

Difference between project process and product process

Project Process: Refers to the set of activities and steps required to manage and complete a project successfully. It focuses on how the project is carried out, including planning, execution, monitoring, controlling, and closing the project.

- Concerned with the **management** of the project
- Covers the **entire project lifecycle** from start to finish
- The **project process** focuses on how to manage the project from initiation to closure.

Product Process: Refers to the sequence of steps and activities involved in designing, developing, and delivering the product itself. It focuses on how the product (or service) is created, ensuring that it meets requirements and quality standards.

- Concerned with the **development** and **creation** of the product or service
- Covers only the **development lifecycle** of the product
- The **product process** focuses on how to build and deliver the product within the project.

Total Slack vs. Free Slack

Slack (or float) refers to the amount of time a task in a project schedule can be delayed without causing delays to other tasks or the project itself. There are two primary types of slack: **Total Slack** and **Free Slack**.

Total slack shows how long a task can be delayed without affecting the overall project end date.

- Total Slack = Latest Finish Time (LF) - Earliest Finish Time (EF)
- Total Slack = Latest Start Time (LS) - Earliest Start Time (ES)

Free slack shows how long a task can be delayed without affecting the next task in sequence.

- Free Slack = Earliest Start of the next task - Earliest Finish of the current task

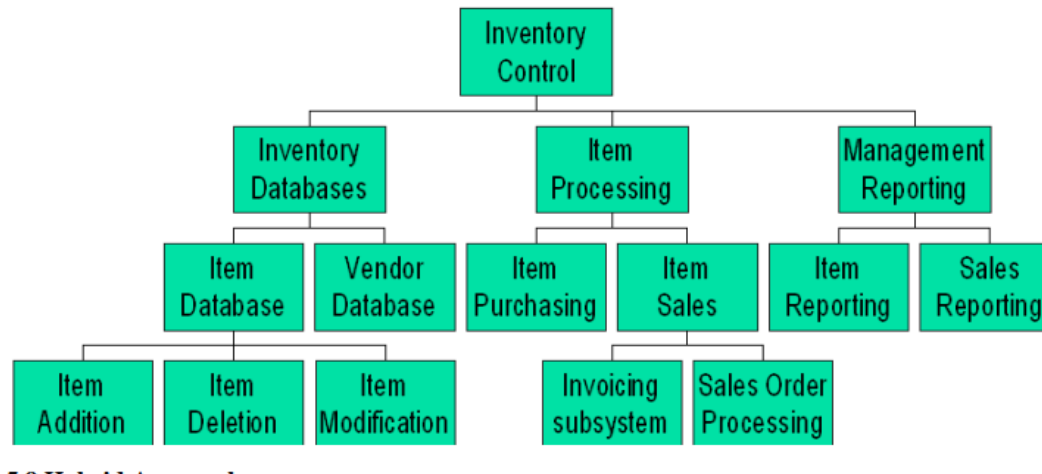
Benefits of Identifying the Critical Path in Project Management

1. project managers know which tasks are critical to project completion.
2. helps in allocating resources (e.g., team members, equipment) efficiently.
3. Helps in Risk Management
4. Identifying Project Flexibility : Tasks with slack can be delayed without affecting the overall project timeline, allowing room for adjustments.
5. provides a clear roadmap to track project progress
6. allows for clearer communication with stakeholders regarding project status

What is PBS? A diagram of PBS

A Product Breakdown Structure (PBS) is a communication tool used in project management to systematically break down complicated projects or product developments into smaller, conceivable components and responsibilities

A Product Breakdown Structure (an extract)



What are the activities covered by project management ?

1. Project Initiation

- defining Project Objectives
- Feasibility Study: Assessing whether the project is viable in terms of resources, time, and budget.
- Stakeholder Identification:

2. Project Planning: Step wise project planning

3. Project Execution : Software Development Life Cycle 7 Steps

What is project evaluation? Why do we need it ? describe how a project can be evaluated

Project evaluation is the systematic process of assessing the design, implementation, outcomes, and overall impact of a project. It helps determine whether the project's objectives have been achieved,

Why Do We Need Project Evaluation?

