

1. Project Evaluation and Project Planning

Both Project Evaluation and Project Planning are critical aspects of Software Project Management that help ensure a project is well-defined, feasible, and executed successfully.

Project Evaluation-Project evaluation is the process of assessing the feasibility, effectiveness, and impact of a software project. It helps stakeholders determine whether a project should proceed and how it aligns with business goals.

Key Aspects of Project Evaluation

- Feasibility Study – Examines whether the project is technically, financially, and operationally viable.
- Cost-Benefit Analysis – Compares the expected benefits with the estimated costs.
- Risk Assessment – Identifies potential risks and their impact on the project.
- Performance Evaluation – Assesses past project data to predict future success.
- Stakeholder Analysis – Evaluates the interests and expectations of stakeholders.
- Return on Investment (ROI) Analysis – Measures the potential financial return from the project.

Project evaluation occurs before, during, and after project execution to ensure continuous alignment with objectives.

Project Planning-Project planning involves defining the scope, objectives, schedule, resources, risks, and deliverables of the software project. It serves as a roadmap for successful execution.

Key Components of Project Planning

- Defining Project Scope – Outlines the boundaries, deliverables, and objectives.
- Requirement Analysis – Gathers and documents software requirements.
- Work Breakdown Structure (WBS) – Breaks down the project into manageable tasks.
- Scheduling – Uses Gantt charts, timelines, and Agile sprints to define timelines.
- Resource Allocation – Assigns team members, tools, and infrastructure.
- Budget Estimation – Forecasts project costs and financial needs.
- Risk Management Plan – Identifies potential risks and mitigation strategies.
- Quality Assurance Plan – Establishes quality benchmarks and testing strategies.
- Communication Plan – Defines how stakeholders will receive project updates.
- Change Management Plan – Outlines procedures for handling project changes.

Project planning is a continuous process and may evolve based on project progress, stakeholder feedback, and external factors.

Aspect	Project Evaluation	Project Planning
Purpose	Assesses feasibility and effectiveness	Defines execution strategy and roadmap
Timing	Before, during, and after the project	Before and throughout project execution
Focus	Feasibility, risks, and success metrics	Tasks, schedules, resources, and risks
Outcome	Decision to proceed, modify, or stop the project	A structured plan for execution

Both Project Evaluation and Project Planning play crucial roles in software project management. Evaluation ensures that the project is worth pursuing, while planning provides a structured approach to execution. Together, they help organizations minimize risks, optimize resources, and ensure project success.

2. Importance of Software Project Management

Software Project Management (SPM) is a proper way of planning and leading software projects. It is a part of project management in which software projects are planned, implemented, monitored, and controlled.

Need for Software Project Management-Software is a non-physical product. Software development is a new stream in business and there is very little experience in building software products. Most of the software products are made to fit clients' requirements. The most important is that basic technology changes and advances so frequently and rapidly that the experience of one product may not be applied to the other one. Such types of business and environmental constraints increase risk in software development hence it is essential to manage software projects efficiently. It is necessary for an organization to deliver quality products, keep the cost within the client's budget constraint, and deliver the project as per schedule. Hence, in order, software project management is necessary to incorporate user requirements along with budget and time constraints.

Types of Management in SPM

1. Conflict Management-Conflict management is the process to restrict the negative features of conflict while increasing the positive features of conflict. The goal of conflict management is to improve learning and group results including efficacy or performance in an organizational setting. Properly managed conflict can enhance group results.
2. Risk Management-Risk management is the analysis and identification of risks that is followed by synchronized and economical implementation of resources to minimize, operate and control the possibility or effect of unfortunate events or to maximize the realization of opportunities.

3. Requirement Management-It is the process of analyzing, prioritizing, tracking, and documenting requirements and then supervising change and communicating to pertinent stakeholders. It is a continuous process during a project.

4. Change Management-Change management is a systematic approach to dealing with the transition or transformation of an organization's goals, processes, or technologies. The purpose of change management is to execute strategies for effecting change, controlling change, and helping people to adapt to change.

5. Software Configuration Management-Software configuration management is the process of controlling and tracking changes in the software, part of the larger cross-disciplinary field of configuration management. Software configuration management includes revision control and the inauguration of baselines.

6. Release Management-Release Management is the task of planning, controlling, and scheduling the built-in deploying releases. Release management ensures that the organization delivers new and enhanced services required by the customer while protecting the integrity of existing services.

Aspects of Software Project Management-The list of focus areas it can tackle and the broad upsides of Software Project Management is:

1. Planning-The software project manager lays out the complete project's blueprint. The project plan will outline the scope, resources, timelines, techniques, strategy, communication, testing, and maintenance steps. SPM can aid greatly here.

2. Leading-A software project manager brings together and leads a team of engineers, strategists, programmers, designers, and data scientists. Leading a team necessitates exceptional communication, interpersonal, and leadership abilities. One can only hope to do this effectively if one sticks with the core SPM principles.

3. Execution-SPM comes to the rescue here also as the person in charge of software projects (if well versed with SPM/Agile methodologies) will ensure that each stage of the project is completed successfully. measuring progress, monitoring to check how teams function, and generating status reports are all part of this process.

4. Time Management-Abiding by a timeline is crucial to completing deliverables successfully. This is especially difficult when managing software projects because changes to the original project charter are unavoidable over time. To assure progress in the face of blockages or changes, software project managers ought to be specialists in managing risk and emergency preparedness. This Risk Mitigation and management is one of the core tenets of the philosophy of SPM.

5. Budget-Software project managers, like conventional project managers, are responsible for generating a project budget and adhering to it as closely as feasible, regulating spending, and reassigning funds as needed. SPM teaches us how to effectively manage the monetary aspect of projects to avoid running into a financial crunch later on in the project.

6. Maintenance-Software project management emphasizes continuous product testing to find and repair defects early, tailor the end product to the needs of the client, and keep the project on track. The software project manager makes ensuring that the product is thoroughly tested, analyzed, and adjusted as needed. Another point in favor of SPM.

Downsides of Software Project Management-Numerous issues can develop if a Software project manager lacks the necessary expertise or knowledge. Software Project management has several drawbacks, including resource loss, scheduling difficulty, data protection concerns, and interpersonal conflicts between Developers/Engineers/Stakeholders. Furthermore, outsourcing work or recruiting additional personnel to complete the project may result in hefty costs for one's company.

1. Costs are High-Consider spending money on various kinds of project management tools, software, & services if ones engage in Software Project Management strategies. These initiatives can be expensive and time-consuming to put in place. Because your team will be using them as well, they may require training. One may need to recruit subject-matter experts or specialists to assist with a project, depending on the circumstances. Stakeholders will frequently press for the inclusion of features that were not originally envisioned. All of these factors can quickly drive up a project's cost.

2. Complexity will be increased-Software Project management is a multi-stage, complex process. Unfortunately, some specialists might have a propensity to overcomplicate everything, which can lead to confusion among teams and lead to delays in project completion. Their expressions are very strong and specific in their ideas, resulting in a difficult work atmosphere. Projects having a larger scope are typically more arduous to complete, especially if there isn't a dedicated team committed completely to the project. Members of cross-functional teams may lag far behind their daily tasks, adding to the overall complexity of the project being worked on.

