BUS 106: PRINCIPLES OF PROJECT MANAGEMENT

TOPIC 1: PROJECT MANAGEMENT MEANING AND COMPONENTS

What is Project Management?

At its core, project management is the process of planning, organizing, and overseeing the overall execution of a project from the beginning to its end.

The general role of a project manager is to define a project's goals, create an actionable project plan, allocate the essential resources, and manage the project team as a whole. In addition, project managers are responsible for ensuring that projects are completed on time, within budget, and to the satisfaction of the necessary stakeholders.

Effective project management requires strong communication skills, attention to detail, and adapting to ever-changing circumstances. It is critical in many industries, including construction, engineering, software development, and marketing, among others

Components of Project management

The Project Management Triangle is a helpful way to visualize the four primary components of project management. This model helps visualize the need to balance scope, cost, and time to support a high-quality final product.

Three major dimensions that define the project performance are scope, time, and resource. These parameters are interrelated and interactive. The relationship generally represented as an equilateral triangle. The relationship is shown below:

1. Time

Time is one of the most critical factors in project management. You cannot replenish time once you spend it because it is a finite resource. Therefore, managing time effectively is essential to ensure the project's timely completion.

Time management involves identifying the required completed tasks, estimating the time needed for each assignment, and creating a schedule that allocates the appropriate amount of time. It also consists of monitoring progress and adjusting the project plan as necessary.

Effective time management reduces the risk of delays and cost overruns and improves the overall quality of the project. Therefore, project managers must prioritize time management throughout the project lifecycle.

2. Scope

Scope is a critical aspect of project management that defines the boundaries of a project. It illustrates the project's goals by specifying the tasks, objectives, and deliverables that must be completed. A well-defined scope helps project managers to plan, execute, and control the project effectively. It also helps manage stakeholders' expectations and ensure the project is completed within the allocated time, budget, and resources.

Without a clear scope, a project can quickly go off track, leading to delays and unsatisfied stakeholders. Therefore, it is essential to define the scope of a project at the outset and continuously monitor and control it throughout the project.

3. Cost

Cost is one of the most critical factors to oversee in project management. Project managers must clearly understand the budget and the resources required to complete a project successfully to ensure a high-quality product. Project costs include direct expenses such as labor, materials, and equipment and indirect costs such as overheads, contingency, and risk management.

A project manager must ensure that a project is completed within the allocated budget and that the costs are managed effectively throughout the entire lifecycle. Failure to manage costs can result in project delays, quality issues, and even project failure.

4. Quality

Quality is the utmost critical element of project management that cannot be overlooked. It is the degree to which a project meets the requirements and expectations of all necessary stakeholders. Quality management involves planning, controlling, and assuring that the project meets the desired level of quality. Project managers maintain project standards by ensuring a balance between time, scope, and cost, resulting in the delivery of a project that fulfills its intended benefits

It is evident that any change in any one of dimensions would affect the other. For example, if the scope is enlarged, project would require more time for completion and the cost would also go up. If time is reduced the scope and cost would also be required to be reduced. Similarly any change in cost would be reflected in scope and time. Successful completion of the project would require accomplishment of specified goals within scheduled time and budget. In recent years a forth dimension, stakeholder satisfaction, is added to the project. However, the other school of management argues that this dimension is an inherent part of the scope of the project that defines the specifications to which the project is required to be implemented. Thus the performance of a project is measured by the degree to which these three parameters (scope, time and cost) are achieved.

Mathematically, Performance = f(Scope, Cost, Time)

The Five Stages of Project Management (Project Life Cycle)

Managing a project is challenging, regardless of the scale and scope. From everyday planning to overseeing the ever-changing demands of stakeholders and clients, many variables can pop up at a moment's notice. One strategy to maintain the order and flow of a project is to break it down into smaller, manageable stages. Each stage (or milestone) may have its own goals, timelines, and deliverables. This compartmentalization makes it easier to control the project and ensure the quality of work. In the next section, we'll take a closer look at each of the five project management lifecycle stages.

1. Initiation

The initiation stage is the first phase of the project life cycle. It involves defining the project's purpose, objectives, and scope, as well as identifying the clients and stakeholders and their needs. During this stage, the project manager must determine whether the project is viable and worth pursuing by asking certain questions.

- *What is the objective of this project?*
- *What are the potential roadblocks?*
- *Who are the essential stakeholders?*

A charter, contract, or statement of work (SOW) is also developed during this stage. This is a formal document that outlines a project's goals, objectives, and scope, as well as the roles and responsibilities of each project team member. The initiation stage sets the foundation for the entire project. It ensures everyone is aligned and on a clear path to accomplish the project's goals and objectives.

2. Planning

During the planning stage, the project manager and team define the strategy and purpose behind the project scope, objectives, and deliverables. Next, the required resources are identified to estimate the necessary timeline and budget appropriately.

The next step is to create a project plan, which is a detailed breakdown and forecast of each team member's roles, responsibilities, and deadlines. The planning stage involves a great deal of collaboration and communication among stakeholders and project team members to ensure that everyone is on the same page and understands the project's overarching goals and expectations.

A well-planned project is more likely to be successful, as it helps to minimize risks, avoid delays, and ensure that the project is completed within budget and on time.

In the process, major tasks need to be performed which are:
• Identification of activities and their sequencing
• Time frame for execution
• Estimation and budgeting
• Staffing

3. Execution

The execution stage is where the actual work of the project takes place. Project team members are assigned their tasks and responsibilities and begin working on specific project deliverables defined in the initiation stage. The project manager is responsible for monitoring the progress and deadlines of a project and ensuring that it stays on track.

It is vital to manage these workflows, pinpointing any issues or risks, then adjusting the project plan, as needed. In addition, project managers are responsible for keeping all teams in the loop as the project progresses, especially if given milestones create dependencies that impact the work of team members.

Important activities in this phase are
• Communicating with stakeholders
• Reviewing progress
• Monitoring cost and time
• Controlling quality
• Managing changes

4. Monitoring and Control

The monitoring and control stage ensures a project is on track and meets its objectives. During this stage, project managers use various tools and techniques to monitor project progress against the original project plan. Additionally, the progress is often held to specific key performance indicators (KPIs). If roadblocks occur, the project manager must identify potential issues and take corrective actions to keep the project on track. Effective monitoring and control help project managers to identify and address issues before they become major problems.

5. Closure

The closure stage is the final phase of a project, where the teams complete all the remaining tasks and activities to bring a project to a successful conclusion. This stage often involves a series of duties, such as finalizing project deliverables, conducting a final project review, obtaining final client approval, and closing out (or renewing) contracts.

Overall, the project manager is responsible for ensuring that all project objectives have been met (and met with quality), all stakeholders are happy with the completed work, and all project documentation is complete.

The closing stage is critical as it provides an opportunity to evaluate the project's success, identify lessons learned, and apply them to future projects. It also allows the project team to celebrate their achievements and recognize their contributions to the project's success.

Benefits of effective project life cycle management

Effective project life cycle management streamlines processes in several ways:

- Improved project visibility: Teams can proactively remove obstacles to ensure timely, high-quality results. This enables more effective decision-making.
- Better risk management: Teams can spot risks early and find solutions. Regular risk checks ensure projects stay on time and avoid costly delays or failure.
- Enhanced stakeholder communication: With regular updates, progress reports, and meetings, participants stay more informed and involved throughout the project life cycle.