1. It helps determine whether the project objectives were achieved and if the desired outcomes were delivered.
2. It identifies areas of success and areas for improvement
3. assesses the long-term impact of the project
4. supports informed decision-making for project continuation, replication, or scaling
5. Risk Management

How Can a Project Be Evaluated?

- Cash flow forecasting
- Cost-benefit analysis
- Cost-benefit evaluation techniques
- Risk analysis

1. Cash Flow Forecasting

- **Definition:** Cash flow forecasting predicts the inflows and outflows of cash during the project lifecycle.
- **Purpose:** Helps determine whether the project has enough liquidity to sustain operations and whether it will be financially viable.
- **Key Points:**
 - Projects future revenue and expenses over time.
 - Assesses whether the project generates positive cash flow.
 - Identifies periods of high or low liquidity.
 - Critical for maintaining solvency during the project execution phase.

2. Cost-Benefit Analysis (CBA)

- **Definition:** A technique that compares the total expected costs of a project with the total expected benefits to determine if the project is financially worthwhile.
- **Purpose:** Ensures that the benefits of the project outweigh the costs.
- **Key Points:**
 - Quantifies benefits and costs in monetary terms.
 - $\text{Benefits} > \text{Costs} = \text{Project is financially viable.}$
 - Includes both direct (tangible) and indirect (intangible) factors.
 - Assists in decision-making and justifying project investments.

3. Cost-Benefit Evaluation Techniques

There are various techniques used for evaluating cost-benefit analysis, including:

- **Net Present Value (NPV):** Calculates the present value of future cash flows minus the initial investment.
 - **Key Points:** Positive NPV indicates profitability.
- **Internal Rate of Return (IRR):** The rate at which the NPV equals zero.
 - **Key Points:** Higher IRR than the cost of capital means the project is good.
- **Payback Period:** Time it takes for the project to repay its initial investment.
 - **Key Points:** Shorter payback periods are preferable.
- **Benefit-Cost Ratio (BCR):** Ratio of project benefits to project costs.
 - **Key Points:** $BCR > 1$ indicates the project is beneficial.

4. Risk Analysis

- **Definition:** The process of identifying, analyzing, and managing potential risks that could impact the project.
- **Purpose:** Helps in making informed decisions by understanding possible challenges and preparing mitigation strategies.
- **Key Points:**

- **Risk Identification:** Listing potential risks (e.g., financial, operational, or technical risks).
- **Risk Assessment:** Evaluating the likelihood and impact of each risk.
- **Risk Mitigation:** Developing strategies to reduce or eliminate risks.

What is a milestone?

A milestone is a significant event in a project, usually associated with a major work product or deliverable. Stages or phases are not milestones but are collections of related product activities.

Define process.

A software process provides the framework from which a comprehensive plan for software development can be established

Differentiate Leaders and managers.

- Leaders- set direction, do the right thing
- Managers- Follow process, do things right

Define project portfolio?

Project portfolio is a group of projects carried out under this sponsorship and/or management.

What is Software Quality Assurance?

Software Quality Assurance (SQA) is a systematic process aimed at ensuring that software products meet specified requirements and standards

Software Quality Assurance is an ongoing process to ensure that the plan is being carried out according to the procedures laid down. Its primary purpose is to guarantee that the quality of the procedures and processes results in a product that fully meets user requirement

Write any two advantages of function point analysis

1. It can be applied early in the S/W development life cycle.
2. It is dependent on programming language, technology & techniques except for the adjustments at the end.

Write the disadvantages of function point analysis

1. It requires subjective evaluation.
2. There is more research data on LOC than on function points.

What is structured data?

Structured data are numbers and facts that can be conveniently stored and retrieved in an orderly manner for operations and decision-making

Write some ways to collect information for system requirements.

1. Interviews 2. Questionnaires 3. Examination of documents 4. On-the-job observation

Give any two examples for personnel attributes.

Analyst capability (ACAP), Programming language (LEXP)

Give any two examples for Computer attributes.

Execution time constraint (TIME), Main storage constraint (STOR).

What are the Managerial activities?

Project planning, tracking, control, risk analysis

What is ROI?

The Return on Investment is a calculation of the difference between the stream of benefits and the stream of costs over the life of the system, discounted by the applicable interest rate.

