# Project Management

Project

- A project is defined as a ―**temporary endeavor** with a beginning and an end and it must be used to create a unique product, service or result
  - Converting a vision ,a dream, or a need to reality
  - A sequence of tasks that must be completed to attain a certain outcome
  - A job that has a beginning and an end (Time)
  - A specified outcome (Scope)
  - At a stated level of performance (
  - At a budget (Costs)

Scope
(Features, Functionality)

Quality

Cost
(Resources, Budget)

Time
(Schedule)
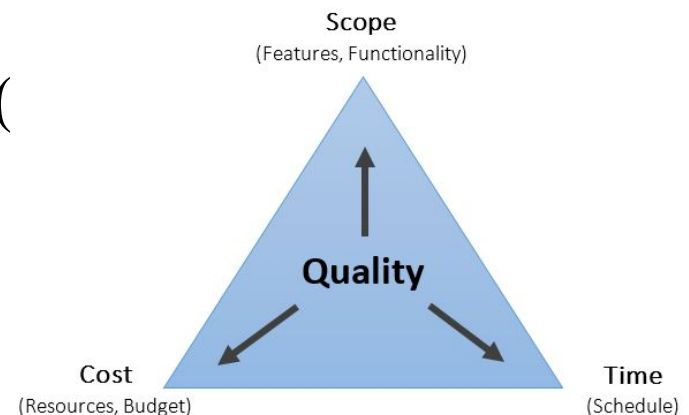
Characteristics of a project

A clear start and end date

A project has boundaries

A project creates something new

A project is not business as usual

Characteristics of a Project:

- The project is **temporary** in nature. It typically has a defined start and a defined end time.
- The project will have a **unique** set of requirements that need to be delivered within the boundaries of the project.
- Has some **resources and budget.**
- Projects are progressively elaborated
- A project is typically for a customer.
- A project can very often be cross-functional, or indeed cross-organization.

Examples of project

- Developing a new information system, software
- Building a Robot
- Construction project(building, road)
- Research and development project
- Introducing new products in market
- Conducting training and capacity development packages
- Awareness and advocacy campaign
- Writing a book, thesis etc.

Project Management

- **Management:**
  - Management is the technique of the understanding the problems, needs and controlling the use of resources, cost, time ,scope and quality.
- **Project management:**
  - Application of knowledge, skills, tools and techniques to project activities in order to meet stakeholders needs & expectations from a project.

"Completion of project on time within a budget without comprising quality"
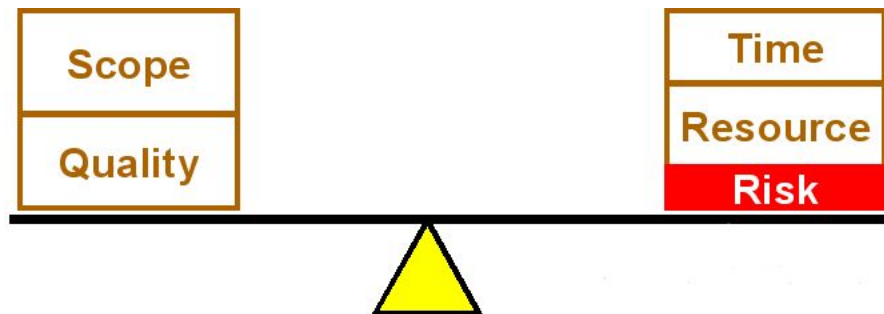
Triple Constraints of a Project

- The project is carried out under certain constraints - they are **cost**, **time** and **scope**.

- These three factors are called triple constraints.

- They can be explained as:
  - Projects must be delivered within **cost**.
  - Projects must be delivered on **time**.
  - Projects must meet the agreed **scope or objectives**.

- The goal of the constraints is to meet customer quality requirements.
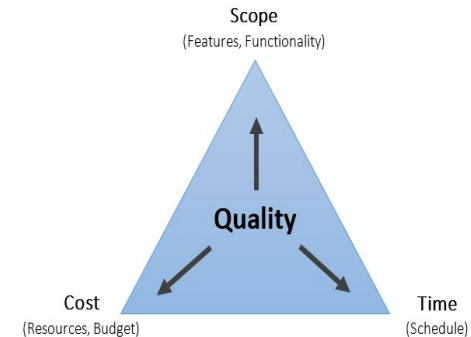
Inter relationships between the constraints

- If you reduce cost of project, you will either reduce its scope or increase its time.

- If you reduce time of project, you will either increase its cost or reduce its scope.

- If you increase scope of project, you will either increase its cost or time.

Setting Project Objective

- Project has clearly defined objectives , which should be achieved at the end of the project.

- Project exists when the objectives have been achieved.