3. Overhead in Communication-Recruits enter your organization when we hire software project management personnel. This provides a steady flow of communication that may or may not match a company's culture. As a result, it is advised that you maintain your crew as small as feasible. The communication overhead tends to skyrocket when a team becomes large enough. When a large team is needed for a project, it's critical to identify software project managers who can conduct effective communication with a variety of people.

4. Lack of Originality-Software Project managers can sometimes provide little or no space for creativity. Team leaders either place an excessive amount of emphasis on management processes or impose hard deadlines on their employees, requiring them to develop and operate code within stringent guidelines. This can stifle innovative thought and innovation that could be beneficial to the project. When it comes to Software project management, knowing when to encourage creativity and when to stick to the project plan is crucial. Without Software project management personnel, an organization can perhaps build and ship

code more quickly. However, employing a trained specialist to handle these areas, on the other hand, can open up new doors and help the organization achieve its objectives more quickly and more thoroughly.

3 Software Project Management Activities

Software Project Management consists of many activities, that includes planning of the project, deciding the scope of product, estimation of cost in different terms, scheduling of tasks, etc.

The list of activities are as follows:

1. Project Planning: It is a set of multiple processes, or we can say that it a task that performed before the construction of the product starts.

2. Scope Management: It describes the scope of the project. Scope management is important because it clearly defines what would do and what would not. Scope Management create the project to contain restricted and quantitative tasks, which may merely be documented and successively avoids price and time overrun.

3. Estimation management: This is not only about cost estimation because whenever we start to develop software, but we also figure out their size(line of code), efforts, time as well as cost.

- If we talk about the size, then Line of code depends upon user or software requirement.
- If we talk about effort, we should know about the size of the software, because based on the size we can quickly estimate how big team required to produce the software.
- If we talk about time, when size and efforts are estimated, the time required to develop the software can easily determine.
- And if we talk about cost, it includes all the elements such as:
 - Size of software
 - Quality
 - Hardware
 - Communication
 - Training
 - Additional Software and tools
 - Skilled manpower

4. Scheduling Management: Scheduling Management in software refers to all the activities to complete in the specified order and within time slotted to each activity. Project managers define multiple tasks and arrange them keeping various factors in mind. For scheduling, it is compulsory -

- Find out multiple tasks and correlate them.
- Divide time into units.
- Assign the respective number of work-units for every job.
- Calculate the total time from start to finish.
- Break down the project into modules.

5. Project Resource Management: In software Development, all the elements are referred to as resources for the project. It can be a human resource, productive tools, and libraries. Resource management includes:

- Create a project team and assign responsibilities to every team member
- Developing a resource plan is derived from the project plan.
- Adjustment of resources.

6. Project Risk Management: Risk management consists of all the activities like identification, analyzing and preparing the plan for predictable and unpredictable risk in the project. Several points show the risks in the project:

- The Experienced team leaves the project, and the new team joins it.
- Changes in requirement.
- Change in technologies and the environment.
- Market competition.

7. Project Communication Management: Communication is an essential factor in the success of the project. It is a bridge between client, organization, team members and as well as other stakeholders of the project such as hardware suppliers. From the planning to closure, communication plays a vital role. In all the phases, communication must be clear and understood. Miscommunication can create a big blunder in the project.

8. Project Configuration Management: Configuration management is about to control the changes in software like requirements, design, and development of the product. The Primary goal is to increase productivity with fewer errors. Some reasons show the need for configuration management:

- Several people work on software that is continually update.
- Help to build coordination among suppliers.
- Changes in requirement, budget, schedule need to accommodate.
- Software should run on multiple systems.
- Tasks perform in Configuration management:
 - Identification

- Baseline
- Change Control
- Configuration Status Accounting
- Configuration Audits and Reviews
- People involved in Configuration Management:

4 Methodologies

A Project Management Methodology is a structured approach or framework that guides how projects are planned, executed, monitored, controlled, and closed. It provides a set of principles, processes, tools, and techniques for managing projects effectively and efficiently. Examples of project management methodologies include Waterfall, Agile, Scrum, PRINCE2, and Lean, each offering its own unique approach to project delivery based on the specific needs and characteristics of the project and organization.

Why do Project Management Methodologies Matter?

Project management methodologies are essential for several reasons:

- Standardization: They provide a standardized approach to managing projects, ensuring consistency and repeatability across different projects within an organization.
- Efficiency: By following established processes and best practices, project managers can streamline project execution, optimize resource utilization, and minimize risks and uncertainties.
- Clarity and Alignment: Project methodologies help align stakeholders and project teams by clearly defining project objectives, roles, responsibilities, and expectations.
- Flexibility: While project methodologies provide structured frameworks, they also offer flexibility to adapt to changing project requirements, environments, and constraints.
- Continuous Improvement: Many project methodologies emphasize the importance of learning from past experiences and continuously improving project management practices through feedback and reflection.

Top 10 Project Management Methodologies

Several project management methodologies are commonly used in various industries, each with its unique characteristics, advantages, and suitability for different types of projects. Some of the most widely recognized methodologies include:

- Waterfall: The Waterfall methodology follows a linear, sequential approach to project management, with distinct phases such as initiation, planning, execution, monitoring, and closure. It is well-suited for projects with clear, well-defined requirements and limited changes expected during the project lifecycle.
- Agile: Agile methodologies, such as Scrum and Kanban, emphasize iterative and incremental delivery, collaboration, and flexibility in responding to changing requirements. Agile is particularly well-suited for software development projects and projects where requirements are likely to evolve.
- Lean: Lean project management focuses on maximizing value while minimizing waste through continuous improvement, eliminating non-value-added activities, and optimizing processes. It originated in manufacturing but has since been applied to various industries, including healthcare, construction, and service sectors.
- PRINCE2: PRINCE2 (Projects in Controlled Environments) is a process-based methodology that provides a structured approach to project management, with defined roles, processes, and governance principles. It is widely used in the UK and Europe, particularly in government and public sector projects.
- Critical Path Method (CPM): CPM is a mathematical algorithm used for scheduling and managing projects, focusing on identifying the critical path, which is the longest sequence of dependent tasks that determines the project's duration. It is commonly used in construction, engineering, and manufacturing industries.
- Kanban Methodology: Kanban is one of the widely used software development methodologies along with Scrum. The Kanban Methodology was developed in the 1940s by Toyota for manufacturing purposes. However, for software purposes, it was released in 2001 after the release of the Agile Manifesto.
- Project Management Body of Knowledge (PMBOK): PMBOK is a process-based project management methodology (actually a framework), developed by the Project Management Institute (PMI). It constitutes a collection of project management processes, best practices, terminologies, guidelines, and tools, accepted as standard within the project management industry.
- Extreme Programming (XP): XP is based on the frequent iteration through which the developers implement User Stories. User stories are simple and informal statements of the customer about the functionalities needed. A User Story is a conventional description by the user of a feature of the required system.
- Six Sigma: Six Sigma is a powerful methodology for process improvement and quality management that originated with Motorola Corporation. This approach revolves around expressing process capability in terms of defects per million opportunities (DPMO), where a Six Sigma level implies a mere 3.4 parts per million defect probability.
- Scrum Methodology: Scrum is the type of Agile framework. It is a framework within which people can address complex adaptive problems while productivity and creativity of delivering products are at highest possible values. Scrum uses Iterative process.

