
- 11) **Quality Management:** Satisfying the customer requirements is called quality. Quality reflects in many ways. It can be through functionality, performance and external factors like portability etc. So, the project manager needs to implement different quality management techniques from the analysis phase itself.
- 12) **Issues solving:** An issue can be a conflict among the team members, sudden increase in the attrition rate of employees, sudden drop in rupee value etc. Based on the issues, proper corrective action needs to be taken to ensure the smooth working of the system.
- 13) **Defect prevention:** A defect is a flaw in the system. It is more serious than an error. A defect occurs because of improper design, poor quality etc. A thorough testing is needed before and after implementation of the product, to avoid the defects.

14) **Project Closure meet:** Project closure describes the overall project details. The details can be conveyed through closure reports. Ex. Performance reports, testing reports and project completion reports.

15) **Controlling:** Controlling consists of measuring and correcting activities to ensure that the goals are achieved. Controlling requires the measurement against plans and taking corrective action when development occurs.

3.3 Stakeholders

Stakeholders are those who have a stake in the project. Stakeholders could be groups, units, individuals, or organizations, internal or external to our organization, which are impacted by, or can impact, the outcomes of the project. This includes the Project Team, Sponsors, Steering Committee, Customers, and Customer co-workers who will be affected by the change in customer work practices due to the new product or service.

SELF-ASSESSMENT QUESTIONS – 1

1. Project Management is the application of knowledge, skills, tools and techniques to project activities to meet the project requirements. (True / False)
2. The three most important factors that influence project management are _____, _____ and _____.
3. CMM stands for _____.
 - a) Capability Maturity Model
 - b) Capacity Maturity Model
 - c) Customer Maturity Model
 - d) Common Maturity Model

4. PROJECT COMMUNICATION

There are many reasons that software projects get into trouble. The scale of many development efforts is large, leading to complexity, confusion, and significant difficulties in coordinating team members. **Uncertainty** is common, resulting in a continuing stream of changes that ratchets the project team. **Interoperability** has become a key characteristic of many systems. New software must communicate with existing software and conform to predefined constraints imposed by the system or product.

To deal with them effectively, a software engineering team must establish effective methods for coordinating the people who do the work. To accomplish this, mechanisms for formal and informal communication among team members and between multiple teams must be established. Formal communication is accomplished through written text, structured meetings, and other relatively non-interactive and impersonal communication channels. Informal communication is more personal. Members of a software team share ideas on an adhoc basis, ask for help as problems arise, and interact with one another on a daily basis.

There are several categories in which we can distinguish the communication methods. This categorization is mainly dependent on content and the group involved in the communication. The **Formal, impersonal** style of communication is adopted to document the software engineering practices, any notices or guidelines to be issued to the team. Also, this type of communication is followed in the communication with client to update about the project status, milestones, deliverables like source code, and for project tracking.

The **Formal, interpersonal** type of communication requires physical presence of the participating team in the communication. Typical example of such meetings are the review meetings, status meetings and similar such activities.

The **Informal interpersonal** procedures – As the name suggests, these will be informal group meetings. This kind of communication is preferred while conducting brainstorming sessions to know more about the available information like requirement analysis and come to a conclusion on design to a particular implementation.

The medium of communication can be **Electronic** communication or Interpersonal networking. Electronic communication encompasses e-mail, or electronic dashboards, or

video conferencing system. The **Interpersonal networking** refers to discussions that happen among the group.

The figure 2.2 shows the people involved during project work.