- First step in any project is to define the objective.

- We define the project objective in order to:

  - Make sure that we have identified the right target.

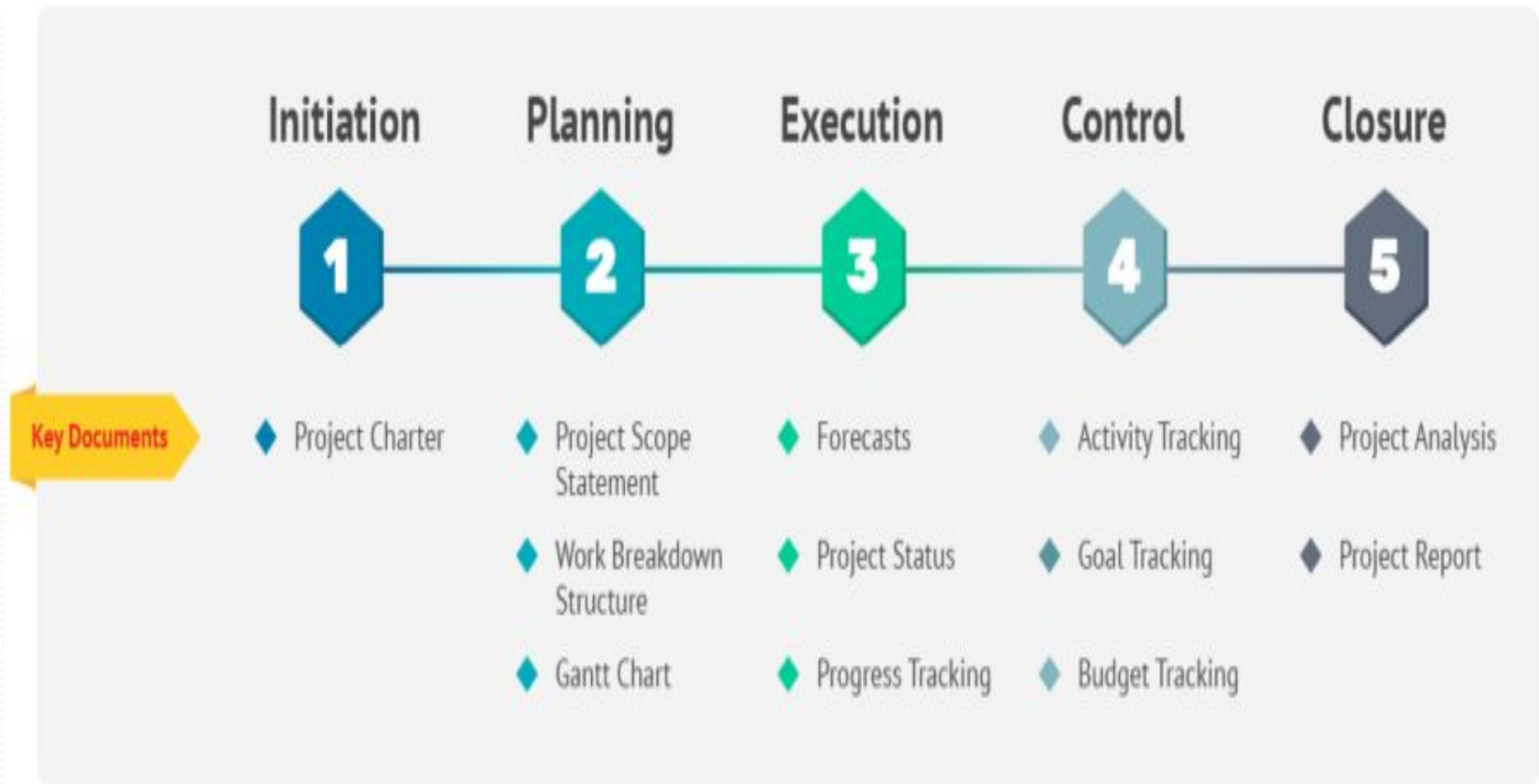 - Create team commitment and involve all interested parties in achieving the successful project outcome.

An easy way to ensure that we include enough detail in project objective is to remember **SMART**

SMART

- **Specific**: This involves describing the objective by answering the questions ―what, why, when, who, where‖ to leave stakeholders in no doubt as to what the goal is.
- **Measurable**: An objective should have metrics and specific values that can be used to monitor and assess success.
- **Achievable**: Your goals should be something that it is possible for the team to achieve, otherwise they are easily dismissed or can become a point of demotivation.
- **Relevant**: Objectives should fit the focus and long-term plan of your organization or team, so that each objective achieved is a step towards overall goals.
- **Time limited**: The aim should be to achieve your project objectives within a certain time-frame.