- Project life cycle management contribute to organizational growth:
  Project life cycle management helps teams optimize the utilization of resources, including people and tools. This improved efficiency allows teams to complete projects on time, contributing to the success of the organization.

Benefits of Project Management

Project management is a necessary process in many fields that helps organizations achieve their goals and objectives efficiently and effectively. The advantages of project management are considerable, including improved communication, enhanced consumer satisfaction, better risk management, and increased productivity.

In addition, by using project management methodologies, businesses can ensure that projects are completed on time, within the allocated resources, and to the required quality benchmarks. Project management also helps identify potential problems early on, which reduces project costs, improves project results, and increases client and stakeholder satisfaction. Project management is essential for any organization looking to succeed in today's competitive business environment.

Clear, shared goals and objectives

Everyone involved in the project is working towards shared goals and the same objectives, which increases the chances of project success. It also promotes clear collaboration and communication among team members, leading to more efficient and effective project execution.

Quality control

Quality control measures are implemented throughout the project lifecycle, resulting in a higher quality end product and increased customer satisfaction. Additionally, project management allows for continuous monitoring and adjustment of quality control processes, ensuring that any issues are identified and addressed promptly.

Realistic timelines

Creating agreed-upon timelines ensures that project workflows are completed on time and within budget, leading to increased efficiency, productivity, and improved client satisfaction.

Save time and money

Project management helps to streamline processes and reduce inefficiencies, ultimately saving time and money for the organization.

Managed risk

A well-defined project can identify and mitigate potential risks before they become major issues. This ensures that projects are completed on time, within budget, and with minimal disruptions.

Oversight

All aspects of a project are monitored and controlled, which helps prevent potential issues and ensures that the project stays on track toward its goals.

Transparency

Openly sharing information and progress updates with stakeholders builds trust, improves communication, and ensures everyone is aligned.

Opportunity (to learn from mistakes and missteps)

Learning from mistakes and missteps in project management allows for continuous improvement. In addition, it can prevent similar issues from occurring in future projects.

Topic 2: PROJECT IDENTIFICATION

Project Identification is the initial step in the project management lifecycle where potential projects are identified and assessed for their feasibility and alignment with organizational goals. Here's a structured approach to project identification:

1. Environmental Scan: Conduct a thorough analysis of the internal and external environment to identify emerging trends, challenges, and opportunities that could give rise to potential projects. This involves reviewing industry reports, market analyses, technological advancements, regulatory changes, and organizational strengths and weaknesses.

2. Brainstorming Sessions: Facilitate brainstorming sessions with key stakeholders to generate ideas for potential projects. Encourage creativity and diversity of perspectives to explore a wide range of possibilities.

3. Review Organizational Goals: Align project ideas with the strategic objectives and priorities of the organization. Projects should contribute to achieving the organization's mission, vision, and long-term goals.

4. Prioritization Criteria: Establish criteria for prioritizing project ideas based on factors such as strategic fit, potential impact, feasibility, resource availability, return on investment, and risk level.

5. SWOT Analysis: Conduct a SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis for each project idea to evaluate its internal strengths and weaknesses as well as external opportunities and threats. This helps in assessing the viability and sustainability of the project.

PROJECT FORMULATION

Project Formulation is the initial stage in the project management process where ideas and concepts are developed into a concrete plan. It involves defining the project's objectives, scope, feasibility, and initial requirements. Here's a breakdown of the key components involved in project formulation:

1. Identifying the Need or Opportunity: This involves recognizing a problem that needs to be solved, an opportunity that can be capitalized on, or a goal that needs to be achieved.

2. Defining Objectives: Clearly stating what the project aims to achieve. Objectives should be specific, measurable, achievable, relevant, and time-bound (SMART).

3. Scope Definition: Determining the boundaries of the project, including what will be included and what will be excluded. This helps in managing stakeholders' expectations and preventing scope creep.

4. Feasibility Analysis: Assessing the project's feasibility in terms of technical, economic, operational, legal, and scheduling aspects. This involves conducting a preliminary assessment of resources, risks, constraints, and potential challenges.

5. Stakeholder Analysis: Identifying and analyzing stakeholders who will be affected by or have an influence on the project. Understanding their interests, expectations, and concerns is crucial for effective project management.

6. Risk Assessment: Identifying potential risks and uncertainties that could impact the project's success and developing strategies to mitigate or manage them.

7. Resource Identification: Identifying the resources (human, financial, material) required to execute the project and assessing their availability and allocation.

8. Preliminary Cost Estimation: Estimating the initial budget required for the project, including capital expenditure, operational costs, and contingencies.

9. Initial Schedule Development: Creating a high-level timeline outlining the sequence of activities and key milestones for the project.

10. Formulating a Project Plan: Bringing together all the above elements into a comprehensive project plan that serves as a blueprint for execution.

Topic 3: FEASIBILITY STUDY

Definition of Feasibility Study

Preparing a feasibility is primary and most important in the development of a business. A feasibility study is an analysis of the viability of a business. Its is the process of thinking through the idea from its logical beginning to its logical end. Feasibility study is carried out in order to assess the viability of a new project.

Feasibility study addresses things like where and how the project will operate and how the project would be implemented to succeed as it was carefully planned. Feasibility study helps to answer essential question like 'should we proceed with the proposed idea?' All activities of the study are directed towards helping to answer these questions.

Purpose and Concept of Feasibility Study

The purpose behind a business feasibility study is to know the different variables involved with the business venture and how it will be accepted in the open market along with who will be the target audience.

In setting up a business, the feasibility study is the second document that is created following the business plan.

Preparing a feasibility study will help in making informed decision on which path should be pursued in order to achieve profitability.

The purpose of feasibility study is given below:

1. The purpose is to know the different variables involved with the proposed project
2. Explores the project opportunity and alternative paths available (e.g where can we get raw materials at a cheaper rate? is there a particular location? where is the best place to get goods for sale, can it be purchased online?)
3. Feasibility study allows one have a final grasp of the overall proposed business. (Its summarised in a single document)
4. Feasibility study of the project explores the different markets and targets **audience**. It also explores how the project will be perceived by the public.

The Different Areas of Feasibility Study

There are many different aspects of feasibility studies, here is a list of some of the most common:

1. Technical Feasibility

The assessment is centred on the technical resources available for the project. It helps to assess whether the technical team is capable of converting the ideas into working systems or not. Technical feasibility deals with the arrangement and logistics i.e how the product will actually get to the end users from the time material is been sourced.

This part of the feasibility study should answer the following questions:

1. What is the proposed project? does the project already exist? Will there be need to introduce the project to the market?
2. How can we protect the product or service from the competition? Competitive edge
3. What are the main benefits to customers or users?

4. What resources are required for producing or providing it? machines, equipment, people
5. How capable is the organization to acquire these resources? Money to buy machines, equipment, paying qualified hands?
6. How will the product actually get to the end users?

2. Schedule Feasibility

Schedule feasibility has to do with the period of time its going to take to actually complete the project or set up the business. Schedule Feasibility study answers the following questions:

1. How much time will it take to execute the business/project plan?
2. Does the business/project owners currently have the time resources to undertake the business.
3. Can the business/project plan be completed in the available time?