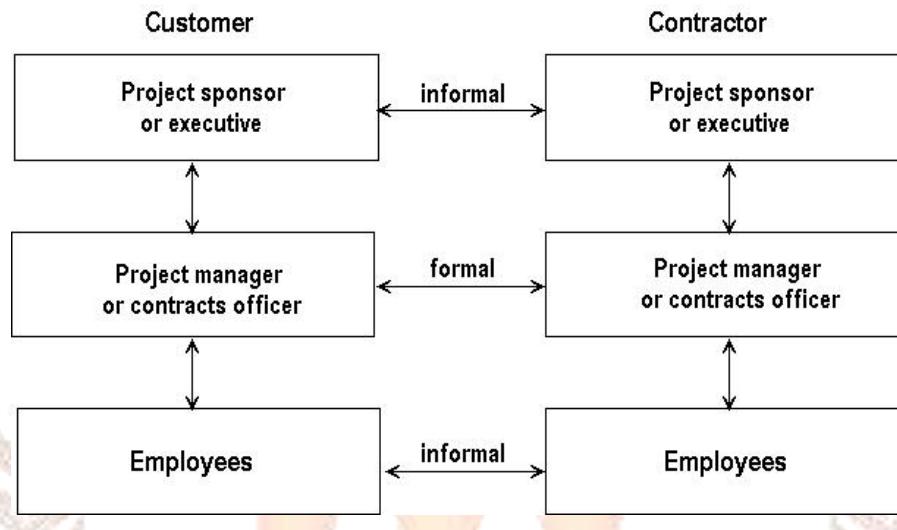


Fig. 2.2: People involved in project work

SELF-ASSESSMENT QUESTIONS – 2

4. Interoperability has become a key characteristic of many systems. (True/ False)
5. Conducting structured meetings is a form of _____ communication.
6. _____ encompasses e-mail, or electronic dashboards, or video conferencing system.
 - a) Formal communication
 - b) Electronic communication
 - c) Informal communication
 - d) Interpersonal networking

5. PROJECT DEVELOPMENT STAGES

The software project development can be broadly broken into following phases irrespective of their implementation methodologies

- Initiation
- Planning and design
- Implementation
- Closing/Maintenance

Initiation

Project initiation is very crucial stage of the project that is used to determine the scope and nature of the project. The business need of the project to be understood properly so that the project team can implement the end product as per the business need. Initiation phase performs this important activity of understanding the business needs and identifying the controls that are needed to implement these needs so that the same can be transformed into the end product. The project initiation phase includes following major activities

- Study the business needs and represent them in measurable goals
- Review current operations to have better understanding of system to be developed.
- Decide on conceptual design and approach for final product.
- List the Resources needed for the project
- Cost estimation and budget
- List the stakeholders of the project including the end users and support team
- Project charter that includes costs, task list, deliverables, and schedule.

This phase can also be called initiation phase, where in people has to identify the following,

- Information to be processed.
- Functions required.
- Performance required.
- System behavior should be determined
- Numbers of interfaces - both internal and external to the system are estimated. This will be a tentative list, and will be refined during the design phase.

Sometimes project can be dropped during at this phase after the initial analysis.

A SMART goal is a goal-setting framework that helps ensure that goals are specific, measurable, achievable, relevant, and time-bound. By using the five criteria of "specific, measurable, achievable, relevant, and time-bound," or "SMART," goals can be formulated with more confidence of success. By providing direction and structure, this framework aids in the development of specific, realistic, and attainable objectives. Effective goals exhibit the qualities reflected in the letters of the acronym "SMART":

Specific: The aim must be very clear, with no space for interpretation. It addresses the question, "What is it that you hope to achieve?" What's the big deal, anyway? The players are... Where exactly will it occur?

Measurable: The aim should be based on quantifiable criteria so that progress can be monitored and success can be confirmed. It addresses the issue of "how to tell when the mission is complete."

Achievable: The target should be reasonable and doable, given the available resources. Goals should be ambitious, but not impossible to achieve given the resources, time, and knowledge at hand.

Relevant: Objectives should be relevant to the overall mission and priorities of the person or group setting them. Does this aim count, and does it add up to something larger?

Time-Related: The target date or deadline for completion should be specified. This provides more immediacy and prevents the objective from being too vague. It provides an answer to the question, "When do you expect to achieve this goal?"

CLEAR GOALS:

Goals are said to be "clear" when they are specific, measurable, and devoid of any room for interpretation. They point people or groups in the right direction and make it clear what they should be trying to accomplish. When everyone involved in a project is on the same page with what needs to be accomplished, it's much easier to get things done. Here are some of the hallmarks of well-defined objectives:

- Collaborative – The goal should encourage employees to work together.
- Limited – They should be limited in scope and time to keep it manageable.
- Emotional – Goals should tap into the passion of employees and be something they can form an emotional connection to. This can optimize the quality of work.
- Appreciable – Break larger goals into smaller tasks that can be quickly achieved.
- Refinable – As new situations arise, be flexible and refine goals as needed.

Planning and Design

As we saw during the project initiation business needs are documented. These requirements will be the input for the Planning and Design stage of the project. In this stage the solution is decided to implement the product outlined using the business needs. Occasionally, a small prototype of the final product is built and tested to affirm and bring out hidden requirements. Controls should be in place that ensures that the final product will meet the specifications of the project charter. The objective of the design phase is that we should arrive at a design that should

- Spell out the approach and steps needed to implement the business requirements.
- Satisfy the stakeholders including the project sponsor and end users.
- Be a feasible solution that can be implemented within the time and budget constraints
- Comply with organization's quality standards.