Project Life Cycle

Initiation	Planning	Execution	Control	Closure
1	**2**	**3**	**4**	**5**

Key Documents

Initiation	Planning	Execution	Control	Closure
◆ Project Charter	◆ Project Scope Statement	◆ Forecasts	◆ Activity Tracking	◆ Project Analysis
	◆ Work Breakdown Structure	◆ Project Status	◆ Goal Tracking	◆ Project Report
	◆ Gantt Chart	◆ Progress Tracking	◆ Budget Tracking	

Project Life Cycle

- **Initiation :**
  - We figure out an objective for our project
  - Determine whether the project is feasible
  - Identify the major deliverables for the project
- **Planning:**
  - We break down the larger project into smaller tasks
  - Build our team
  - Prepare a schedule for the completion of assignments
  - Anticipating risks and potential quality roadblocks

Project Life Cycle

- **Execution:**
  - Keep work on track
  - Organize team members
  - Manage timelines, and make sure the work is done
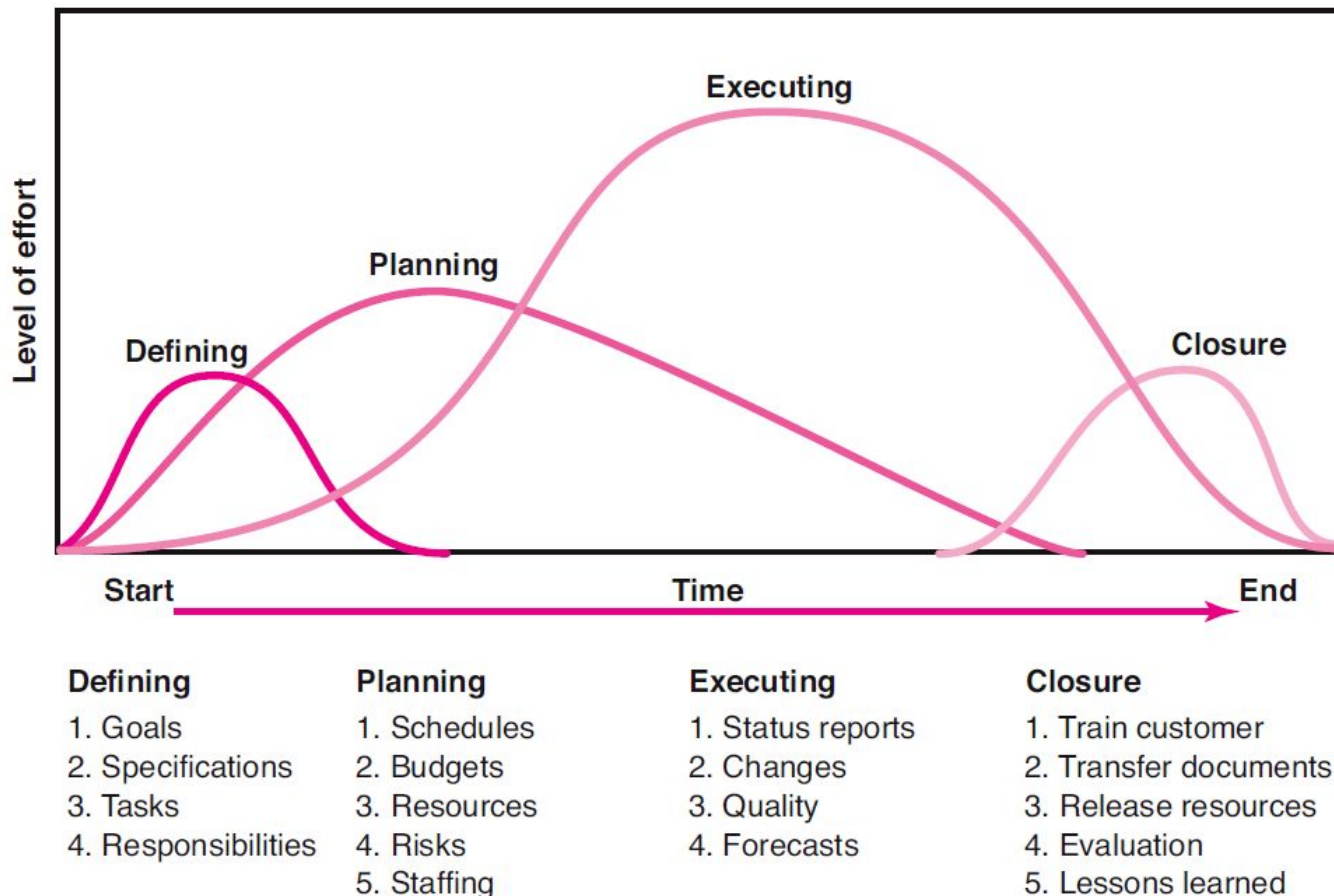 - According to the original plan
- **Monitoring and controlling**
  - Activity tracking
  - Goal tracking
  - Budget tracking
- **Closure:**
  - Analyzing team performance
  - Documenting project closure
  - Conducting post-implementation reviews
  - Accounting for used and unused budget