How To Choose the Right Project Management Methodology

Choosing the right methodology is crucial in software development as it directly impacts the success of a project. Methodologies provide structured approaches to planning, executing, and managing projects, ensuring that teams work efficiently and effectively towards achieving their goals. Here are some key points to consider when selecting the right methodology:

- Understand Project Nature: Start by getting a clear picture of what the project involves. Consider its size is it a small, straightforward task, or a large, complex endeavor? Understand its goals what are you trying to achieve with this project?
- Consider Organizational Culture: Take a moment to think about the culture of your organization. Is it a place where people are used to working in a flexible, adaptive manner, or is there a preference for more structured, step-by-step approaches? Understanding this can help you choose a methodology that aligns well with how things are typically done.
- Evaluate Stakeholder Preferences: Every project involves different people with their own preferences and expectations. Take the time to understand what these stakeholders—whether they're clients, team members, or higher-ups—want and need from the project. How do they prefer to communicate? How much input do they want to have along the way?
- Assess Project Requirements: Dive deep into the specific requirements of the project. When does it need to be completed? What's the budget? What resources are available to you—both in terms of manpower and tools? Understanding these constraints and limitations will help you plan effectively.
- Review Methodology Characteristics: Once you have a clear understanding of the project's nature, organizational culture, stakeholder preferences, and requirements, it's time to review different project management methodologies. Consider the characteristics of each approach—whether it's Agile, Waterfall, or a hybrid method—and choose the one that best fits the unique needs of your project. Each methodology has its strengths and weaknesses, so pick the one that aligns most closely with your project's goals and constraints.

Implementing Project Management Methodologies

Implementing a project management methodology requires careful planning, training, and buy-in from stakeholders and project teams. Key steps in implementing a project management methodology include:

- Assessment and Planning: Evaluate the organization's current project management practices, identify areas for improvement, and develop a plan for implementing the chosen methodology.
- Training and Education: Provide training and education to project managers and team members on the selected methodology, including its principles, processes, and tools.
- Customization: Tailor the chosen methodology to fit the specific needs and requirements of the organization and the project at hand.
- Pilot Projects: Start with small pilot projects to test the effectiveness of the selected methodology in real-world scenarios and gather feedback for refinement.
- Continuous Improvement: Continuously monitor and evaluate the implementation of the methodology, solicit feedback from stakeholders, and make adjustments as needed to improve project outcomes.

Challenges and Considerations in Project Management Methodologies

Challenges and considerations in project management methodologies vary depending on the specific methodology used, the nature of the project, and the organizational context. Here are some common challenges and considerations that project managers may encounter across different project management methodologies:

- Adaptability: Employing a methodology that allows for seamless adjustment to evolving project demands and objectives, ensuring flexibility and responsiveness in execution.
- Stakeholder Engagement: Actively involving and communicating with all relevant stakeholders throughout the project lifecycle, promoting transparency, understanding, and buy-in to achieve shared goals.
- Resource Allocation: Strategically managing time, finances, and human resources across different project phases, optimizing productivity and efficiency to meet project milestones and deliverables effectively.
- Risk Management: Systematically identifying, analyzing, and addressing potential threats to project success, proactively implementing measures to mitigate risks and minimize their impact on project outcomes.
- Team Collaboration: Cultivating an environment of cooperation, trust, and effective communication among team members, fostering synergy and collective problem-solving, particularly vital in dispersed or remote team settings.
- Case Studies: Application of Project Management Methodologies
- Agile in Software Development: Agile is like building a puzzle. Instead of trying to finish the whole puzzle at once, you break it into small pieces and finish them one by one. This helps you adjust and improve as you go along, based on how the pieces fit together.
- Waterfall in Construction Projects: Think of building a house like following a recipe. You start with the foundation, then the walls, then the roof, and so on. Each step is finished before you move on to the next. It's like building one layer at a time, making sure everything is solid before adding more.
- Hybrid Approach in Marketing Campaigns: Imagine planning a big party. You might have a general idea of what you want, but as the party gets closer, you might need to change things based on who's coming or what's available. A hybrid approach is like having a mix of plans – some that you can change easily and others that you stick to no matter what.
- Lean Six Sigma in Manufacturing: Picture a factory making toys. Lean Six Sigma is like having someone watch the process closely to find ways to make it smoother and faster. They might notice that certain steps aren't necessary or that things could be done more efficiently. It's about making the factory run like a well-oiled machine.

Future Trends in Project Management Methodologies

Future trends in project management methodologies are shaped by advancements in technology, changes in organizational structures, and evolving industry practices. Here are some emerging trends that are likely to influence the future of project management methodologies:

- AI Integration: This means using smart computer programs to help with tasks that are repetitive or predictable. For example, they might automatically organize information or predict future trends based on data.
- Blockchain for Transparency: Blockchain is like a digital ledger that records transactions securely. Using it in project management means keeping track of things in a way that everyone involved can see and trust. It's especially helpful in projects involving things like shipping, where you need to know where items are at all times.
- Remote Project Management Tools: These are tools that help teams work together on projects, even if they're not in the same place. They might include things like video calls, shared documents, or task trackers, making it easier for everyone to stay organized and connected.
- Agile Scaling Frameworks: Imagine a sports team getting bigger and needing new strategies to work together effectively. Agile scaling frameworks are like those new strategies for managing larger projects with multiple teams. They help everyone stay coordinated and focused, even when there's a lot going on.
- Focus on Sustainability: This means considering the long-term impact of projects on the environment and society. It involves making choices that are good for the planet and for people, like using renewable resources or minimizing waste. Integrating sustainability into project management means thinking about these things from the start and finding ways to make projects better for everyone.

5 Categorization of Software Projects

In project management, there are many categories that need to plan as well while planning the project. You will see each category in detail that how we can define the categories of the project. You will see categories like scope and significance, type of the project, level of technology, size, and scale of operations, ownership, and control, implementations, and purpose of the project are generally used categories. If you're planning a project and want to implement then you can consider these categories. Projects are often categorized on the basis of their scope, size, speed of implementation, location, type, and technology. The project can be classified on the grounds of the following.