During this phase the following issues are addressed,

- How design should be converted into code?
- What should be the testing strategy?
- How to integrate and test the different sub-modules.
- Evaluation of Architectural issues to decide on best approach
- External and Internal Interfaces are characterized etc.

Project Implementation

After the design and implementation strategy is finalized in the planning stage, project heads into the Implementation stage. Here the planned activities are executed, and also tracked and measured. The major implementation activities include the coding, testing, and the installation of the product after successful testing. The coding is done following the design done in the previous stage. During the coding the development team will complete the unit

testing. The unit tested code will be picked up by the testing team to carry out the testing as decided during the Planning and design phase. The testing team performs integration testing, performance testing and load testing to certify the product to be as per business requirements defined during the Initiation of the project.

During the Implementation stage we also need to ensure that the project tasks are tracked and measured. This will help to keep the project on schedule and determine if the project deliverables are as per expected quality standards.

Closing and Maintenance

After the project is successfully implemented we need to follow the formal process to end the project. This stage of the project is called Closing and Maintenance stage of the project. This stage is vital for continuous process improvement for an organization's project handling. In this stage we evaluate the successful aspects of the project as well as the steps that could have been done better. This introspection helps to derive the best practices out of the project and can be followed in subsequent projects that will be taken up by the organization. This closing stage activity also focuses on performance of project team members. All these findings are documented and formal acceptance is obtained as part of official closure of the project. The findings of the project closure report are archived for the future usage within the organization.

Maintenance is an ongoing process, and it includes:

- Continuing support of end users
- Correction of errors
- Upgradation of software and hardware etc.
- Documentation preparation (user manuals).

Project Performance Monitoring:

This concerns measuring project progression and performance and ensuring that everything happening aligns with the project management plan. Project managers will use key performance indicators (KPIs) to determine if the project is on track. A Project Manager will generally pick two to five of these KPIs to measure project performance.

Project Objectives: Measuring if a project is on schedule and budget is an indication if the project will meet stakeholder objectives.

- **Quality Deliverables:** This determines if specific task deliverables are being met.
- **Effort and Cost Tracking:** PMs will account for the effort and cost of resources to see if the budget is on track. This type of tracking informs if a project will meet its completion date based on current performance.
- **Project Performance:** This monitors changes in the project. It takes into consideration the amount and types of issues that arise and how quickly they are addressed. These can occur from unforeseen hurdles and scope changes.
- **Effort and Cost Tracking:** PMs will account for the effort and cost of resources to see if the budget is on track. This type of tracking informs if a project will meet its completion date based on current performance.
- **Project Performance:** This monitors changes in the project. It takes into consideration the amount and types of issues that arise and how quickly they are addressed. These can occur from unforeseen hurdles and scope changes.

Project Closer:

This is especially helpful to understand lessons learned so that improvements can be made for future projects.

- This phase represents the completed project. Services of Contractors hired specifically to work on the project are terminated at this time.
- Valuable team members are given recognition. Sometime Project Managers even organize small work events for people who contributed in the project to thank them for their efforts.
- After a project gets completed, a Project Manager holds a meeting – referred to as a “post mortem” – to evaluate what went well in a project and identify project failures.

Project Execution

Despite the fact that the monitoring phase of a project has its own unique set of needs, it is not uncommon for this phase to overlap with the planning phase. At this stage, all work necessary to complete the deliverables has been accomplished. Due to the high volume of activities—including status meetings, progress reports, and evaluations of the project’s

success—this phase is typically considered the meat of the project. At the beginning of the Project Execution phase, teams often gather for a "kick-off" meeting where they are briefed on their roles. All potential dangers should be listed in the risk management strategy. The customer review cycle, budget cuts, shifting expectations, and a lack of committed resources are all examples of common risks.

Tasks Completed during the Execution Phase

1. While the project monitoring phase has a different set of requirements, these two phases often occur simultaneously.

Develop team

Assign resources

Execute project management plans

Procurement management if needed

PM directs and manages project execution

Set up tracking systems

Task assignments are executed

Status meetings

Update project schedule

Modify project plans as needed

SELF-ASSESSMENT QUESTIONS – 3

7. Project implementation is the first stage in project development. (True / False)
8. The _____ stage determines the nature and scope of the development.
9. Testing and Module Integration strategies are addressed in _____ phase.
 - a) Initiation
 - b) Implementation
 - c) Planning and Design
 - d) Maintenance

6. PROJECT CHARTER

The project charter is a one-time announcement on the formal commencement of the project. This gives the opportunity for the project manager to establish the authority and platform to implement the project in the direction he or she wants to lead the project.