Project Life Cycle

Defining
1. Goals
2. Specifications
3. Tasks
4. Responsibilities

Planning
1. Schedules
2. Budgets
3. Resources
4. Risks
5. Staffing

Executing
1. Status reports
2. Changes
3. Quality
4. Forecasts

Closure
1. Train customer
2. Transfer documents
3. Release resources
4. Evaluation
5. Lessons learned

Project Life Cycle

- The project management life cycle is usually broken down into four phases:
- **initiation, planning, execution, and closure**—these make up the path that takes our project from the beginning to the end.
- Some methodologies also include a fifth phase, **controlling or monitoring. This phase is covered under** the execution and closure phases.

Project Life Cycle

1. Initiation

● In the initiation phase, we identify a business need, problem, or opportunity and brainstorm ways that our team can meet this need, solve this problem, or seize this opportunity. During this step, we figure out an objective for our project, determine whether the project is feasible, and identify the major deliverables for the project .

Steps for the project initiation phase may include the following:

● **Undertaking a feasibility study** – Identifying the primary problem our project will solve and whether our project will deliver a solution to that problem

● **Identifying scope** – Defining the depth and breadth of the project

● **Identifying deliverables** – Defining the product or service to provide

● **Identifying project stakeholders** – Figuring out whom the project affects and what their needs may be

● **Developing a business case** – Using the above criteria to compare the potential costs and benefits for the project to determine if it moves forward.

● We'll also develop a statement of work or project initiation document, which may include basic project life cycle flowcharts.

Project Life Cycle

2. Planning

● Once the project is approved to move forward based on our business case, statement of work, or project initiation document, we move into the planning phase. In this phase, we break down the larger project into smaller tasks, build our team, and prepare a schedule for the completion of assignments. During this phase, we create smaller goals within the larger project, making sure each is achievable within the time frame. Smaller goals should have a high potential for success.

Steps for the project planning phase may include the following:

● **Creating a project plan –** Identifying the project timeline, including the phases of the project, the tasks to be performed, and possible constraints

● **Creating workflow documents or process maps –** Visualizing the project timeline by diagramming key milestones

Project Life Cycle

- **Estimating budget and creating a financial plan –** Using cost estimates to determine how much to spend on the project to get the maximum return on investment

- **Gathering resources –** Building our functional team from internal and external talent pools while making sure everyone has the necessary tools (software, hardware, etc.) to complete their tasks

- **Anticipating risks and potential quality roadblocks –** Identifying issues that may cause our project to stall while planning to mitigate those risks and maintain the project's quality and timeline The planning phase is also where we bring your team on board, usually with a project kickoff meeting. It is important to have everything outlined and explained so that team members can quickly get to work in the next phase.

Project Life Cycle

3. Execution

● We've received business approval, developed a plan, and built our team. Now it's time to get to work. The execution phase turns our plan into action. The project manager's job in this phase of the project management life cycle is to keep work on track, organize team members, manage timelines, and make sure the work is done according to the original plan.

Steps for the project execution phase may include the following:

● **Creating tasks and organizing workflows –** Assigning granular aspects of the projects to the appropriate team members, making sure team members are not overworked

● **Briefing team members on tasks –** Explaining tasks to team members, providing necessary guidance on how they should be completed, and organizing process-related training if necessary

Project Life Cycle

- **Communicating with team members, clients, and upper management** – Providing updates to project stakeholders at all levels

- **Monitoring quality of work** – Ensuring that team members are meeting their time and quality goals for tasks

- **Managing budget** – Monitoring spending and keeping the project on track in terms of assets and resources If we have a properly documented process already in place, executing the project will be much easier.

Project Life Cycle

4. Closure

● Once our team has completed work on a project, we enter the closure phase. In the closure phase, we provide final deliverables, release project resources, and determine the success of the project. Just because the major project work is over, that doesn't mean the project manager's job is done—there are still important things to do, including evaluating what did and did not work with the project.