3. Economic Feasibility

This helps organizations assess the viability, cost, and benefits of the business; before financial resources are allocated. It helps decision-makers determine the positive economic benefits to the business/project owners that the proposed system will provide, and helps quantify them too.

Economic feasibility has to do with analysisng economic factors such as inflation, exchange rate, tax etc and how it may affect the planned business.

4. Legal/Ethical Feasibility

There is need to make sure that any project undertaken will meet all legal and ethical requirements.

This area investigates if the proposed business conflicts with legal requirements like data protection acts or social media laws.

5. Operational Feasibility

This measures how well the company will be able to solve problems and take advantage of opportunities that are presented during the course of the business.

SWOT Analysis. Sometimes challenges spring up and you identify opportunity from the challenge

6. Marketing Feasibility

This has to do with how the business/project owner intends to get market for his/her product to boosts sales and in turn increase profit.

Market feasibility should answer the following questions:

1. Will anyone want the product once its done?
2. Should there be a test run?
3. What market segments are you targeting?
4. Why would people buy the product or service?
5. Who are the potential customers and how many of them are there?

7. Resource Feasibility

Are there adequate resources to execute the project?
What resources will be required?
What facilities (buildings, equipment, plant and machines) will be required for the business, etc.

8. Cultural Feasibility
This has to do with the product and services acceptance considering the culture of the target market and whether it will conform with their culture and make them willing to buy. It answers questions such as;
What will be the impact of the project on both local and general cultures?
What sort of environmental implications does it have?

9. Real Estate Feasibility
What kind of land or property will be required to undertake the business? or What kind of building will be erected in the course of the project?
Will it be rented or built from scratch?
What are the zoning laws in terms of location? How will the business impact the area?

Topic 4: PROJECT REPORT

A project report is a detailed document that provides comprehensive information about a specific project. It serves as a record of the project's objectives, activities, progress, outcomes, and other relevant details. The purpose of a project report is to communicate the key aspects of the project to stakeholders, team members, sponsors, and other interested parties.

Here are some key elements of a project report:

1. Introduction: This section provides background information about the project, including its purpose, objectives, and scope. It sets the context for the rest of the report and helps readers understand the project's significance.

2. Project Description: Here, the report outlines the details of the project, including its goals, deliverables, timeline, budget, and resources. It provides a clear overview of what the project aims to achieve and how it will be executed.

3. Methodology: This section describes the research methods, techniques, or approaches used to carry out the project. It explains how data was collected, analyzed, and interpreted, providing transparency about the project's processes.

4. Progress Report: The progress report section summarizes the project's status and accomplishments. It highlights key milestones achieved, tasks completed, and any challenges or obstacles encountered during the project's implementation.

5. Results and Analysis: Here, the report presents the findings, data, or results obtained from the project. It includes analysis and interpretation of the results, showing how they align with the project's objectives and contribute to its overall success.

6. Discussion: This section discusses the significance of the project's results and outcomes. It explores the implications for stakeholders or the organization and identifies any lessons learned from the project experience.

7. Conclusion: The conclusion section summarizes the key findings, outcomes, and conclusions drawn from the project. It may also include recommendations for future actions or improvements based on the project's findings.

8. Recommendations: This section provides suggestions for further action or areas for improvement based on the project's outcomes. It offers practical insights and strategies for addressing challenges or maximizing opportunities identified during the project.

9. Appendices: Additional supporting documents, data, charts, graphs, or detailed project plans may be included in the appendices to provide supplementary **information.**

PROJECT CLASSIFICATION

Project Classification There is no standard classification of the projects. However considering project goals, these can be classified into two broad groups, industrial and developmental. Each of these groups can be further classified considering nature of work (repetitive, non-repetitive), completion time (long term, shot term etc), cost (large, small, etc.), level of risk (high, low, no-risk), mode of operation (build, build-operate-transfer etc).

Industrial projects also referred as commercial projects, which are undertaken to provide goods or services for meeting the growing needs of the customers and providing attractive returns to the investors/stake holders.

Development projects are undertaken to facilitate the promotion and acceleration of overall economic development. These projects act as catalysts for economic development providing a cascading effect. Development projects cover sectors like irrigation, agriculture, infrastructure health and education.

The essential differences between Industrial projects and Developmental project

Industrial projects and developmental projects have distinct characteristics and objectives, although there can be overlap between them in certain cases. Here are the essential differences between the two:

1. Objective:

    - Industrial Projects: Industrial projects are primarily aimed at establishing or improving manufacturing facilities, processes, or systems to produce goods or provide services efficiently. The focus is on increasing productivity, optimizing resources, and maximizing profits.

    - Developmental Projects: Developmental projects focus on socio-economic growth and welfare. They aim to address specific social, economic, or

infrastructural challenges within a region or community. These projects may include initiatives related to education, healthcare, infrastructure development, poverty alleviation, etc.

2. Scope:

    - Industrial Projects: The scope of industrial projects revolves around enhancing the production capacity, quality, and efficiency of goods or services. This may involve constructing new factories, upgrading machinery, implementing automation, or streamlining processes.

    - Developmental Projects: Developmental projects have a broader scope, encompassing various sectors such as education, healthcare, agriculture, transportation, and infrastructure. They often require multi-sectoral collaboration and may involve policy reforms, community engagement, and capacity building.

3. Beneficiaries:

    - Industrial Projects: The primary beneficiaries of industrial projects are usually the stakeholders involved in the production process, including shareholders, employees, and consumers. The focus is on generating revenue and creating employment opportunities.

    - Developmental Projects: Developmental projects are designed to benefit the broader society or specific target groups, such as marginalized communities, rural populations, or underprivileged individuals. The goal is to improve living standards, promote social equity, and foster sustainable development.

4. Investment:

    - Industrial Projects: Investment in industrial projects is mainly driven by the potential for profit generation. Investors, both private and public, allocate funds based on expected returns on investment (ROI) and market demand.

    - Developmental Projects: Investment in developmental projects often comes from government budgets, international aid, donor agencies, or development banks. The focus is on achieving long-term social and economic development goals rather than immediate financial returns.

5. Metrics of Success:

    - Industrial Projects: Success in industrial projects is typically measured in terms of increased production output, cost reduction, market share growth, and profitability indicators such as return on investment (ROI) and net profit margins.

- Developmental Projects: Success in developmental projects is evaluated based on socio-economic impact indicators, such as poverty reduction, improved access to basic services (education, healthcare, clean water), infrastructure development, environmental sustainability, and overall quality of life enhancements.

6. Timeline:

    - Industrial Projects: Industrial projects often have shorter timelines focused on achieving operational efficiency and meeting market demands. They may involve continuous improvement processes to adapt to changing market conditions.

    - Developmental Projects: Developmental projects typically have longer timelines, as they aim to address complex socio-economic issues and achieve sustainable development outcomes. They may require phased implementation and long-term monitoring and evaluation to assess their effectiveness.

PROJECT MANAGEMENT TECHNIQUES

1. **Work Breakdown Structure (WBS):** This technique involves breaking down the project scope into smaller, more manageable tasks and subtasks. It helps in organizing work and defining the hierarchy of project deliverables.