Write any two disadvantages of using LOC

LOC is difficult to estimate for new software early in the life cycle There are no industry standards for counting lines of code.

→ What factors⁽⁶⁾ are considered when selecting a development methodology and life cycle approach?

- 1) Project scope
- 2) complexity
- 3) Uncertainty
- 4) flexibility
- 5) collaboration
- 6) Delivery

What is Risk ? Types of Risks?

Risk is a potential problem that might happen in the future, or it might not.

It involves **uncertainty** and **loss** if it materializes. **Uncertainty**: The risk may or may not happen **Loss**: If the risk happens, it results in unwanted consequences or losses.

1. Project Risks
2. Technical Risks
3. Business Risks
4. Known Risks
5. Predictable Risks
6. Unpredictable Risks?

What is meant by known risk?

A known risk refers to a risk that can be identified in advance through careful analysis and planning. These are risks that can be anticipated based on the current project plan, environment, or past experiences.

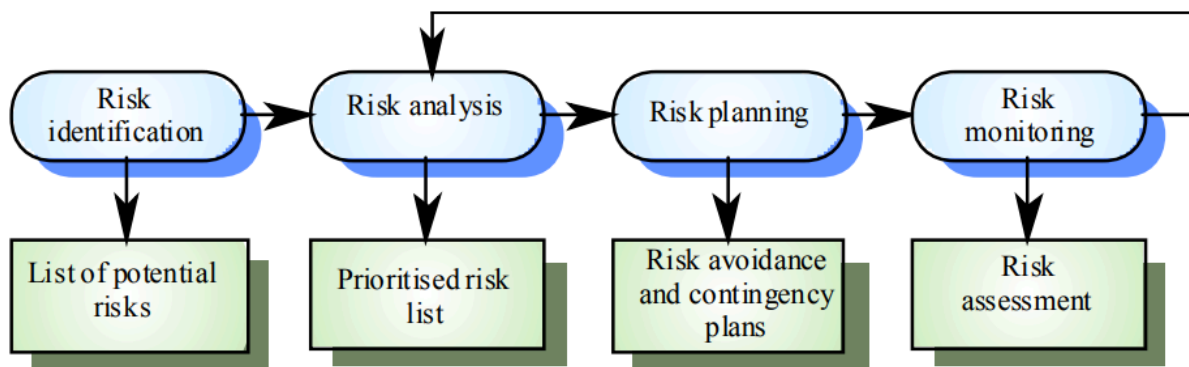
- Unrealistic Deadlines: A project is assigned a delivery deadline that is too short based on the scope of work and resource availability.
 - Technology Limitations: project involves using a new technology or tool that the team has little experience with.
 - Resource Availability: A key team member is scheduled to be on leave during a critical phase of the project
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- Product size - Business impact - Customer characteristics
 - Process definition - Development environment - Technology to be built
 - Staff size and experience

What is Risk Analysis?

Risk analysis is the process of identifying, assessing, and prioritizing potential risks in a software project. It involves systematically examining various aspects of the project to determine what could go wrong and how likely it is to occur.

Steps for Risk Management :

1. Risk Identification
2. Risk Projection (Estimation)
3. Assessing Risk Impact
4. Risk Mitigation, Monitoring, and Management



Write down the problems of measuring risk in software project management?

- Intangible **Assets**: Difficult to assign monetary **value** to data, in-house software, and goodwill.
- **Customer Confidence**: Hard to quantify the loss of customer trust in money.
- **Unreliable Past Data**: Past threats may not predict future risks accurately.
- **Unpredictable Future Attacks**: New and unforeseen threats or attackers make risk measurement uncertain.

- Security Benefits: Difficult to measure the exact benefit of security measures, especially for low-probability risks.
- **Changing Technologies:** Rapid tech changes make it hard to keep risk assessments up to date.
- **Human Factors:** Errors or unpredictable behavior by people add uncertainty to risk measurements.

How do unclear requirements pose a risk in software projects?