Steps for the project closure phase may include the following:

● **Analyzing project performance –** Determining whether the project's goals were met (tasks completed, on time and on budget) and the initial problem solved using a prepared checklist

● **Analyzing team performance –** Evaluating how team members performed, including whether they met their goals along with timeliness and quality of work

Project Life Cycle

- **Documenting project closure –** Making sure that all aspects of the project are completed with no loose ends remaining and providing reports to key stakeholders

- **Conducting post-implementation reviews –** Conducting a final analysis of the project, taking into account lessons learned for similar projects in the future

- **Accounting for used and unused budget –** Allocating remaining resources for future projects

- By remaining on task even though the project's work is completed, we will be prepared to take everything we've learned and implement it for our next project

Project vs Operation

- Projects are unique and temporary (definitive beginning and ending), while operations are ongoing and permanent with repetitive output.
- Projects have a fixed budget; on the other hand, operations have to earn a profit in order to run the business.
- Projects are executed to start a new business objective and terminated when it is achieved, while operational work does not produce anything new and it is ongoing.
- Projects create a unique product, service, or result; operations produce the same product, aim to earn a profit, and keep the system running

Projects	Operations
Temporary	Permanent (ongoing)
Delivers unique output (Product or service)	Delivers the same output continuously
Innovative in nature	Repetitive in nature
Exists before a product	Exists after a product
Transformational	Enhances the performance of normal practice

Activity definition

Definition: "The process of identifying the specific actions to be performed to produce the project deliverables."

Activity definition overview		
Inputs	Tools and techniques	outputs
• Project scope statement • WBS • WBS dictionary • Enterprise environmental factor • Organizational process • Protect scope management plan	• Decomposition • Rolling Wave Planning • Templates • Expert Judgment • Planning component	Activity List Activity attributes Milestone List

Decomposition of activities

Example

You are a software developer. You need to solve a customer bug. What do you do? You will:

- First, identify the activities you need to execute to reproduce the customer issue.

- Then, modify the software code to rectify the issue.

- Lastly, deploy the fix at customer end.

Activity attributes

- An **activity list** is a tabulation of activities to be included on a project schedule.

- **Activity attributes** provide more information about each activity, such as predecessors, successors, logical relationships, leads and lags, resource requirements, constraints, imposed dates, and assumptions related to the activity.

Activity duration

An activity's duration is the amount of time estimated for its completion.

Node(Event)

The beginning or end of the activity is known as node/event. It represents specific point in time and does not consume time ,manpower, materials and other resources.

Activity sequencing
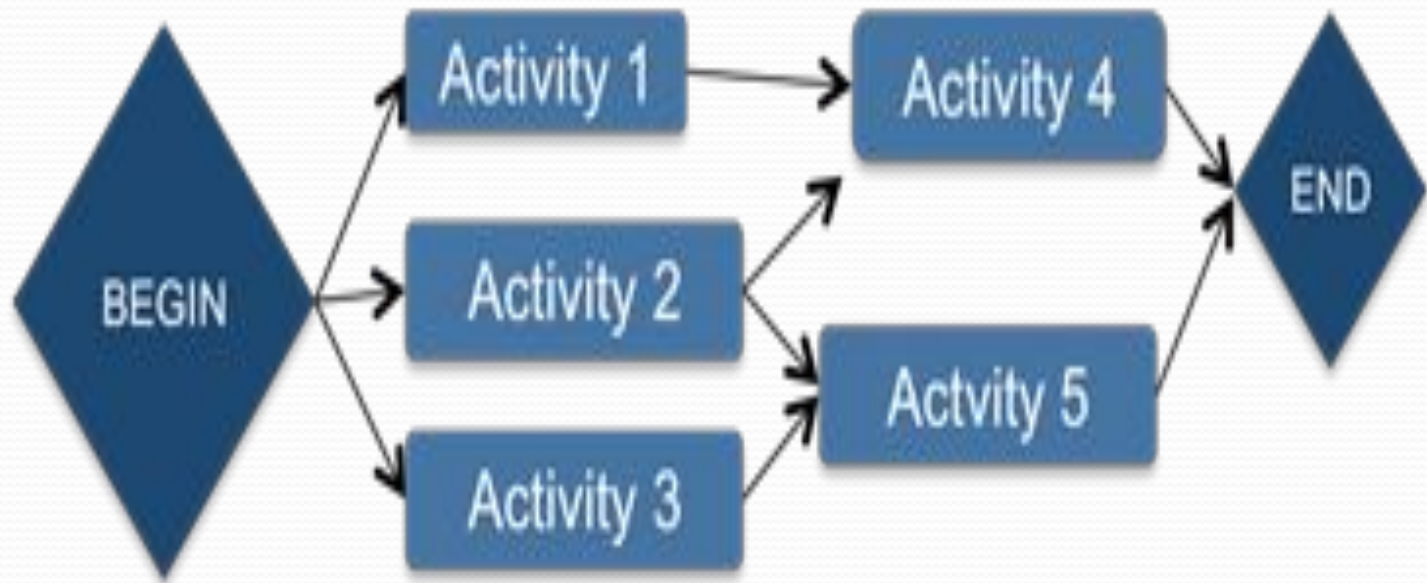
Network diagram

- Network diagrams are the preferred technique for showing activity sequencing.