2. **Gantt Charts**: Gantt charts visually represent project schedules, showing tasks, their start and end dates, dependencies, and progress. They help project managers and team members understand the timeline of activities and identify potential bottlenecks.

3. **Critical Path Method (CPM):** CPM identifies the longest sequence of dependent tasks and determines the shortest possible duration for completing the project. It helps in scheduling and resource allocation by focusing on critical tasks that could delay the project if not completed on time.

4. **PERT (Program Evaluation and Review Technique):** PERT is similar to CPM but incorporates uncertainty in task durations by using three time estimates (optimistic, pessimistic, and most likely). It calculates expected durations and helps in managing project risks.

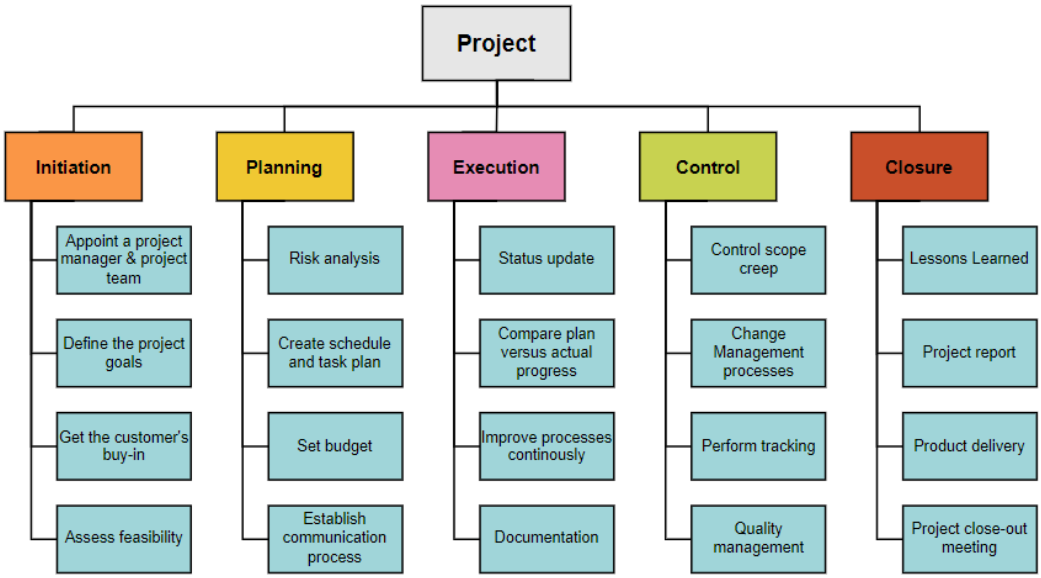
5. **Kanban: Kanban** is a visual project management technique used to manage workflow and tasks. It uses cards or sticky notes on a board to represent tasks at different stages of completion, making it easy to visualize progress and identify bottlenecks.

6. **Agile Methodologies**: Agile methodologies, such as Scrum and Kanban, emphasize iterative development, collaboration, and flexibility. They involve breaking the project into small iterations or sprints, with regular feedback and adjustments to deliver value quickly and adapt to changing requirements.

Topic 5&6: WORK BREAKDOWN STRUCTURE AND GANTT CHART

A work breakdown structure (WBS) is a project management system that breaks projects into smaller, more manageable components or tasks. It is a visual tool that breaks down the entire project to make it easier to plan, organize, and track progress.

A typical project example



A Work Breakdown Structure (WBS) is a hierarchical decomposition of a project into smaller, more manageable components. It organizes and defines the scope of the project work and serves as a foundation for planning, scheduling, and controlling project activities. Let's break it down using the example of organizing a music concert:

1. Main Project: Organizing a Music Concert
    - Stage 1: Planning and Preparation
        - Define project objectives and requirements
        - Create a budget
        - Secure venue and necessary permits
        - Hire event staff
    - Stage 2: Venue Setup
        - Stage construction
        - Sound and lighting setup
        - Seating arrangement
        - Decorations
    - Stage 3: Artist Management
        - Contract negotiations

        - Travel arrangements
        - Accommodation booking
        - Technical requirements coordination
    - Stage 4: Ticketing and Promotion
        - Design and printing of tickets
        - Marketing strategy development
        - Online ticket sales setup
        - Promotional campaigns
    - Stage 5: Event Execution
        - Artist performances
        - Crowd management
        - Security arrangements
        - Catering services
    - Stage 6: Post-Event Activities
        - Event breakdown and cleanup
        - Financial reconciliation
        - Feedback collection
        - Evaluation of project success

Each of these stages can be further broken down into smaller, more manageable tasks until the work is defined at a level where it can be easily understood, estimated, and assigned to a team member. For instance, under "Artist Management," tasks could include contacting agents, negotiating fees, arranging transportation, etc.

TYPES OF WORK BREAKDOWN STRUCTURE

There are primarily two types of Work Breakdown Structures (WBS):

1. **Deliverable-Based WBS:** In this type, the breakdown is structured around the final deliverables or outcomes of the project. Each level of the WBS represents a deliverable that contributes to the completion of the project. This type of WBS is commonly used in product-oriented projects where the end result is tangible, such as construction projects or product development.

Example:

- Level 1: Project
- Level 2: Major deliverables (e.g., concert venue setup, artist management, ticketing)
- Level 3: Sub-deliverables (e.g., stage construction, sound setup, lighting setup)

2. **Phase-Based WBS**: This type of WBS organizes the project work into phases or stages. Each phase represents a distinct stage of the project lifecycle. This type of WBS is often used in projects where the focus is on completing sequential phases, such as software development or event planning.

Example:

- Phase 1: Planning and Preparation
- Phase 2: Venue Setup

- Phase 3: Artist Management
- Phase 4: Ticketing and Promotion
- Phase 5: Event Execution
- Phase 6: Post-Event Activities

Both types of WBS can be effective depending on the nature of the project and the preferences of the project team.

GANTT CHARTS

Gantt Chart Definition & History

A Gantt chart is a project management tool that allows project managers to create a project schedule by mapping project tasks over a visual timeline which shows the order in which they'll be completed, when they're due, their duration and other details about them such as their percentage of completion. Every Gantt chart has two main parts, a grid or task list on the left side and a project timeline on the right.

Henry Gantt was a social scientist and management consultant who also held a degree in mechanical engineering. He worked in the field of scientific management, developing methods to streamline and increase the productivity of corporations and their workforce. He created the Gantt chart in the 1910s to help supervisors understand the progress of their labour force and to ensure tasks were on schedule. He created Gantt chart to improve project planning, scheduling and tracking by illustrating completed work compared to planned work. Today, project managers and team members use Gantt charts to plan projects, create a project schedule, allocate resources and track progress with just one project management tool.

Purpose of a Gantt Chart

At a basic level, a Gantt chart allows project, program and portfolio managers to easily map out project plans by organizing project tasks on a visual timeline. However, Gantt charts are used for many other purposes in project planning, project scheduling, project tracking and resource management.

With Gantt chart, you can assign tasks to team members, set due dates, estimate costs and monitor progress in real time. The best part is that it can be used along with other project management tools such as kanban boards, real-time project dashboards, timesheets and team collaboration tools.