1. lead to continuous changes in the project's scope, as new features are added or modified during development
2. Without clear requirements, developers, designers, and stakeholders may have different interpretations of what the final product should look like
3. Unclear requirements make it difficult to estimate the time, resources, and cost needed to complete the project
4. If requirements are not well-defined, the software may fail to meet the actual needs of the users, resulting in a product that is either incomplete or of poor quality.
5. Due to changes or misunderstandings about the scope, the project timeline may be extended, causing delays in delivery.
6. When requirements are unclear, developers may make incorrect assumptions, leading to more bugs and testing efforts

What are the main elements of the Software Project Management Plan (SPMP) ?

A Software Project Management Plan (SPMP) is a comprehensive document that outlines the strategy and processes for managing a software project. It serves as a roadmap for the project team, stakeholders, and management, detailing how the project will be executed, monitored, and controlled.

Element	Description
Project Charter	<p>Authorizes the project, defines objectives, scope, and stakeholders</p> <p>The project charter is a formal document that authorizes the project and outlines its objectives, scope, stakeholders, and high-level requirements.</p>
Organization	<p>Outlines team structure, roles, responsibilities, and communication plan</p> <p>Defines the structure of the project team and the roles and responsibilities of team members.</p>
Process	<p>Details project management methodologies and development processes</p>
Work Breakdown Structure (WBS)	<p>The WBS is a hierarchical decomposition of the project into smaller, manageable components or work packages.</p>

Schedule	Timeline for project activities, milestones, and task dependencies
Budget	Financial framework including cost estimates and resource allocation

Compare "Theory X" and "Theory Y" regarding organizational behavior

Organizational Level Behavior

- Organization – a group of people working to achieve an objective
- Created to produce goods and services for the larger society
- Organizational behavior – the collective behavior of an organization's individuals and groups

Theory X and **Theory Y** are two contrasting theories of human motivation and management styles proposed by Douglas McGregor in his 1960 book *"The Human Side of Enterprise."* They describe two different views of employee behavior and management's approach to leadership.

Theory X:

- **View of Employees:**
 - Assumes employees are inherently lazy and dislike work.

- Workers need close supervision and control to ensure they meet organizational goals.
- Believes employees avoid responsibility and prefer being directed.

- **Management Style:**

- Authoritarian, top-down approach.
- Managers must use strict rules, rewards, and punishments to motivate employees.
- Assumes employees are motivated primarily by money and job security.

- **Impact on Behavior:**

- Can lead to a lack of creativity and initiative.
- Creates a rigid, controlled environment with little employee engagement.

Theory Y:

- **View of Employees:**

- Assumes employees are self-motivated and find satisfaction in their work.
- Workers are capable of self-direction, seek responsibility, and can be innovative.

- Believes employees can enjoy work and contribute to organizational goals without constant supervision.

- **Management Style:**

- Participative, empowering approach.
- Managers encourage collaboration, trust, and delegate authority.
- Assumes employees are motivated by personal growth, job satisfaction, and achievement.

- **Impact on Behavior:**

- Promotes creativity, initiative, and engagement.
- Fosters a positive, flexible work environment that values employee input.

Aspect	Theory X	Theory Y
View of Employees	Lazy, need supervision, avoid responsibility	Self-motivated, seek responsibility, enjoy work
Management Style	Authoritarian, control-oriented	Participative, trust and empowerment
Motivation	Primarily by money and job security	By personal growth, achievement, job satisfaction
Work Environment	Rigid, controlled, low engagement	Creative, open, high employee involvement
Innovation	Limited creativity, follows rules strictly	Encourages creativity and innovation

In summary, **Theory X** assumes employees need external control and motivation, while **Theory Y** assumes they are internally driven and capable of self-management. Organizations often benefit from using a **Theory Y** approach, as it promotes a more collaborative and productive work environment.

Significance of "Working in Groups" in Software Projects:

- Collaboration: Working in groups allows individuals to pool their knowledge, skills, and expertise to solve complex problems more effectively.
- Diverse Perspectives: Teams often consist of people with different backgrounds and experiences, leading to innovative ideas and creative solutions.
- Division of Labor: Group work enables the division of tasks based on each team member's strengths, ensuring more efficient project completion.
- Skill Development: Group environments encourage learning from others, improving interpersonal, communication, and technical skills.
- Shared Responsibility: The workload is distributed, reducing the pressure on any single individual, and increasing accountability across the team.
- Complex Problem Solving: Software development is multifaceted, and group work helps tackle larger and more intricate issues by bringing together various perspectives.