- A Network Diagram is a **visual** representation of a project's schedule.

- A **network diagram** is a schematic display of the logical relationships among, or sequencing of, project activities.

- Two main formats are the arrow and precedence diagramming methods.

Drawing rules for network diagram

- It is always drawn from left to right to reflect project chronology

- There is starting point

- There is ending point

- There are predecessors for all activities

- There are successors for all activities

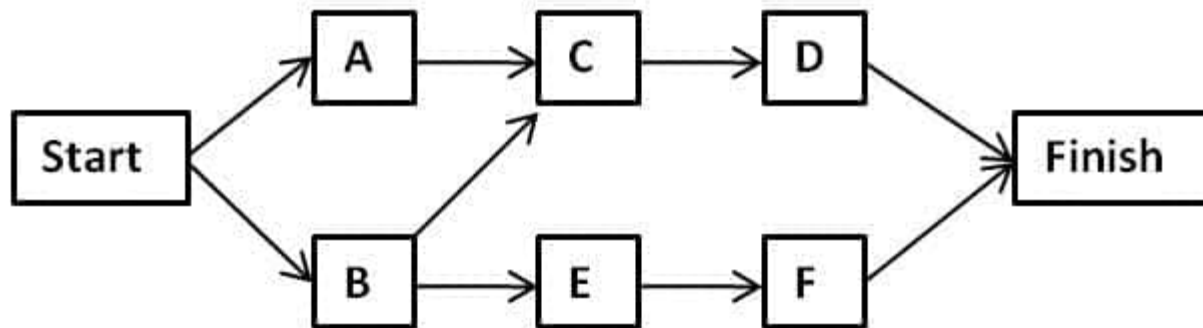- There are no loops

Network diagram

Network diagram example

| Activity	Predecessor	Duration
A	-	5
B	A	4
C	A	5
D	B	6
E	C	3
F	D,E	4
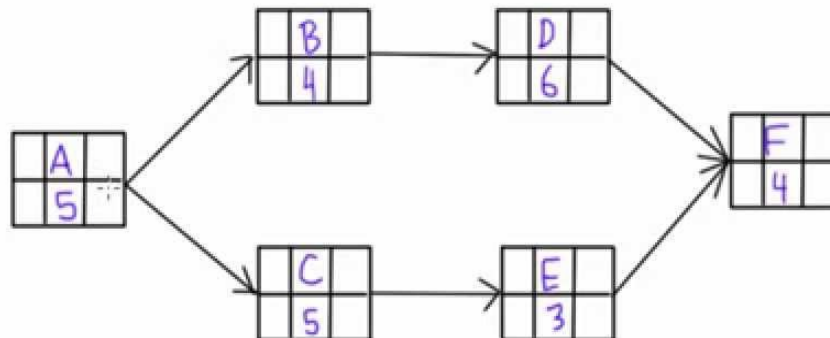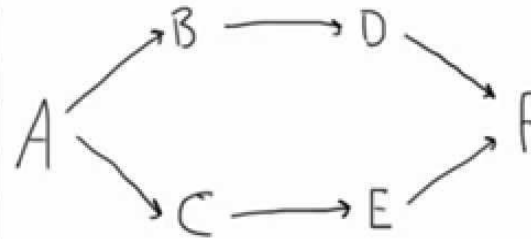
Precedence diagram method

● Activities are represented by boxes.

● Arrows show relationships between activities.

● More popular than ADM method and used by project management software.

● Better at showing different types of dependencies.

Precedence Diagram Method (PDM)

Arrow diagramming method

- Also called activity-on-arrow (AOA) network diagram.

- Activities are represented by arrows.

- Nodes or circles are the starting and ending points of activities.

- Can only show finish-to-start dependencies.
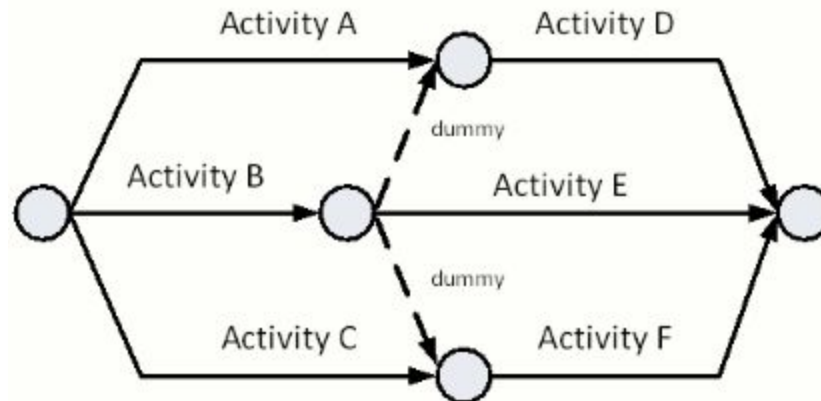
Dummy Activity

● A dummy activity is an imaginary activity included in network.