- Scope and Significance : The projects are generally classified on the basis of coverage and magnitude of their operations. So on the basis of scope projects can be National or International.
- National Projects –There are also projects which are undertaken either by the government itself or assigned to private entrepreneurs in a country. In a country like India Public and Private sectors coexist to undertake major and minor projects. Government projects and private projects operate in vastly different environments, associated with different advantages and disadvantages. The only purpose of the National Project is the growth and development of the economy and maintenance of existing standards of living.
- International Projects –The projects which are embarked on by “Foreign investors” either by establishing a solitary or a branch of their unit or by mere participation in the equity of any domestic company are called International Projects. These can be in the form of joint ventures, MNC’s, and collaborations between two companies.
- Type : According to the type, projects can be industrial and non-industrial.
 - Industrial –These are those projects which are undertaken with a view to developing the economy.
 - Non-Industrial –These projects can be related to welfare and maintenance of a standard of living in an economy.
- Level of Technology : Technology plays a significant role in managing projects. Projects can be sub-divided into four categories on the basis of technology. These are as follows.
 - Conventional Technology Projects –These are the projects which use acquainted and known technology in the continuous process. e.g. steel, cement, sugar, chemicals, and fertilizers, etc.
 - Non-Conventional Technology –Such kinds of projects apply if not the latest at least contemporary mode technology e.g. projects using cranes i.e. a mechanical way of lifting.
 - High-Tech Project –Huge investments are made in technology in these types of projects, e.g., space projects, nuclear power projects, etc.
 - Low Investment Projects –These types of projects demand low investment in technology e.g., cosmetics and household utilities, etc.
- Size and Scale of Operations : On the basis of size and scale of operations, projects can be large scale, medium scale, and small scale.
 - Small Scale Projects –These are the projects which can be completed within a time period of 1-2 years and with investment below Rs. 5 crores.
 - Medium Scale Projects –These are the projects which can be completed within a time period of 2-5 years and with investment between Rs. 5 to Rs. 10 crores.
 - Large Scale Projects –These are the projects which can be completed within a time period of 5-10 years and with investment over and above Rs. 100 crores.
- Ownership and Control : Projects can be divided into 3 categories according to their governance.
 - Public Sector Projects –These are fully owned and controlled by the government e.g., generating power and extracting minerals, etc.
 - Private Sector Projects –These are fully owned by individuals and companies e.g., newspapers and magazines, etc.
 - Joint Sector Projects –These projects are run and controlled by both government and private individuals are under this category.
- Speed of Implementation: According to the speed of implementation, projects can be normal, crash, and disaster projects.
 - Normal Projects –In this category, an adequate time is allowed for implementation. It requires minimal capital costs.
 - Crash Projects –In this category, additional capital is incurred to save time.
 - Disaster Projects –In this category, naturally capital cost will go up, but project time will get drastically reduced. Failure of quality is accepted.
- Purpose : There is always a purpose for everything. So, the projects are classified according to purpose as follows.

- Rehabilitation Projects –These projects are undertaken by financially sound investing groups to service sick units. It is very risk and success are very less in such projects.
- Balancing Projects –These are undertaken to cope with changes in the supply side of economies of factors of production, to eliminate the underutilization of the actual capacities, and enhance efficiency and effectiveness.
- Maintenance Projects –These projects involve overhauling the machinery, repairs, and patching up activities at regular intervals.
- Modernization Projects –Modernization of old plants is required to cope with the dynamic environment.
- Others : Some other types of projects are as follows.
 - Capacity Expansion Projects –This involves enlarging the existing capacity of the products.
 - Employees Welfare Project –The objective of such projects is to install infrastructural facilities for improving working conditions and labor relations as well as to develop the skills of the staff.

6 Setting objectives

Project objectives of Project Management outline what a project is meant to achieve and are defined as clear, measurable, attainable, applicable, and time-bound goals. They provide the project a distinct purpose and course, directing the team's selections and actions all through the project's lifecycle. Typically, project objectives specify the deliverables, success criteria, and intended results. They serve as a foundation for planning, carrying out, overseeing, and evaluating the project and aid in the understanding of its goal by stakeholders.

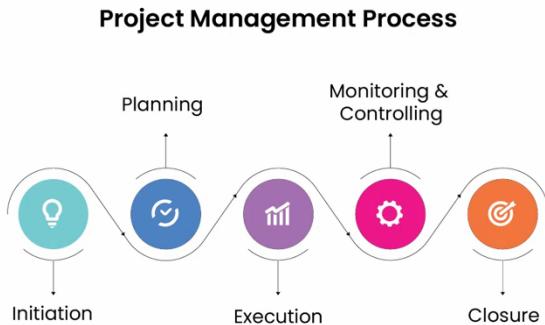
What are the Objectives of Project Management?

- Successfully Accomplishing All Project Goals: Making sure that all project objectives, such as deliverables, deadlines, and quality standards, are fulfilled or surpassed.
- Providing instructions and supervision for team members: Throughout the project lifetime, team members should receive clear instructions, assistance, and advice to ensure tasks are executed effectively and efficiently.
- Promoting Cooperation and Communication: To improve the efficacy and efficiency of a project, team members, stakeholders, and other pertinent parties should be encouraged to collaborate and maintain open lines of communication.
- Implementing all Safety Procedures and Protocols: Ensuring that all essential safety measures are followed in order to safeguard the health and safety of project participants and stakeholders.
- Optimizing Budget and Resources: Budget and resource optimization refers to the effective management of project resources, such as funds, supplies, and labor, in order to achieve project goals while maximizing value and reducing waste.
- Managing Changes and Risks: Actively detecting, evaluating, and controlling risks at every stage of the project's lifetime in order to minimize dangers and take advantage of opportunities. In order to keep the project in line with its goals, it is also important to manage changes to the project's scope, schedule, or resources successfully.
- Ensuring Client Satisfaction: Throughout the project, giving the needs and expectations of the client first priority, making sure that deliverables meet or surpass the client's expectations; and aggressively requesting feedback to resolve any issues and improve client satisfaction.
- Attaining Cost Efficiency: Keeping an eye fixed on and handling project charges to ensure that spending remains inside economic limits whilst optimizing value.
- Continuous Improvement: Promoting a tradition of non-stop development via the use of best practices, identity of lesson learnt from preceding projects, and learning from them.

What are the types of Project Objectives?

- Time-based Objectives: These goals outline when certain project phases must be finished. To reveal improvement and ensure the project remains on time, they incorporate milestones and cut-off dates.
- Strategic Objectives: High-level objectives that complement the organization's broad mission and vision are known as strategic objectives. They are often long-term in nature and give the project direction and emphasis.
- Tactical Objectives: These goals concentrate on the project's short- to medium-term objectives and are more precise than strategic goals. They help in directing daily operations and decision-making and are frequently derived from strategic objectives.
- Cost Objectives: Cost objectives delineate the project's budget and resource allocation strategy. They make sure that sources are spent correctly and that the project is completed inside the allocated budget.
- Functional Objectives: These goals are related to the particular departments or functions which can be a part of the project. They make sure that everybody is operating toward the identical goals and delineate the jobs and obligations of various team members.

Project Management Phases



- **Initiation:** The project's goal, scope, objectives, and early feasibility evaluation are all defined during the early phase. A project charter might also want to be created, stakeholders must be identified, a initial threat assessment should be done, and approval to move forward should be acquired.
- **Planning:** Detailed plans are created during this stage to direct the project's implementation. This comprises determining the needs for the project, putting together a work breakdown structure (WBS), making timelines, estimating the resources needed, outlining roles and duties, and setting aside money. During this stage, techniques for risk management are also devised.
- **Execution:** Members of the project team assign tasks, distribute resources, and carry out their individual responsibilities. To keep the project moving forward throughout this phase, team member's and stakeholder's cooperation and communication are essential.
- **Monitoring and Controlling:** Throughout the path of the project, the plan, timeline, finances, and excellent standards are used to gauge how well the work goes. Any deviations or problems are found and fixed right away with corrective measures. Monitoring performance indicators, holding frequent status meetings, handling changes, and managing risks are all part of this phase.
- **Closing:** The project is officially closed out once all deliverables have been finished and authorized. This entails getting the client's or stakeholder's final approval, recording lessons learned, allocating project resources, and preserving project records.