The project charter can be considered as the kick off meeting of the project. The project charter involves the upper management, stakeholders (sponsors of the project and end users), and the project team who will implement the project. The project manager runs the project charter. The project charter indicates the commencement of the new project. It is a platform to display the support of the senior management to the new project and the project manager who will be leading the project. It is also used by the sponsor to provide a broad direction for the project to the project manager. The charter helps project manager to get the agreement on the project goals from the project sponsors and also get an agreement by the team on the documents to be followed in the project.

After the conclusion of the project charter following two entities will be finalized:

- A project definition document that defines the scope of the project
- A formal recognition of authority for decision making.

Audience of a Project Charter

The project charter as specified earlier will be an event comprising of all those who will be responsible and affected by the new project. The audience includes the relevant senior management of the organization and the stakeholders of the project. The charter is usually written by the sponsor or the project leader and should be approved by the sponsor, the customer, and the resource manager.

Content of a Project Charter

The charter sets the direction of the project by defining the goals and constraints of the project. The charter comprises of the Scope and Resources section.

Scope Section

- Name of the project
- Problem statement
- Project Objectives

- Deliverables expected
- End users of the project
- Customer Requirements and quality characteristics
- Stakeholders

As we can see, the Scope section lists the project objectives and deliverables, customers and their needs and requirements, project stakeholders.

Resources Section

- Team structure

Name of the project manager and other key team members

- Timeline when the product is expected
- Staff Effort Limit
- Budget (or Spending Limit)
- Organizational Constraints

Other than deadlines, staff effort, and budget

- Project Priorities

Ranking of scope, schedule, and cost

In the Resources Section of the Charter we specify the project team structure, the timelines, staff effort limit, budget, and other organizational constraints of the project. In order for the team to make the best choices between the three main variables (deadline, budget, and organizational constraints), the Resources Section describes also project priorities according to the ranks assigned by the sponsor to the scope, schedule, and cost.

7. STATEMENT OF WORK (SOW)

The statement of work (SOW) describes about the work products that will be created over the course of the project. SOW typically should contain following:

- The list of modules or functionalities that will be delivered.
- The list of deliverables. Typically, when a project is implemented developing a new code base. But only the code base will not be the deliverable, but the project team might have to provide the design document, test cases, user manual etc. along with the code. All these will become the deliverables of the project and should be agreed upon before the project is started. Hence, all the agreed deliverables will be listed in the SOW.
- The SOW should contain the rough estimated effort to deliver the work products listed above. The effort might change during the detailed analysis of the requirement in the later stages of the project.

8. PROJECT MANAGEMENT ASSOCIATIONS

Several national and professional associations exist which have, as their aim, the promotion and development of project management and the project management profession. The most prominent associations include:

- The Association for Project Management (UK) (APM)
- The Australian Institute of Project Management (AIPM)
- The International Project Management Association (IPMA)
- The Project Management Institute (PMI)
- The International Association of Project and Program Management (IAPPMM)

As we defined earlier, project is a collective effort by a team of people to achieve a defined goal or objective to develop a product or service. For the team to work with proper harmony and focused direction we need a project manager to lead the team through the execution of the project. The project management will not guarantee that all the problems, risks in the project are eliminated, but will definitely help to minimize the error through standard processes and procedures. The effective project management helps to address the common problems seen across the projects and helps prevent the following:

- 1) Projects that are not meeting customer expectations, not as per defined schedule or cost
- 2) Inconsistency between the processes and procedures used by projects managers, leading to some being favored more than others are
- 3) Successful project delivery through high stress levels and overtime to be put by the project team
- 4) Project management seen as only a process and not adding any value to the successful delivery of the project
- 5) Unforeseen internal or external events that impacts the project delivery

Aims and Objectives:

- To promote the Certification of Qualified Project Management Professionals (QPMP) - test conducted by PMA-India in association with the Association for Project Management (APM-UK) twice a year, based on the IPMA D-Level Certification Programme in Project Management which is recognized all over the world.
- Certification for cost engineering in India on similar lines is under consideration.
- educational training, consulting and research

Aims and Objectives:

- To propagate professional management ideas and practices in India;
- To perform the responsibilities of an apex body of the Project Management Profession in India and to enroll its members - government departments, corporate bodies and institutions, professionals individuals and similar entities as its members;
- To undertake on its own and/or in collaboration with other corporate bodies, educational and research institutions - for the promotion of Project Management;
- To provide a recognized forum for the free exchange of ideas, applications and solutions to Project Management issues among the members of the Institute and other organizations interested and involved in Project Management; To serve as a recognised platform for open communication and collaboration among Institute members and other organisations with an interest in or involvement in Project Management;

- To serve as a recognised platform for open communication and collaboration among Institute members and other organisations with an interest in or involvement in Project Management;
- To seek and encourage international cooperation and contact with other organizations both public and private which relate to Project Management and collaborate in areas of mutual benefit; Seek out and foster international collaboration and interaction with other public and private organisations involved in project management, and work together for mutual gain.
- To explore and examine, plan, execute, unify and integrate policies in the relatively unorganised sectors.

Aims and Objectives:

- To promote the Certification of Qualified Project Management Professionals (QPMP) – test conducted by PMA-India in association with the Association for Project Management (APM-UK) twice a year, based on the IPMA D-Level Certification Programme in Project Management which is recognized all over the world.
- The Association for Project Management (APM) in the United Kingdom and the Project Management Association (PMA) in India hold an exam twice yearly to certify Qualified Project Management Professionals (QPMPs) based on the internationally recognised IPMA D-Level Certification Programme in project management.
- Certification for cost engineering in India on similar lines is under consideration.

Aims and Objectives:

- Projects are short-term and one-of-a-kind activities. Unique in that they are not regular businesses but rather a series of steps meant to generate a one-off product, outcome, service, or result; temporary because they occur only once and for a limited amount of time. Collaboration tools and communication with all project stakeholders—whether they are clients, the project team, the organisation, or the broader community—are essential. Therefore, project management is the hub around which all other processes revolve, the place where tasks are derived, defined, scheduled, organised, communicated, assigned, tracked, and assessed.

- Achievement of all project procedures development and implementation. Initiation, Planning and Design, Construction and Execution, Monitoring and Control, and Completion are the five distinct phases of a project's life cycle. The success of a project depends on the careful planning and execution of all of the preceding steps.
- Certification for cost engineering in India on similar lines is under consideration.

Membership

- The success and popularity of PMA-India is reflected in the various activities of the association and growth in numbers in the last couple of years.
- PMA Membership is extended on the payment of nominal fees to all those individuals or corporations / organizations who share the objectives of the society and are willing to work for its furtherance after approval by the National Managing Committee.

SELF-ASSESSMENT QUESTIONS – 4

10. The project charter is a one-time announcement. (True / False)
11. The purpose of a _____ is to detail the work requirements for projects and programs that have deliverables and/or services performed.
12. IAPPM stands for _____.

9. SUMMARY

Let's summarize:

- The project manager is concerned with overall plan, estimations and budgeting and implementation criteria about any project under development. He/she plays a key role in the software development.
- SOW (statement of work) is essential document for software progress. SOW gives the detail work requirements for projects and programs that have deliverables and/or services performed.
- Project management associations existing across world include PMI, IPMI, and IAPPB etc. These institutes conduct training programs across the world to impart the knowledge about project management.

10. TERMINAL QUESTIONS

1. What is project management? Explain various activities involved in project management.
2. Explain the role of project manager.
3. List out some of Project Management Associations.
4. Explain in detail about software project development stages.

11. ANSWERS

Self Assessment Questions

1. True
2. Time, Cost, Scope
3. a)
4. True
5. Formal
6. b)
7. False
8. Initiation
9. c)
10. True
11. Statement of Work (SoW)
12. International Association of Project and Program Management

Terminal Questions

1. Project Management is the complete set of tasks, techniques, and tools applied during project execution. (Refer Section 3.2)
2. Project Manager is overall responsible for the successful planning and execution of a project. Project Manager Title is used in the construction industry, architecture, information technology and many different occupations that are based on production of a product or service. (Refer Section 3.1)
3. The most prominent project management associations are:
 - a. The Association for Project Management (UK) (APM)
 - b. The Australian Institute of Project Management (AIPM)
 - c. The International Project Management Association (IPMA)
 - d. The Project Management Institute (PMI)
 - e. The International Association of Project and Program Management (IAPP) (Refer Section 8)
4. The project development process has four major stages: Initiation, Planning and Design, Project Implementation and Closing / Maintenance. (Refer Section 5)