Content of a Gantt Chart

On the left is a grid that lists project tasks and important information about them and on the right, there's the Gantt chart timeline, a visual representation of the project schedule. The grid of a Gantt chart is where you list project tasks and project scheduling details about them. The Gantt chart grid is the most important component of your Gantt chart because the data you enter here will be used to populate the Gantt chart timeline.

Gantt Chart Timeline

The Gantt chart timeline is a stacked bar chart where each project task is represented by a bar that runs on the horizontal axis. The task bars start on the date that the work is scheduled to start and end on the date when it's expected to finish. The longer the bar, the longer the task will take. Gantt chart timeline also shows the following:

- Due dates & task duration
- Task dependencies (represented as arrows that link tasks in the Gantt chart timeline)
- Percent complete (mostly a guessed % figure of how much work they have done and how much they still need to do)

A gantt chart typically displays the following:

- The Gantt chart timeline
- What the project tasks are
- Which team member is working on each task
- When project activities start and finish
- The percent complete for each activity and work package
- How tasks group together, overlap and link with each other
- Task dependencies such as finish-to-start, start-to-start, finish-to-finish and start-to-finish
- Milestones and project phases on the schedule

What Is a Gantt Chart Used For?

Because the Gantt chart is such a diverse project management tool for identifying timelines and task dependencies, it can be used in any industry or field. Here are some examples.

Gantt charts in project management
Gantt charts in construction
Gantt charts in manufacturing
Gantt charts in project portfolio management – management of collection of investments owned by an individual or an institution.

The Main Benefits of Gantt Charts

A key benefit of a Gantt chart is its ability to show a top-line perspective of a project. Gantt charts help workers and managers track tasks; managers can also use them to allocate resources wisely in order to finish a project.
Here are some of the main benefits of Gantt charts:

- **It Provides a High-Level Overview:** A Gantt chart provides an overall perspective of a project and its timeline — for both those who are deeply involved and those with less participation, such as executives and other stakeholders.
  A Gantt chart is visually appealing and easy to understand. It provides critical

information about tasks at a glance, including the order in which they begin and their duration.

- **It Improves Efficiency and Helps Manage Resources:** A Gantt chart can help ensure that leaders and workers manage their time and resources effectively. Project leaders can use it to set realistic schedules and allocate resources based on those schedules, including assigning the right people to the right tasks. It can also help project members come up with workarounds for potential problems before a project starts.
- **It Allows for Better Tracking:** A Gantt chart enables project leaders and members to closely track tasks, benchmarks, and overall workflow. The chart can reveal possible constraints or issues and allow project leaders and members to adjust accordingly.
- **It Illustrates Overlaps and Dependencies:** A Gantt chart clearly communicates how tasks in a project might overlap. It also shows how the beginning of one task can be dependent on the completion of another task. That kind of information allows project leaders to schedule work and provide resources in a way that doesn't impede the progress of a project.
- **It Boosts Productivity:** A Gantt chart allows for collaboration among workers to boost their productivity. The high-level visibility of a Gantt chart helps people stay focused on the tasks they must complete. That visibility also ensures the accountability of all team members regarding their tasks.
- **It Allows You to Balance Multiple Projects:** A Gantt chart allows managers to easily track multiple projects. It then enables those managers to balance the work on each project because the chart indicates how to provide the right resources at the right time.
- **It Makes Complex Information Manageable:** The visual clarity that a Gantt chart provides can help simplify a complex set of tasks. The chart displays tasks clearly and simply for the people who must do the work. Such transparency enables team members to stay focused and avoid becoming overwhelmed by a large number of tasks.
- **It Helps You Set Realistic Deadlines and Expectations:** A Gantt chart lays out all the tasks that a team must accomplish in order to complete a project. The chart also illustrates the relationships and dependencies among those tasks. Such coherent visual communication allows for a realistic view of the time it takes to complete the work. Consequently, having access to such accurate information allows you to set realistic deadlines for each task and for the entire project.
- **It Helps Keep Everyone Aligned, Including Remote Workers:** When everyone on a project team (including remote workers and those in other offices) has easy access to the same information, all work on the project remains aligned. The chart improves communication and collaboration among everyone.
- **It Motivates Team Members:** A Gantt chart enables team members to visualize their tasks, thereby motivating them to do their work on the project. Team members can view the project moving forward and watch other members completing their tasks. The chart also shows how certain tasks can't begin until another task is completed. All that visibility enables people to complete their tasks well and on time.

The Main Challenges of Gantt Charts

One of the primary challenges when using Gantt charts is their complexity in large projects. The charts can also fail to represent the complexities of certain tasks and the time your team requires to complete them.

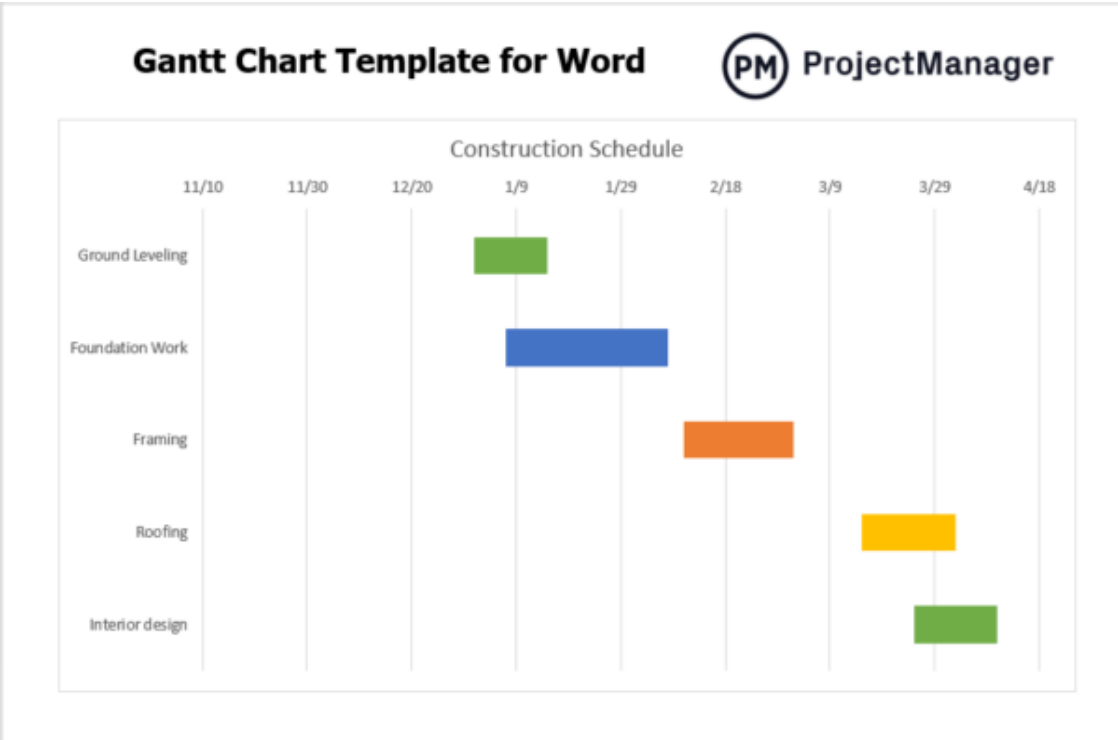
Here are some of the main challenges of Gantt charts:

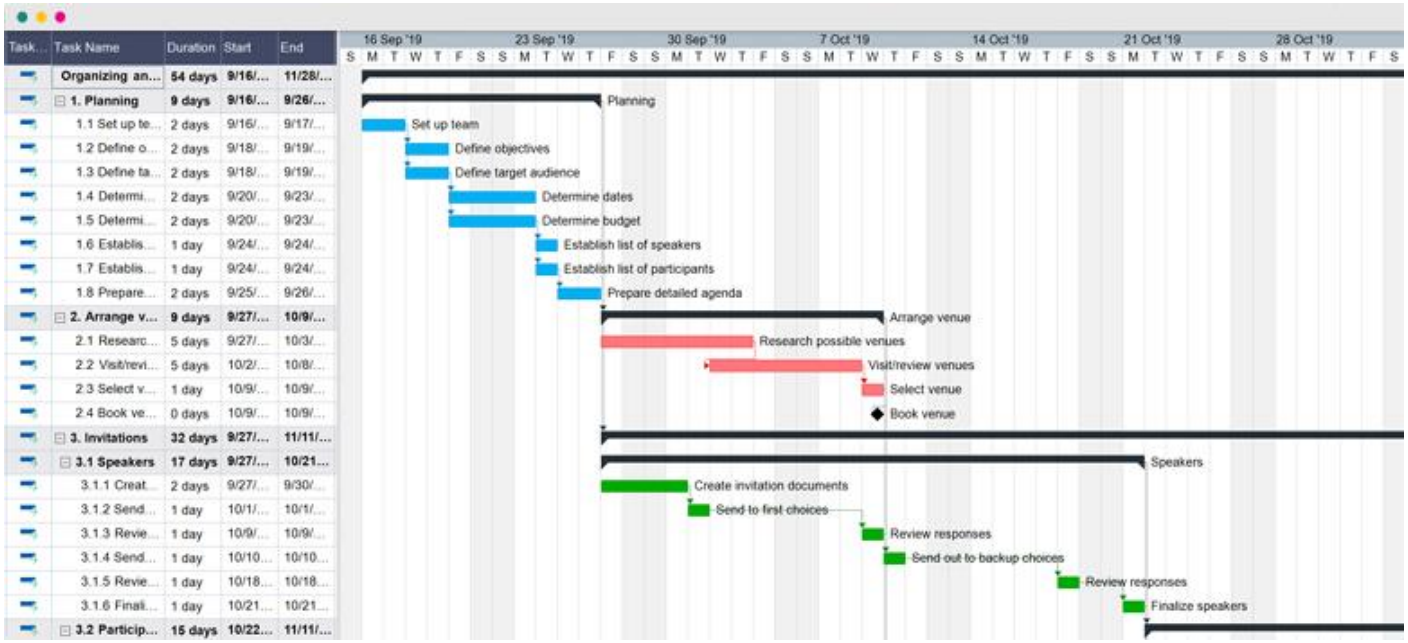
- **Setup Can Be Time Consuming:** Setting up a Gantt chart for a complex project can be convoluted and time consuming. Software can help.
- **They Can Become Complex and Confusing:** A Gantt chart for a large project with many tasks and subtasks can become complicated. Adding even more tasks or making changes to the schedule affects the entire chart. When your organization doesn't use software to help, repeatedly reworking the Gantt chart can become difficult.

  The chart loses some of its value when it becomes too complicated. One of the advantages of a Gantt chart is its ability to depict a project and its tasks at a glance. When the project description expands to cover hundreds of tasks over multiple pages, you lose such an advantage.
- **They Don't Designate Priorities:** Gantt charts focus on presenting the tasks in a project, the order of those tasks, and the approximate time it takes to complete them. The charts don't show the priority of the particular tasks you need to complete for the project to be a success. With such an omission, team members might not understand those priorities the way they should.
- **They Don't Offer Much Detail Regarding Task Dependencies:** Gantt charts can show how you must complete one task before starting another one. But they don't provide much detail concerning all of the dependencies within a particular task for a project.

  For this reason, a project team might want to use a program evaluation review technique (PERT) chart in conjunction with a Gantt chart. A PERT chart or graphic uses arrows to indicate the sequence in which project team members must complete certain tasks in order to begin work on another task.
- **Task Bars Do Not Show the Amount of Work That Each Task Requires:** The length of a Gantt chart task bar shows the amount of time it might take to finish a task. But that length doesn't indicate the specific resources that such a task requires.

  Some tasks with short bars (representing short deadlines) might require significant resources. Some tasks with long bars might require minimal resources. The Gantt chart can be misleading when it comes to representing the amount of work and resources you require. Thus, in order to correctly allocate and monitor resources, you might need to use other tools in addition to the Gantt chart.





Difference between Work Breakdown Structure and Gantt Charts

Work breakdown structures show what you are making, and Gantt charts show when you are doing so. The WBS breaks down work hierarchically, from top to bottom. The Gantt chart is linear and displays time progression from left to right.

Topic 7: CRITICAL PATH METHOD

A technique used to identify tasks that must be completed to finish the project on time. It's used to determine the shortest length of time necessary to complete a project.

The Critical Path Method (CPM) is a project management technique used to identify the sequence of tasks that are critical to the completion of a project. It helps project managers determine the shortest possible duration for completing a project by analyzing the dependencies between tasks.

In CPM, each task in a project is represented as a node, and the dependencies between tasks are represented as directed edges between nodes. The critical path is the longest path through the network of tasks, meaning it is the sequence of tasks that, if any are delayed, will cause the entire project to be delayed.

By identifying the critical path, project managers can focus their attention on those tasks that are most crucial to the project's timeline. They can also identify tasks that have some flexibility in their start or end times without affecting the overall project duration.

CPM is often visualized using a Gantt chart or a network diagram, which helps project managers and team members understand the sequence of tasks and dependencies visually. This method is widely used in industries such as construction, engineering, software development, and manufacturing to effectively plan and manage projects.

Finding the critical path is very helpful for project managers because it allows them to:

- Accurately estimate the total project duration.
- Estimate the time that's necessary to complete each project task.
- Identify critical activities which must be completed on time and require close supervision.
- Find out which project tasks can be delayed without affecting the project schedule by calculating slack for each task.
- Identify task dependencies, resource constraints and project risks.
- Prioritize tasks and create realistic project schedules.

Steps in the CPM process

CPM encompasses the following six steps:

1. Identify each activity to be completed in the project; start with the high-level ones and then identify ancillary activities.
2. Define the activity sequence. This also requires identifying dependencies among activities, such as which ones occur before or after others and which should occur concurrently.
3. Build a flow diagram, also called a network diagram, similar to the one in Figure 2, that positions all activities for the entire project.
4. Estimate the amount of time for completion of each activity and map that to the whole project plan, including the estimated completion date.
5. Perform a critical path analysis to define the activities that must be completed to ensure project completion and success.

6. Update the plan as the project progresses, accounting for delays, resource allocation, staffing issues and other factors. For this step, project management software with CPM capabilities is essential. These tools use a critical path algorithm that automatically adjusts the plan based on specific inputs, such as changes in scope or time frame.