Essential Skills to become a Project Manager

Below are some essential skills to become a Project Manager:

- **Team Building:** Effective project managers have to recognize how to create a collaborative environment, capitalize on each team member's specific skills, and develop strong teams.
- **Technical Skills:** Project managers can also require know-how specifically disciplines, together with engineering, IT, creation, or finance, relying on the nature of the project.
- **Negotiation:** Project managers frequently have to negotiate in order to settle disputes, come to an agreement, and accomplish project goals with stakeholders, team members, and vendors.
- **Problem-Solving:** During the course of a project, managers face a variety of difficulties and roadblocks. To effectively identify the sources of these issues, weigh their choices, and put solutions in place, project managers need to possess excellent problem-solving abilities.
- **Communication:** Team members, stakeholders, and clients must be informed of project goals, expectations, and progress through effective communication. This involves communicating effectively, listening carefully, and changing up communication tactics when necessary.

How to Set Effective Project Management Objectives?

- **Understand Project Requirements:** To start, make sure you have a clear understanding of the project's requirements, which include its objectives, deliverables, scope, budget, schedule, and stakeholders' expectations. A solid grasp of these elements serves as the basis for goal-setting.
- **Communicate Objectives Clearly:** Make sure that all parties involved in the project—team members, sponsors, and clients—are aware of the goals. Make certain that everyone is aware of the goals, how they fit into the bigger picture, and how success will be determined.
- **Divide Your Goals Into Milestones:** Divide more ambitious goals into more doable deadlines or tasks. This facilitates monitoring development, early detection of possible problems, and project momentum maintenance.
- **Review and update goals on a regular basis:** Throughout the course of the project, continuously review and, if necessary, update the project objectives. This enables adaptability to shifting project needs, objectives, and outside circumstances.
- **Set Project Objectives in Order of Priority:** Set project objectives in order of significance, influence on project success, and alignment with organizational objectives. This aids in concentrating resources and efforts on the most important goals.

7 Management Principles

Project Management is a demanding task that requires highly skilled people having complete domain knowledge and good soft skills such as communication, time management, and leadership. Some set principles and methodologies are followed for efficient project management. A project has a predetermined beginning time and ending time, which means that the work is to be carried out within preset deadlines.

The essential guidelines that must be followed to successfully manage projects are known as project management principles. There isn't presently an official list of guidelines for productive projects in the Project Management Book of Knowledge.

(PMBOK). Nonetheless, the yearly pulse study conducted by PMI reveals the guidelines that prosperous project managers and organisations adhere to.

Principles-of-Project-Management



Let us discuss various principles of project management as follows:

Well-defined Goals and Objectives: Before beginning any project work, the goals and objectives of the project must be clear to everyone involved in the project. This step of defining goals helps to decide the size of the workforce, make further schedules, and evaluate the success/failure of the project at the evaluation stage. For an ideal project, goals must be realistic, clear, and measurable.

Project Organizational Structure: An organizational structure is a system that defines the roles and responsibilities of various departments in an organization in a hierarchical manner. It includes various rules such as how the flow of information should be across various levels. Various procedures and guidelines to be followed for specific tasks should also be clearly defined. This ensures the proper distribution of responsibilities among team members.

Risk Management: The project manager should analyze the various potential risks associated with the project work at the very beginning stage of the project. There is no specified way for proper risk management. Proper risk management plans should also be developed so that if any issue arises during the project work, it can be rectified as soon as possible so that there is no delay in the completion of the project.

Establish the Project Deliverables: Project deliverables are the tangible and measurable items that are expected as a result or outcome of the project work. For instance, a software development project can have deliverables such as a fully-fledged working application, user manuals, documentation, source code, testing reports, etc. These should also be defined clearly right at the beginning of any project so that each team member is aware of what they are aiming to achieve and act accordingly.

Build a Communication Plan: There should be a well-defined communication plan to be followed by team members during the project duration for any kind of formal communication related to the project work. Most of the communication should be in written form such as emails, letters, notices, etc. so that there is a record for that. It becomes crucial when the organizational structure is quite complex and there are various hierarchical levels involved in the team.

Define Various Performance Baselines: Performance baselines refer to the benchmark points that are established to assess and measure the performance of a system, process or project as a whole. Various team members can contribute to update the progress during the project. Some common types of performance baselines are Schedule baselines, Cost baselines, Quality baselines, etc.

Define the Priorities of Shareholders: The primary goal of any project in an industry is business profit, so this goal should be clearly defined in quantifiable terms by discussion with the shareholders. Their priorities should be given utmost importance and the progress of the project towards the set goal should be tracked by setting up milestones in the beginning.

Ensure Transparency: The project manager should ensure a transparent system where each team member can obtain any project-relevant information quickly and efficiently. For any relevant information access, this should not be there that team members require permission from the team leader as this will cause unnecessary delay in the project work.

Careful Budgeting and Scheduling: Budgeting and scheduling are crucial resources for any project. Proper budgeting involves defining all costs associated with the project and monitoring expenses. Scheduling involves defining activities for different timelines, typically daily or weekly. Each team member should follow the schedule provided by the project manager.

Establish Accountability and Responsibility: Accountability and Responsibility are two important soft skills that every team member should possess. The project manager should ensure that team members are accountable, which means that they must accept their actions without any hesitation. This ensures that only reasonable actions are taken. Each team member should also have a sense of responsibility in them so that they do their work with complete dedication and carefulness to avoid any kind of errors.

8 Management Control

Management control in software project management refers to the process of monitoring, measuring, and ensuring that the project stays on track in terms of scope, time, cost, quality, and risk. It helps project managers identify deviations, take corrective actions, and ensure successful project delivery.

Key Aspects of Management Control

1. Project Monitoring & Tracking
 - Continuously tracking progress against the project plan.
 - Using tools like Gantt Charts, Kanban Boards, and Agile Dashboards to visualize progress.
 - Monitoring key performance indicators (KPIs) such as budget adherence, schedule variance, and defect rates.
2. Change Control Management

- Handling modifications in project scope, schedule, or resources.
- Implementing a structured Change Control Process to assess and approve/reject changes.
- Ensuring stakeholders are informed about changes and their impact.

3. Risk Management

- Identifying potential project risks (e.g., technical failures, resource shortages, market changes).
- Developing risk mitigation strategies and contingency plans.
- Regularly assessing and updating risk logs.

4. Quality Assurance & Control

- Ensuring that the software meets predefined quality standards and customer expectations.
- Conducting code reviews, testing (unit, integration, system testing), and audits.
- Implementing process improvement models like Six Sigma, CMMI, or ISO 9001.

5. Cost & Budget Control

- Monitoring project expenses to prevent budget overruns.
- Using techniques like Earned Value Management (EVM) to measure cost performance.
- Ensuring efficient resource allocation and cost optimization.

6. Schedule & Time Management

- Ensuring project milestones and deadlines are met.
- Using Critical Path Method (CPM) or Program Evaluation and Review Technique (PERT) for scheduling.
- Addressing delays proactively and reallocating resources if needed.

7. Communication & Reporting

- Keeping stakeholders informed through regular status reports, dashboards, and meetings.
- Using collaboration tools like JIRA, Trello, Slack, or Microsoft Teams.
- Ensuring transparency in decision-making and project updates.

8. Performance Evaluation & Feedback

- Reviewing team and individual performance through KPIs, velocity charts (Agile), and retrospectives.
- Conducting post-mortem meetings to analyze successes and failures.
- Implementing feedback loops to improve future projects.