What are the Stages of becoming a team ?

1. Forming: The members of the group get to know each other and try to set up
2. Storming: Conflicts arise as various members of the group try to exert leadership and the groups methods of operation are being established
3. Norming: Conflicts are largely settled and a feeling of group identity emerges and forms .
4. Performing: The group focuses on achieving tasks and goals efficiently
5. Adjourning: The project or task is completed, and the group disbanded.

Why is the time cost model important in project management?

The time-cost model is important in project management because it helps in balancing time and cost to achieve project objectives efficiently. Key reasons include:

- 1. Optimizing Project Schedule:** Helps in determining the shortest possible time to complete the project while controlling costs.
- 2. Cost Control:** Identifies how changes in the project timeline affect overall costs, enabling better budget management.
- 3. Resource Allocation:** Assists in managing resources efficiently by analyzing trade-offs between speeding up activities (incurring extra costs) or slowing down to save costs.

4. Risk Management: Reduces risks by providing insights into time delays and potential cost overruns.

5. Decision Making: Aids project managers in making informed decisions about whether to spend more to meet deadlines or adjust the schedule to avoid extra costs.

This model ensures a balance between delivering the project on time and within budget, enhancing overall project performance.

What Constitutes a Hazard?

A hazard in project management refers to any potential event or condition that can cause harm, delay, or negative impact on the project. Common hazards include:

- a) **Technical failures:** Equipment breakdown or software bugs.
- b) **Environmental factors:** Natural disasters, weather disruptions.
- c) **Human errors:** Mistakes in task execution, miscommunication.
- d) **Health and safety risks:** Injuries or illnesses affecting workers.

How Customer Risks are Derived?

- a) **Changing Requirements:** Frequent or unclear changes to project scope.

- b) **Misaligned Expectations:** Differences between customer expectations and project deliverables.
- c) **Budget Constraints:** Limited financial resources from the customer.
- d) **Engagement Levels:** Inadequate communication or feedback from customers, leading to delays or unmet requirements.

If a project manager must review overall resource estimates, discuss how they would approach this task and analyze the potential impact on the project budget and timeline.

1. **Evaluate Current Estimates:** Review all resource allocations (personnel, equipment, time) for each task or phase of the project.
2. **Compare with Actual Usage:** Analyze if resources are over or under-utilized compared to initial estimates.
3. **Consult Stakeholders:** Gather input from team leads, financial controllers, and other key stakeholders for accurate updates.
4. **Adjust Resource Allocations:** Identify areas where resources may need to be reallocated or increased to meet deadlines.
5. **Reassess Timelines:** If additional resources are needed or resource shortages exist, adjust the project schedule accordingly.

6. Cost Impact Analysis: Analyze how reallocating resources or extending timelines will affect the project budget. Increased resource needs can lead to cost overruns, while time reductions might reduce quality.

Potential Impact on Budget and Timeline:

- a) **Increased Costs:** Adding resources (e.g., hiring more personnel) can inflate the project budget.
- b) **Delays:** If resources are inadequate, the project timeline may extend, leading to penalties or stakeholder dissatisfaction.
- c) **Quality Trade-offs:** To stay within budget, the project might have to cut certain features or reduce quality standards.

List Two Problems with Software Projects.

1. **Scope Creep:** Uncontrolled changes or continuous expansion of project scope without adjusting time, cost, or resources, leading to delays and budget overruns.
2. **Unrealistic Deadlines:** Setting timelines that do not consider the complexity of tasks, leading to rushed work, lower quality, or missed milestones.

What are the key Elements to Review When Assessing Project Resource Requirements?

1. **Team Capacity:** Evaluate the availability and skill levels of personnel to ensure tasks are assigned to the right people and that they have the time to complete them.
2. **Budget Constraints:** Analyze financial resources available for the project, ensuring enough funding to cover personnel, equipment, software tools, and contingency reserves.

Take a scenario in which a project manager is managing a software development project with known external dependencies. How should the manager effectively anticipate and mitigate the risks arising from these dependencies?