The Importance of Critical Path Method in Project Management

The Critical Path Method (CPM) holds significant importance in project management for several reasons:

1. **Time Management**: CPM helps in effectively managing project timelines by identifying the critical path, which represents the longest sequence of tasks that determine the minimum project duration. By focusing on tasks along the critical path, project managers can ensure that the project is completed on time.
2. **Resource Allocation**: Knowing the critical path allows project managers to allocate resources efficiently. Resources can be prioritized for critical tasks to prevent delays and ensure that the project stays on schedule.
3. **Risk Management**: CPM helps identify potential risks and uncertainties that could impact project timelines. By focusing on critical tasks, project managers can develop contingency plans to address risks and mitigate their impact on project completion.
4. **Dependency Management**: CPM provides a clear understanding of task dependencies and relationships within a project. This allows project managers to coordinate tasks effectively and ensure that each task is completed in the correct sequence to avoid bottlenecks and delays.
5. **Communication and Coordination**: CPM provides a visual representation of project tasks and timelines, making it easier for project teams to communicate and coordinate their efforts. Team members can see how their tasks fit into the overall project schedule and understand the impact of their work on project completion.
6. **Performance Measurement**: CPM allows project managers to track progress against the planned schedule. By comparing actual progress to the critical path, project managers can identify deviations and take corrective actions to keep the project on track.

Disadvantages of Critical Path Method in Project Management

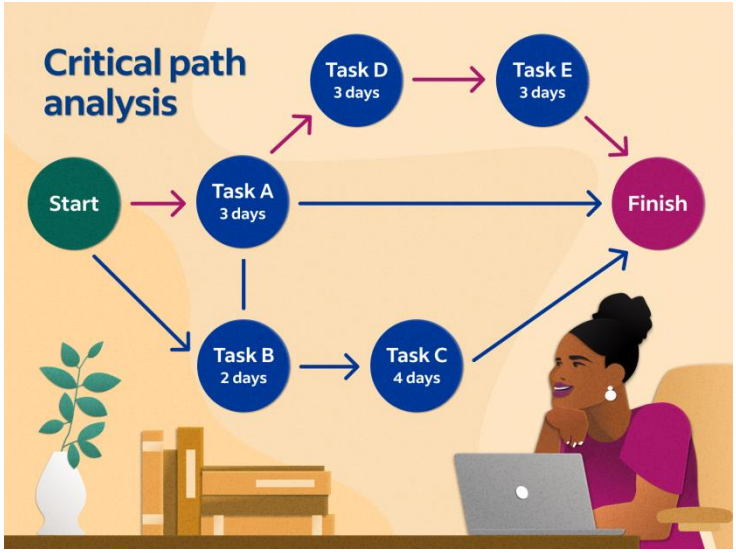
1. **Complexity**: CPM can be complex to implement, especially for large projects with numerous tasks and dependencies. Creating and managing the network diagram requires careful attention to detail, and changes to the project schedule can be challenging to incorporate.
2. **Resource Constraints**: CPM does not explicitly consider resource constraints when scheduling tasks. While it identifies the critical path and helps allocate resources to critical tasks, it may not account for resource limitations that could affect the overall project schedule.
3. **Uncertainty**: CPM relies on estimates for task durations, which may not always be accurate. Variability in task durations or unexpected delays can lead to inaccuracies in the project schedule and potentially cause the critical path to change.

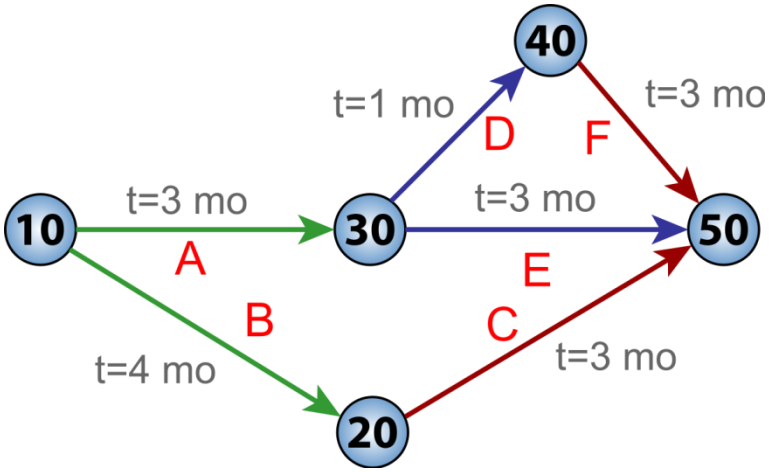
4. **Inflexibility**: Once the critical path is identified, there may be limited flexibility in adjusting task schedules without impacting the project's overall completion time. This lack of flexibility can make it challenging to accommodate changes in project scope or unexpected events.
5. **Doesn't Account for External Factors**: CPM primarily focuses on internal project tasks and dependencies, often overlooking external factors such as market conditions, regulatory changes, or supplier delays. These external factors can significantly impact project timelines but are not explicitly accounted for in CPM.
6. **Limited Scope**: CPM primarily focuses on time management and scheduling and may not address other important aspects of project management, such as cost management, quality control, or risk management. Project managers may need to supplement CPM with other techniques to address these areas effectively.
7. **Assumption of Independence**: CPM assumes that tasks are independent of each other, meaning that the completion of one task does not affect the duration of another. In reality, tasks may have interdependencies or dependencies on external factors that are not captured in the CPM model.

What is the formula for the critical path method?

The critical path formula consists of two parts: the forward pass and the backward pass. The forward pass calculates the earliest start times (ES) and finish times (EF) for each activity, with EF determined by adding the activity's duration (t) to its ES.

A Typical CPM





CPM versus PERT

The critical path method (CPM) and program evaluation and review technique (PERT) are both project scheduling techniques. But they aren't interchangeable. We've been talking about CPM, but before we compare it to PERT let's define the term.

PERT is that technique of project management which is used to manage uncertain (i.e., time is not known) activities of any project. CPM is that technique of project management which is used to manage only certain (i.e., time is known) activities of any project.

PERT is used to get accurate time estimates for complicated projects. It uses an algorithm to calculate the estimated duration for unpredictable activities. It focuses on events and milestones on a PERT chart with nodes in the wireframe when developing projects.

However, while these are two different techniques, PERT and CPM can be used together for project planning and scheduling. The difference between them lies in that PERT is about time planning and time management, while CPM is about time and budgeting. PERT delivers a project quickly and CPM gets the project done on budget and on time.

Topic 8: PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT)

The Program Evaluation and Review Technique (PERT) is a project management tool used to schedule, organize, and coordinate tasks within a project. PERT was developed in the late 1950s by the U.S. Navy as part of the Polaris missile submarine program. It's particularly useful for projects that involve a high degree of uncertainty in terms of time estimates.

Program Evaluation and Review Technique (PERT) is a method used to examine the tasks in a schedule and determine a Critical Path Method variation (CPM). It analyzes the time required to complete each task and its associated dependencies to determine the minimum time to complete a project. It estimates the shortest possible time each activity will take, the most likely length of time, and the longest time that might be taken if the activity takes longer than expected.

In project management, the Project Evaluation Review Technique, or PERT, is used to identify the time it takes to finish a particular task or activity. It is a system that helps in the proper scheduling and coordination of all tasks throughout a project. It also helps in keeping track of the progress, or lack thereof, of the overall project.