Tools for Management Control in Software Projects

- Project Management Software – Jira, Trello, Asana, Microsoft Project.
- Version Control Systems – Git, GitHub, GitLab, Bitbucket.
- Testing & Quality Control Tools – Selenium, JUnit, TestRail.
- Communication & Documentation – Slack, Confluence, Microsoft Teams.

Management control in software project management ensures that the project remains on schedule, within budget, and meets quality expectations. By integrating monitoring, risk management, quality control, and communication, project managers can effectively handle challenges and deliver successful projects.

9 Project portfolio Management

A project portfolio is a collection of all the projects a company is doing. It's like having a list of different tasks or jobs that need to be done. Each project in the portfolio is like a piece of the bigger picture, helping the company reach its goals. Just like a mix of different investments in a portfolio, there are different projects in a project portfolio, each at various stages. These projects can be anything from making new products to improving how things work or promoting products. The goal is to have a balanced portfolio with different kinds of projects, each important in its way. By managing the portfolio well, a company can make sure it's spending its time and money wisely and moving closer to its big goals.

It is like being a team manager where each member has their tasks to do. It's about overseeing and controlling all the projects a company is working on. PPM means deciding which projects are most important and how to divide up resources like time and money among them. It's about steering everything in the right direction to reach the company's goals and making sure things stay on track. PPM also involves keeping an eye on progress, spotting and dealing with any problems, and making changes when necessary. By doing PPM well, a company can make sure its projects fit with its overall plans and that it's getting the best results.

Project Portfolio Management Process

Project Portfolio Management (PPM) is all about managing a bunch of different projects in a structured way.

1. Define Business Objectives-This step involves understanding the strategic goals and objectives of the organization. It includes identifying key performance indicators (KPIs), market trends, competitive landscape, and stakeholder expectations. The aim is to align project initiatives with the overarching business strategy to ensure that every project contributes to the organization's success.

Example: If the business objective is to increase market share, PPM would prioritize projects that focus on product development, marketing campaigns, or market expansion strategies.

2. Collect Project Ideas for Your Portfolio-In this phase, project ideas are gathered from various sources such as stakeholders, employees, customers, market research, and industry trends. Idea generation techniques like brainstorming sessions, surveys, and feedback mechanisms are used to capture a diverse range of project proposals. Each project idea is evaluated based on its potential to contribute to the business objectives, feasibility, resource requirements, risks, and expected benefits.

Example: Project ideas may include launching a new product line, improving customer service processes, implementing a digital transformation initiative, or expanding into new markets.

3. Select the Best Project for Your Portfolio-Once project ideas are collected, they undergo a selection process to determine which projects should be included in the portfolio. Criteria for project selection may include strategic alignment, ROI potential, resource availability, risk assessment, market demand, and technological feasibility. Projects that align closely with business objectives, offer high ROI, and fit within resource constraints are prioritized for inclusion in the portfolio.

Example: A project to implement a customer relationship management (CRM) system may be selected due to its potential to improve customer satisfaction, streamline processes, and increase sales efficiency.

4. Validate Project Portfolio Feasibility-Before finalizing the project portfolio, each selected project undergoes a feasibility analysis to assess its technical, financial, and organizational viability. Technical feasibility evaluates whether the project can be successfully implemented given the available technology and expertise. Financial feasibility assesses the project's cost estimates, potential revenue or cost savings, and ROI projections. Organizational feasibility considers factors such as alignment with organizational culture, resource availability, skills gaps, and change management requirements.

Example: The CRM system project undergoes feasibility analysis to ensure it can be implemented within budget, meets technical requirements, and aligns with the organization's capabilities.

5. Execute and Manage Your Project Portfolio-Once the project portfolio is finalized and approved, the projects are executed according to their respective plans and timelines. Project portfolio management involves monitoring and controlling each project's progress, managing resources, mitigating risks, and ensuring alignment with business objectives. Regular performance evaluations, status reports, and stakeholder communications are essential for effective portfolio management.

Example: The CRM system project is executed with regular progress updates, milestone reviews, and feedback loops to ensure it meets expectations and delivers the intended benefits.

What Does a Project Portfolio Manager Do?

A Project Portfolio Manager has a big job to make sure all the projects in a company are on track and working towards the same goals.

- Making Sure Projects Fit with Big Plans: They make sure all the projects fit with what the company wants to achieve in the long run. This means they work closely with the big bosses to understand what the company's goals are and then figure out how the projects can help reach those goals.
- Keeping an Eye on Problems: They're always on the lookout for things that could go wrong with the projects. They check if the projects are on track if they're using up too much money or time, or if any other issues need fixing. By spotting problems early, they can stop them from getting worse and keep the projects moving forward smoothly.
- Dividing Up Resources Fairly: They make sure each project gets what it needs to get done. This means they divide up things like money, people, and time so that no project is left without what it needs to succeed. They have to balance things out so that all projects have a fair shot at being successful.
- Talking to Everyone: They're the ones who talk to everyone involved in the projects, from the big bosses to the people doing the work. They keep everyone informed about how the projects are going and listen to any concerns or ideas they might have. This helps make sure everyone is on the same page and working towards the same goals.
- Always Trying to Do Better: They're always looking for ways to make things run smoother and get better results. This means they're always trying out new ways of doing things, like using new tools or changing how projects are evaluated. By always trying to improve, they help the company stay ahead of the game and get the most out of its projects.
- Deciding What to Do: Ultimately, they're the ones who decide which projects the company should focus on and how resources should be used. They look at things like what projects will help the company the most, what risks they might have, and if the company has enough resources to do them. By making smart decisions, they help make sure the company's projects are successful and help it reach its goals.

Project Management Processes for PPM

- Initiation and Planning: At the start, project ideas are identified and checked if they make sense. Once approved, detailed plans are made, including what needs to be done, who does what, and by when. For PPM, this phase ensures that projects fit with the company's goals.
- Execution and Monitoring: With plans in place, work begins. Project managers make sure tasks are done, resources are used well, and everything stays on track. They keep an eye on how things are going, fix any problems, and adjust plans as needed. For PPM, this means watching over many projects at once and keeping them in line with the overall plan.
- Closure and Lessons Learned: When projects finish, loose ends are tied up, and the outcomes are handed over to the right people. Project managers look back on what worked well and what didn't, so they can do better next time. For PPM, this is about looking at how all the projects were done together and figuring out what can be improved.
- Integration with PPM Processes: Throughout the project cycle, project managers and portfolio managers work together closely. They make sure individual projects match the big picture and share updates regularly. This helps keep everything aligned with the company's goals and makes sure resources are used wisely.

By following these steps, organizations can manage their project portfolios effectively, make the most of their resources, and achieve their goals smoothly. It's all about keeping things organized, making smart decisions, and learning from experience to do better in the future.