● Since it is not real activity, is does not consume time, manpower, material, and other resources.

● It is included in a network to maintain the relationship between activities appropriately.
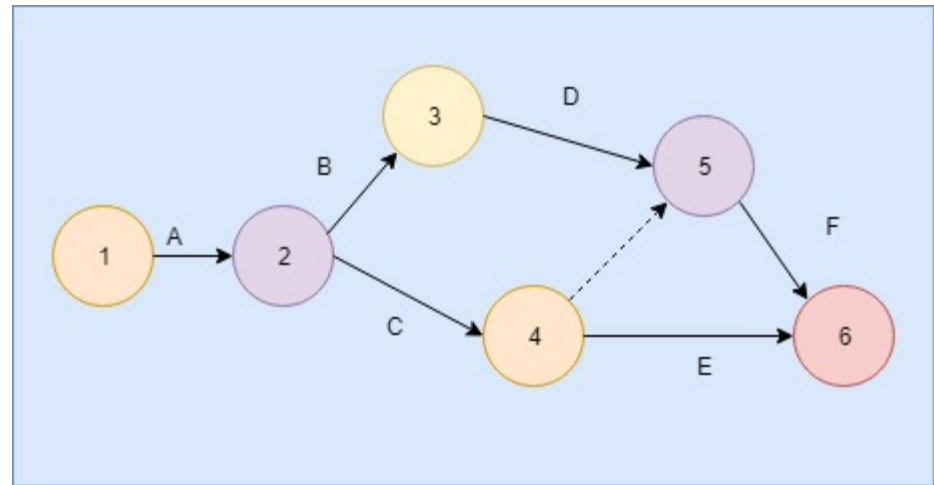
● It is represented by dotted arrow.

Uses of dummies:

1. Grammatical purpose   2. Logical purpose
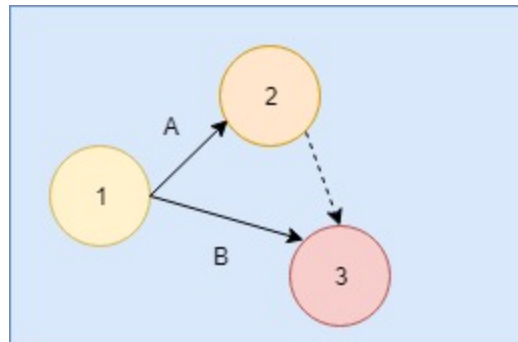
Dummy Activity example

sn	Activity	Predecessor	Successor
1	A	-	B,C
2	B	A	D
3	C	A	E,F
4	D	B	F
5	E	C	-
6	F	C,D	-

Determining resource requirements

Resources type:
- Information
- People
- Technology
- Facilities
- Equipment
- Money

Use resources effectively and efficiently to ensure cost effective and appropriate resource utilization

Activity Duration Estimating

- Definition: "The process of approximating the number of work periods needed to complete individual activities with estimated resources."

- **Duration** includes the actual amount of time worked on an activity *plus* the elapsed time.

- **Effort** is the number of workdays or work hours required to complete a task.

- Effort does not normally equal duration.

- People doing the work should help create estimates, and an expert should review them.

Multi(Three) Point Estimating

- Instead of providing activity estimates as a discrete number, such as four weeks, it's often helpful to create a **three-point estimate**:

  - An estimate that includes an optimistic, most likely, and pessimistic estimate, such as three weeks for the optimistic, four weeks for the most likely, and five weeks for the pessimistic estimate.

- Three-point estimates are needed for PERT estimates

Critical Path Method (CPM)

- **CPM** is a network diagramming technique used to predict total project duration.

- A **critical path** for a project is the series of activities that determines the earliest time by which the project can be completed.

- The critical path is the longest path through the network diagram and has the least amount of slack or float.

- **Slack** or **float** is the amount of time an activity can be delayed without delaying a succeeding activity or the project finish date.

Calculating the Critical Path

● Develop a good network diagram.

● Add the duration estimates for all activities on each path through the network diagram.

● The longest path is the critical path.

● If one or more of the activities on the critical path takes longer than planned, the whole project schedule will slip unless the project manager takes corrective action.