Anticipating Risks from External Dependencies:

1. **Identify Dependencies Early:**
 - Document all external dependencies, such as third-party software, hardware, or vendor deliverables.
 - Ensure all stakeholders are aware of these dependencies.
2. **Communicate Regularly with External Parties:**
 - Establish clear communication channels with vendors or external partners. Regular status meetings can help monitor progress and potential delays.
3. **Set Clear Deadlines and Contracts:**

- Ensure that external parties commit to deadlines and understand the impact of delays. Formalize agreements through contracts with penalties for non-compliance if necessary.

4. Create Contingency Plans:

- Develop backup solutions or alternatives in case external dependencies are delayed. This might involve sourcing alternative vendors or adjusting the project schedule.

5. Monitor and Track Progress:

- Use project management tools to track dependencies and set early warning signals for possible delays.

Mitigating Risks from External Dependencies:

1. Buffer Time in Schedule:

- Include buffer time in the project schedule to account for potential delays from external dependencies. This gives flexibility without affecting the overall timeline.

2. Prioritize Critical Dependencies:

- Identify which external dependencies are critical for project progress. Focus on these and ensure their timely delivery.

3. Risk Sharing and Collaboration:

- Engage in regular collaboration with external parties to share the risk and find mutually beneficial solutions for meeting deadlines.

Explain how the delayed projects can be brought back on track.

- a) **Conduct a Root Cause Analysis:** Identify the exact cause of delays, whether it's from external dependencies, internal inefficiencies, or communication gaps.
- b) **Reprioritize Tasks:** Restructure the project plan to focus on high-priority tasks that can move forward while waiting for the external dependency. This prevents wasted time.
- c) **Fast-Tracking and Crashing:** Fast-track by overlapping tasks that were initially planned sequentially. Crashing involves adding more resources to speed up the completion of delayed tasks
- d) **Negotiate Extensions or Adjust Scope:** If necessary, negotiate with stakeholders for an extension of the project deadline or adjust the scope to reduce work, keeping the most critical functionalities.
- e) **Improve Resource Allocation:** Reallocate resources to critical areas to accelerate development or testing. Consider hiring additional support if feasible.

Explain the key objectives of activity planning in project management, and provide examples of how they can impact project success.

a) Define Project Tasks:

- Objective: Clearly identify all tasks that need to be completed for the project.
- Example: For a software development project, tasks could include design, coding, testing, and deployment. This ensures that no critical steps are overlooked.

b) Sequence Activities:

- Objective: Determine the logical order in which tasks should be completed.
- Example: In a construction project, foundation work must be completed before walls can be built. Misordering tasks can lead to delays and inefficiency.

c) Estimate Time for Each Activity:

- Objective: Assign realistic time estimates for completing each task.
- Example: If coding takes longer than expected, testing and debugging will be delayed, affecting the overall project timeline.

d) Identify Dependencies:

- Objective: Recognize tasks that are dependent on the completion of others.

- Example: In software development, testing cannot begin until coding is complete. Planning for these dependencies helps prevent bottlenecks.

e) Allocate Resources Efficiently:

- Objective: Ensure that the right resources (personnel, equipment) are available for each task.
- Example: Assigning an expert coder to the most complex parts of the project can speed up delivery, while less critical tasks can be handled by junior developers.

f) Set Milestones and Deadlines:

- Objective: Break the project into manageable phases with clear checkpoints.
- Example: Completing a working prototype by a certain date ensures the project is progressing on schedule.

g) Monitor Progress and Adjust Plans:

- Objective: Continuously track progress and make adjustments if needed.
- Example: If a task is falling behind, resources can be reallocated, or the schedule adjusted to ensure timely completion.

How do personnel attributes impact resource allocation within a project?

- a) **Skill Level:** Skilled workers are assigned to complex tasks, ensuring quality and efficiency.
- b) **Experience:** Experienced team members handle tasks better, reducing errors and improving productivity.
- c) **Availability:** Resource allocation depends on the team's availability to prevent delays.
- d) **Teamwork:** Good collaboration improves communication, leading to smoother workflows.
- e) **Motivation:** Motivated personnel work more efficiently, helping meet project deadlines.