10 Cost-benefit evaluation technology

Cost Benefit analysis is thing that everyone must do so as to think of a powerful or an efficient system. But while thinking out on cost and benefit analysis, we also need to find out factors that really affect benefits and costs of system. In developing cost estimates for a system, we need to consider some of cost elements. Some elements among them are hardware, personnel, facility, operating and supply cost. The following are the cost factors :

- Hardware cost –Hardware cost includes actual purchase and peripherals (external devices) that are connected to computer. For example, printer, disk drive etc. Actually, finding actual cost of hardware is generally more difficult especially, when system is shared by various users so as to compared to a system which dedicated stand alone . In some case, best way is to treat it as operating cost.
- Personnel costs –Personnel costs includes EDP staff salaries and benefits as well as pay for those who are involved in process of development of system. Cost occurred during development of system which are one time costs and are also called development cost. Once system is installed, cost of operating and maintaining system becomes recurring cost that one has to pay very frequently based on requirement.
- Facility cost –Facility cost is amount of money that is spent in preparation of a site that is physical where application or computer will be in operation. This includes wiring, flooring, lighting and air conditioning. These costs are treated as one- time costs and are included into overall cost estimate of candidate system.
- Operating costs –These includes all costs associated with day-to-day(everyday) operation of system and amount depends on number of shifts, nature of applications. There are various ways of covering operating costs. One approach is to treat operating costs as an overhead. Another approach is to charge money from each authorized user for amount of processing they require from system. Amount charged is based on computer time or time they spend on system, staff time ad volume of output produced .
- Supply costs –Supply cost are variable costs that increase with increased use of paper, disks and like. They should be estimated and included in overall cost of system.
- A system is also expected to provide health benefits. First task is to identify each benefit and then assign some value to it for purpose of cost/ benefit analysis. Benefits may be tangible and intangible, direct or indirect.

Two major benefits are improving performance and minimizing cost of processing of system. The performance category emphasizes improvement in accuracy of or access to information and easier access to system by authorized users. Minimizing costs through an efficient system – error control or reduction of staff- is a benefit that should be measured and included in cost/benefit analysis. The determination of costs and benefit entails following steps :

- Identify the costs and benefits pertaining to given project.
- Categorize the various costs and benefits for analysis.
- Select a method of evaluation.
- Interpret the results of the analysis.
- Take action.

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Consider the project cash flow estimates for 3 projects that given in the following table.

Year	Project A	Project B	Project C
0	-8000	-8000	-10000
1	4000	1000	2000
2	4000	2000	2000
3	2000	4000	6000
4	1000	3000	2000
5	500	9000	2000
6	500	-6000	2000

calculate NP, PP, ROI and NPV based on the discount 8%, 10% and 12% respectively

Solt:

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$$NP(\text{project A}) = \frac{4000 + 4000 + 2000 + 1000 + 500 + 500 - 8000}{= 4000}$$

$$NP(\text{project B}) = \frac{1000 + 2000 + 4000 + 3000 + 9000 - 6000 - 8000}{= 5000}$$

$$NPV(\text{project C}) = 2000 + 2000 + 6000 + 2000 \\ + 2000 + 2000 - 10,000 \\ \boxed{= 6000}$$

(2) Pay back period

$$PP(\text{project A}) = 2 \text{ years}$$

$$PP(\text{project B}) = 4 \text{ years}$$

$$PP(\text{project C}) = 3 \text{ years}$$

$$(3) ROI = \frac{\text{average annual profit}}{\text{Total investment}} \times 100$$

ROI (Project A)

$$= \frac{(4000/6)}{8000} \times 100$$

$$\boxed{= 8.33\%}$$

ROI (Project B)

$$= \frac{5000/6}{8000 + 6000} \times 100$$

$$\boxed{= 5.95\%}$$

ROI (Project C)

$$= \frac{6000/6}{1000} \times 100$$

$$= 10\%$$

(g) NPU $DF = 1/(1+r)^t$, $NPU = DF \times \text{values}$

NPU (Project A)

Year	values	DF at 8%	Discounted cash flow
0	-8000	$1/(1+\frac{8}{100})^0 = 1.0$	$1 \times -8000 = -8000$
1	4000	$1/(1+\frac{8}{100})^1 = 0.9259$	$4000 \times 0.9259 = 3703.6$
2	4000	0.8573	3429.2
3	2000	0.7938	1587.6
4	1000	0.7350	735
5	500	0.6806	340.3
6	500	0.6302	315.1
			$NPV = 2110.8$

$$DF = \frac{1}{(1+r)^t}$$

r = discount/100
 t = years (increasing)

$$\rightarrow DF = \frac{1}{(1+\frac{8}{100})^2} = 0.8573$$

$$NPU = -8000 + 3703.6 + 3429.2 \\ + 1587.6 + 735 + 340.3 \\ + 315.1 = 2110.8$$

Teacher's Sign.

NPV (project B)		Discounted cash flow	
Year	Project B	DF at 10%	
0	-8000	$1/(1+\frac{10}{100})^0 = 1$	-8000
1	1000	$1/(1+\frac{10}{100})^1 = 0.9091$	909.1
2	2000	0.8264	1652.8
3	4000	0.7513	3005.2
4	3000	0.6830	2049
5	9000	0.6209	5588.1
6	-6000	0.5645	3387
			$NPV = 1817.2$

NPV (project C)		Discounted cash flow	
Year	Project C	DF at 12%	
0	-1000	1	-10000
1	2000	0.8929	1785.8
2	2000	0.7972	1594.4
3	6000	0.7118	4270.8
4	2000	0.6355	1271
5	2000	0.5674	1134.8
6	2000	0.5066	1013.2
			$NPV = 1070$

11 Risk evaluation

Risk Management is a systematic process of recognizing, evaluating, and handling threats or risks that have an effect on the finances, capital, and overall operations of an organization. These risks can come from different areas, such as financial instability, legal issues, errors in strategic planning, accidents, and natural disasters. The main goal of risk management is to predict possible risks and find solutions to deal with them successfully.

Why is risk management important?

Risk management is important because it helps organizations to prepare for unexpected circumstances that can vary from small issues to major crises. By actively understanding, evaluating, and planning for potential risks, organizations can protect their financial health, continued operation, and overall survival. Let's Understand why risk management important with an example.

Suppose In a software development project, one of the key developers unexpectedly falls ill and is unable to contribute to the product for an extended period. One of the solution that organization may have , The team uses collaborative tools and procedures, such as shared work boards or project management software, to make sure that each member of the team is aware of all tasks and responsibilities, including those of their teammates. An organization must focus on providing resources to minimize the negative effects of possible events and maximize positive results in order to reduce risk effectively. Organizations can more effectively identify, assess, and mitigate major risks by implementing a consistent, systematic, and integrated approach to risk management.

The risk management process

Risk management is a sequence of steps that help a software team to understand, analyze, and manage uncertainty. Risk management process consists of

- Risk Identification-Risk identification refers to the systematic process of recognizing and evaluating potential threats or hazards that could negatively impact an organization, its operations, or its workforce. This involves identifying various types of risks, ranging from IT security threats like viruses and phishing attacks to unforeseen events such as equipment failures and extreme weather conditions.

- Risk analysis-Risk analysis is the process of evaluating and understanding the potential impact and likelihood of identified risks on an organization. It helps determine how serious a risk is and how to best manage or mitigate it. Risk Analysis involves evaluating each risk's probability and potential consequences to prioritize and manage them effectively.
- Risk Planning-Risk planning involves developing strategies and actions to manage and mitigate identified risks effectively. It outlines how to respond to potential risks, including prevention, mitigation, and contingency measures, to protect the organization's objectives and assets.
- Risk Monitoring-Risk monitoring involves continuously tracking and overseeing identified risks to assess their status, changes, and effectiveness of mitigation strategies. It ensures that risks are regularly reviewed and managed to maintain alignment with organizational objectives and adapt to new developments or challenges.