In the 1950s, the Project Evaluation Review Technique was developed by the US Navy to manage the Polaris submarine missile program of their Special Projects Office.

How to Create a PERT Chart

A flowchart is used to depict the Project Evaluation Review Technique. Nodes represent the events, indicating the start or end of activities or tasks. The directorial lines indicate the tasks that need to be completed, and the arrows show the sequence of the activities.
There are four definitions of time used to estimate project time requirements:

- Optimistic time – The least amount of time it can take to complete a task
- Pessimistic time – The maximum amount of time it should take to complete a task
- Most likely time – Assuming there are no problems, the best or most reasonable estimate of how long it should take to complete a task.
- Expected time – Assuming there are problems, the best estimate of how much time will be required to complete a task.

Terms used in a PERT chart

In a PERT chart, several terms are commonly used to describe different elements of the project management process. Here are some key terms:

1. **Task/Activity**: A specific piece of work that needs to be completed within the project. Tasks are represented as nodes in the PERT chart.
2. **Predecessor**: A task that must be completed before another task can begin. Predecessors are linked to their dependent tasks by arrows in the PERT chart.
3. **Successor**: A task that cannot begin until another task is completed. Successors are linked to their preceding tasks by arrows in the PERT chart.
4. **Duration**: The estimated time it will take to complete a task. It can be broken down into optimistic, pessimistic, and most likely time estimates.
5. **Expected Time**: The calculated average time it will take to complete a task, based on the optimistic, pessimistic, and most likely time estimates.
6. **Critical Path**: The longest path through the project network, which determines the minimum time required to complete the project. Tasks on the critical path have zero slack or float, meaning any delay in these tasks will delay the entire project.
7. **Slack/Float**: The amount of time a task can be delayed without delaying the project completion date. Tasks with slack have some flexibility in their start or finish times.
8. **Earliest Start Time (EST)**: The earliest possible time a task can start without delaying the project.
9. **Latest Start Time (LST)**: The latest possible time a task can start without delaying the project completion.
10. **Earliest Finish Time (EFT)**: The earliest possible time a task can finish based on its earliest start time and duration.
11. **Latest Finish Time (LFT)**: The latest possible time a task can finish without delaying the project completion.
12. **Float/Slack Time**: The amount of time a task can be delayed without affecting the project's completion time. It is calculated as the difference between the latest start time and the earliest start time (or the latest finish time and the earliest finish time).

How to implement a PERT chart

1. Identify Tasks: Make a list of all the tasks needed to complete the project. Tasks should be specific, measurable, achievable, relevant, and time-bound (SMART).
2. Sequence Tasks: Determine the order in which tasks need to be completed. Some tasks may be dependent on others, while some can be done concurrently. Draw arrows between tasks to show the sequence.

3. Estimate Time: Estimate the time required for each task. Use three time estimates: optimistic (the shortest time), pessimistic (the longest time), and most likely (the time it will most likely take).
4. Calculate Expected Time: Calculate the expected duration for each task using a weighted average of the optimistic, pessimistic, and most likely times. The formula is: Expected Time=Optimistic+(4×Most Likely)+Pessimistic6Expected Time=6Optimistic+(4× Most Likely)+Pessimistic
5. Identify Critical Path: Determine the longest path through the project network. Tasks on the critical path have zero slack or float, meaning any delay in these tasks will delay the entire project.
6. Create the Chart: Draw a diagram representing the tasks, their dependencies, and estimated durations. Use nodes to represent tasks and arrows to represent dependencies. Label each node with the task name and estimated duration.
7. Add Critical Path: Highlight the critical path in your chart. This helps to visually emphasize the tasks that must be completed on time to avoid delaying the project.
8. Review and Update: Review the PERT chart regularly throughout the project. Update task durations and dependencies as needed based on actual progress.
9. Communicate: Share the PERT chart with project stakeholders to keep them informed about the project timeline and critical tasks.

Advantages of PERT

PERT offers several advantages in project management:

1. **Visualization of Project Timeline**: PERT allows for the visualization of project activities and their interdependencies through network diagrams. This helps project managers and team members understand the sequence of tasks and their relationship to each other, facilitating better planning and coordination.
2. **Identification of Critical Path**: PERT helps identify the critical path in a project, which is the longest sequence of dependent activities that determine the project's minimum duration. By focusing on the critical path, project managers can prioritize resources and efforts to ensure timely completion of the project.
3. **Resource Allocation**: PERT aids in resource allocation by providing insights into the time required for each activity and the resources needed for those activities. This enables project managers to allocate resources efficiently, avoiding bottlenecks and ensuring optimal utilization of resources.
4. **Risk Management**: PERT incorporates uncertainty into project planning by allowing for the estimation of activity durations as ranges rather than fixed values. This helps in assessing and managing risks associated with project delays and uncertainties, allowing project managers to develop contingency plans and mitigate potential issues proactively.
5. **Coordination and Communication**: PERT promotes coordination and communication among project stakeholders by providing a structured framework for planning, scheduling, and monitoring project activities. It facilitates collaboration between team members and enables effective communication of project progress and potential issues.
6. **Performance Measurement**: PERT enables performance measurement by comparing planned timelines with actual progress. This helps project managers identify deviations from the planned schedule and take corrective actions to keep the project on track.
7. **Flexibility**: PERT allows for flexibility in project planning and scheduling by accommodating changes in project scope, priorities, or resource availability. It provides a framework for adjusting schedules and resource allocations while minimizing the impact on project timelines.

Disadvantages of PERT

PERT (Program Evaluation and Review Technique) is a project management tool designed to analyze and represent the tasks involved in completing a given project. While PERT offers several advantages, it also has its share of disadvantages:

1. Complexity: Implementing PERT can be complex, especially for smaller projects or teams with limited resources. Its intricacies may require significant training and expertise to use effectively.
2. Estimation Challenges: PERT heavily relies on time estimates for each activity. Estimating these durations accurately can be difficult, especially for novel or highly uncertain tasks. Inaccurate estimates can lead to unreliable project timelines and completion dates.
3. Assumption of Independence: PERT assumes that project activities are independent of each other. In reality, tasks often have dependencies that can affect their duration and sequencing. Failing to account for these dependencies properly can result in inaccurate project scheduling.
4. Resource Allocation Issues: PERT primarily focuses on time management and scheduling, but it may not adequately address resource allocation. Without proper resource management, projects may face shortages or bottlenecks, leading to delays or inefficiencies.
5. Limited Flexibility: PERT tends to be less flexible in accommodating changes or unexpected events during the project lifecycle. Modifications to task sequences or resource allocations may require significant adjustments to the PERT diagram, potentially disrupting the entire project plan.
6. Overemphasis on Critical Path: While identifying the critical path is a key feature of PERT, it can lead to tunnel vision, where project managers focus excessively on critical tasks. This may result in neglecting non-critical tasks or failing to recognize alternative paths that could optimize project efficiency.
7. Resistance to Adoption: Introducing PERT into an organization may face resistance from team members accustomed to traditional project management methods. Overcoming this resistance and ensuring widespread adoption of PERT may require substantial effort and organizational change management.
8. Limited Applicability: PERT is most effective for projects with well-defined tasks and clear dependencies. It may not be suitable for projects with a high degree of uncertainty or those involving creative or innovative work where tasks and dependencies are not easily predictable.