To find the critical path, need to determine the following quantities for each activity in the network

1. Earliest start time (ES): the earliest time an activity can begin without violation of immediate predecessor requirements

2. Earliest finish time (EF): the earliest time at which an activity can end

3. Latest start time (LS): the latest time an activity can begin without delaying the entire project

4. Latest finish time (LF): the latest time an activity can end without delaying the entire project

CPM

- **Free slack** or **free float** is the maximum amount of time the activity can be delayed without delaying any succeeding activity

- **Total slack** or **total float** is the maximum amount of time the activity can be delayed without delaying the project completion date.

- A **forward pass** through the network diagram determines the early start and finish dates.

- A **backward pass** determines the late start and finish dates.

Gantt charts

● **Gantt charts** provide a standard format for displaying project schedule information by listing project activities and their corresponding start and finish dates in a calendar format.
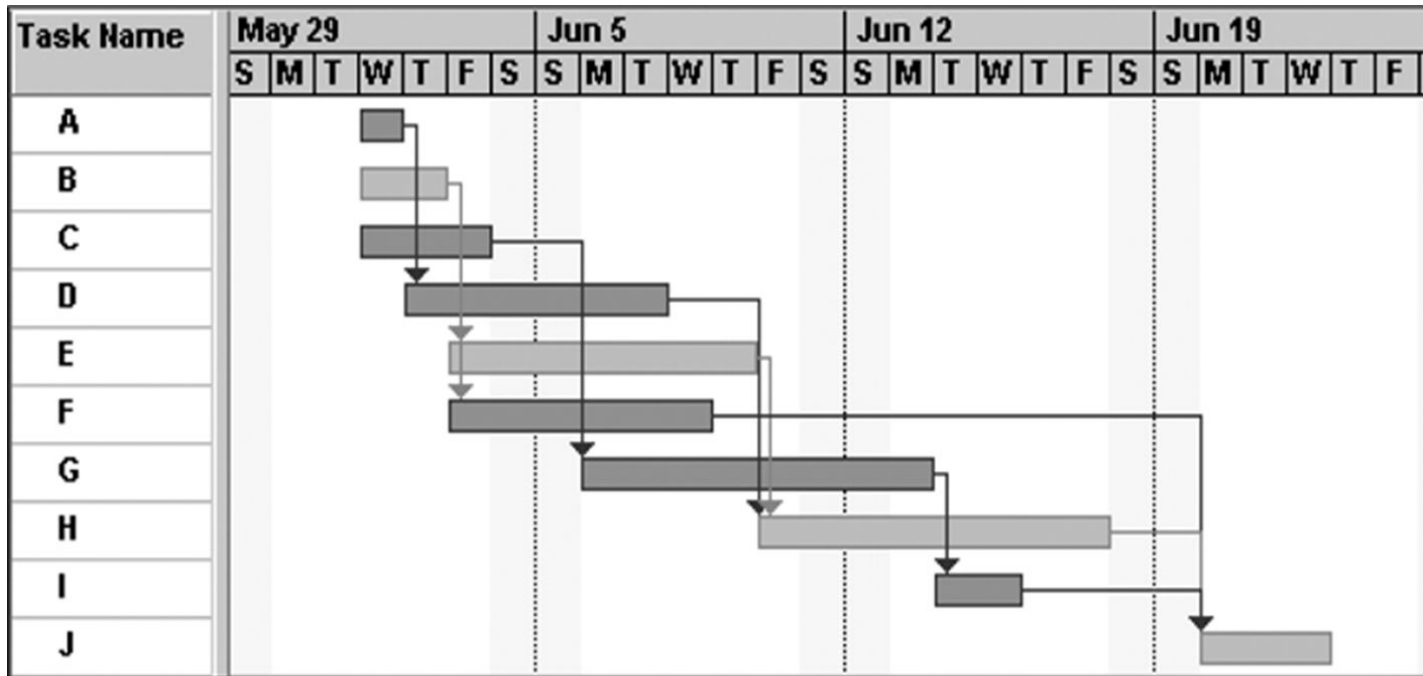
Program Evaluation Review Technique (PERT)

- The **optimistic** time estimate (Ote)
- The **pessimistic** time estimate (Pte)
- The **most likely** time estimate (Mlte)
- **Expected time** (Te)

Example

(a) if every thing progress as you expect, say in complete ideal situation how long it will take?

(b) if every thing goes wrong and encountered unexpected situations, say in worst condition how long it will take? And

(c) in carrying out such work what would be the normal duration?

Expected time(TE)

Te = Ote + 4Mlte + Pte/ 6

Let's say:

☐   in first case, the time required   would be 10 weeks

☐ in second case 34 weeks, and

☐ in third 16 weeks.

$$te = \frac{10 + (4 \times 16) + 34}{6}$$

= 27 weeks