Understanding Risks in Software Projects

A computer code project may be laid low with an outsized sort of risk. To be ready to consistently establish the necessary risks that could affect a computer code project, it's necessary to group risks into completely different categories. The project manager will then examine the risks from every category square measure relevant to the project. There are mainly 3 classes of risks that may affect a computer code project:

- Project Risks: Project risks concern various sorts of monetary funds, schedules, personnel, resources, and customer-related issues. A vital project risk is schedule slippage. Since computer code is intangible, it's tough to observe and manage a computer code project. It's tough to manage one thing that can not be seen. For any producing project, like producing cars, the project manager will see the merchandise taking form. For example, see that the engine is fitted, at the moment the area of the door unit is fitted, the automotive is being painted, etc. so he will simply assess the progress of the work and manage it. The physical property of the merchandise being developed is a vital reason why several computer codes come to suffer from the danger of schedule slippage.
- Technical Risks: Technical risks concern potential style, implementation, interfacing, testing, and maintenance issues. Technical risks conjointly embody ambiguous specifications, incomplete specifications, dynamic specifications, technical uncertainty, and technical degeneration. Most technical risks occur thanks to the event team's lean information concerning the project.
- Business Risks: This type of risk embodies the risks of building a superb product that nobody needs, losing monetary funds or personal commitments, etc.

Risk management standards and frameworks

Risk management standards and frameworks give organizations guidelines on how to find, evaluate, and handle risks effectively. They provide a structured way to manage risks, making sure that everyone follows consistent and reliable practices. Here are some well-known risk management standards and frameworks:

1. COSO ERM Framework:COSO ERM Framework was introduce in 2004 and updated in 2017. Its main purpose is to addresses the growing complexity of Enterprise Risk Management (ERM).
2. ISO 31000: ISO 31000 was introduce in 2009, revised in 2018. It provides principles and a framework for ERM.
3. BS 31100: This framework is British Standard for Risk Management and latest version issued in 2001. It offers a structured approach to applying the principles outlined in ISO 31000:2018, covering tasks like identifying, evaluating, and addressing risks, followed by reporting and reviewing risk management efforts.

Benefits of risk management

- Helps protect against potential losses.
- Improves decision-making by considering risks.
- Reduces unexpected expenses.
- Ensures adherence to laws and regulations.
- Builds resilience against unexpected challenges.
- Safeguards company reputation.

Limitation of Risk Management

- Too much focus on risk can lead to missed opportunities.
- Implementing risk management can be expensive.
- Risk models can be overly complex and hard to understand.
- Having risk controls might make people feel too safe.
- Relies on accurate human judgment and can be prone to mistakes.
- Some risks are hard to predict or quantify.
- Managing risks can take a lot of time and resources.

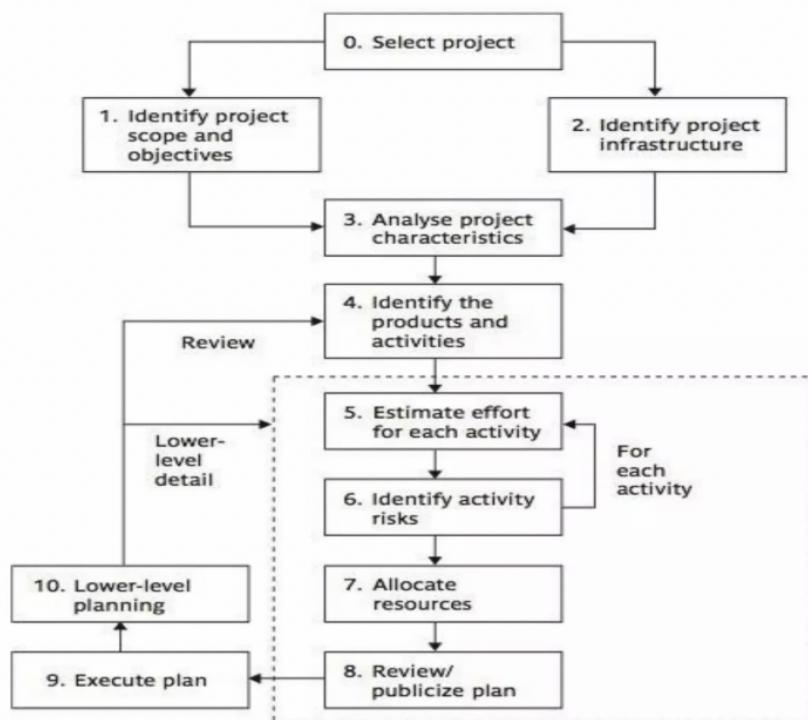
Strategic Planning ?

'Strategic planning' may be defined as the process of determining the objectives of the organization and the resources to be used to attain these objectives, as also the policies to govern the acquisition, utilization and disposition of these resources.

Strategic Planning Process

1. Define or review the organization's values, vision and mission
2. Transform the vision and mission into a series of key goals for your organization
3. Conduct an environmental scan
4. Identify key issues, questions, and choices to be addressed.
5. Finalize a written strategic plan that summarizes your decisions
6. Build in procedures for monitoring and modifying strategies

13 Stepwise Project Planning.



Step 0: SELECT THE PROJECT:

- Deciding whether the project can be taken up or not
- Technical, Organizational and Financial Feasibility is considered

Step 1: Identify Project Scope and Objectives

- Step 1.1 Identify objectives and practical measures of the effectiveness in meeting those objectives
- Step 1.2 Establish a project authority – To ensure the unity of purpose among all persons concerned
- Step 1.3 Identify all stakeholders in the project and their interests
- Step 1.4 Modify objectives in the light of stakeholder analysis
- Step 1.5 Establish methods of communication between all parties

Step 2: Identify Project Infrastructure

- Step 2.1 Identify relationship between the project and strategic planning – To determine the order of related projects (in the organization) being carried out – To establish a framework within which the system fits – To ensure the hardware and software standards are followed
- Step 2.2 Identify installation standards and procedures – more appropriate name: “Identify standards and procedures related to the software project”
- Step 2.3 Identify project team organization

Step 3: Analyse Project Characteristics

- Step 3.1 Distinguish the project as either objective-driven or product-driven
- Step 3.2 Analyse other project characteristics (including quality-based ones)
- Step 3.3 Identify high level project risks
- Step 3.4 Take into account user requirements concerning implementation
- Step 3.5 Select general lifecycle approach in the light of the above
- Step 3.6 Review overall resource estimates Up to this stage, – the major risks of the project are identified – the overall approach of the project is decided So, it is a good place to re-estimate the required effort and other resources for the project

Step 4: Identify Project Products and Activities

- Step 4.1 Identify and describe project products – Identify all the products related to the project – Account for the required activities
- Step 4.2 Document generic product flows – To document the relative order of the products
- Step 4.3 Recognize product instances
- Step 4.4 Produce an ideal activity network – Activity network shows the tasks that have to be carried out as well as their sequence of execution for the creation of a product from another
- Step 4.5 Modify the ideal to take into account need for stages and checkpoints – To check compatibility of products of previous activities