CSE 6324

Advanced Topic in Software Engineering

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Project Planning Objectives

- To provide a framework that allows a software manager to make an estimates of resources, cost, and schedule.
- Estimates should be updated as the project progressed.

Task for Project Planning

1. **Establish project scope and objectives**
2. **Determine feasibility**
3. **Define resources**
4. **Estimate cost and effort**
5. **Develop a project schedule**
6. **Analyze risks**

Task for Project Planning: 1-Establish project scope and objectives

- Project scope is the part of project planning that involves determining and documenting a list of specific project goals, deliverables, tasks, cost and deadlines.

- Software scope describes:
  - The data that are input to and output from the system
  - The functions and features that are to be delivered to end users
  - The performance, constraints, and interfaces that bound the system

Task for Project Planning: 1-Establish project scope and objectives

- SMART is a criterion for setting goals and objectives of the projecxct.
- Your project goals should be Specific, Measurable, Attainable, Relevant and Time-bound.

Task for Project Planning: 2-Determine feasibility

- Software feasibility has four main dimensions:
  - **Technology** – Is the project technically feasible?
  - **Finance** – Is financially feasible? Can development be completed at a cost that the software organization, its client, or the market can afford?
  - **Time** – Will the project's time-to-market beat the competition?
  - **Resources** – Does the software organization have the resources needed in doing the project?

Task for Project Planning: 3-Define resources

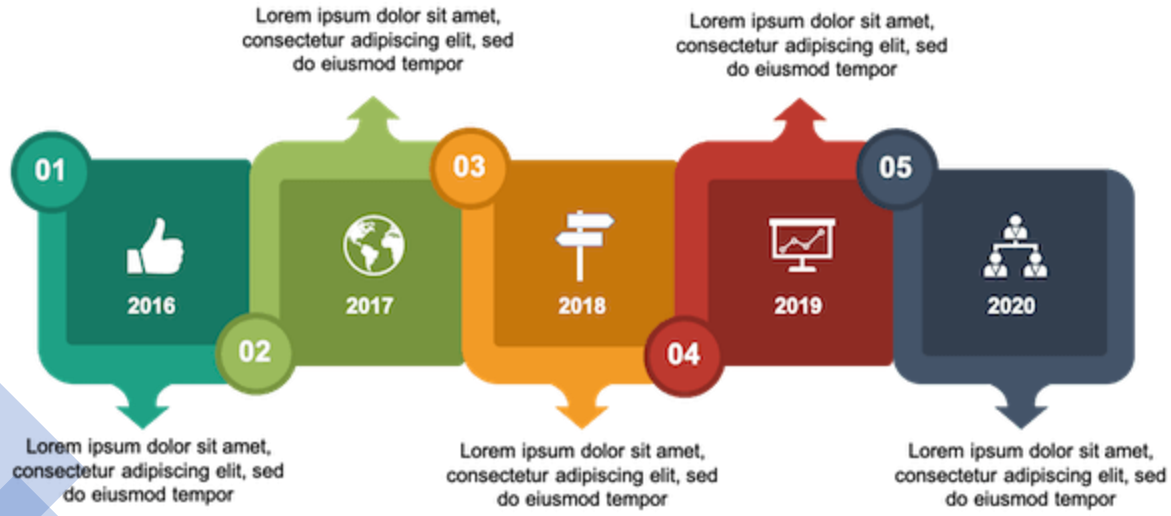
- Good resource planning includes:
  - **Financial resource planning**; Do we have the money to complete the project?
  - **Human resource planning**; Do I have enough people to meet all our goals in the amount of time given?
  - **Physical resource planning**; Do we have the office space, computers, and other equipment required to complete this project?
  - **Vendor resource planning**; Will our current vendor relationships sufficiently meet the needs of this project?
  - **Resource conflict planning**; What else is going on in our organization that could interfere with our project?

Task for Project Planning: 4-Estimate cost and effort

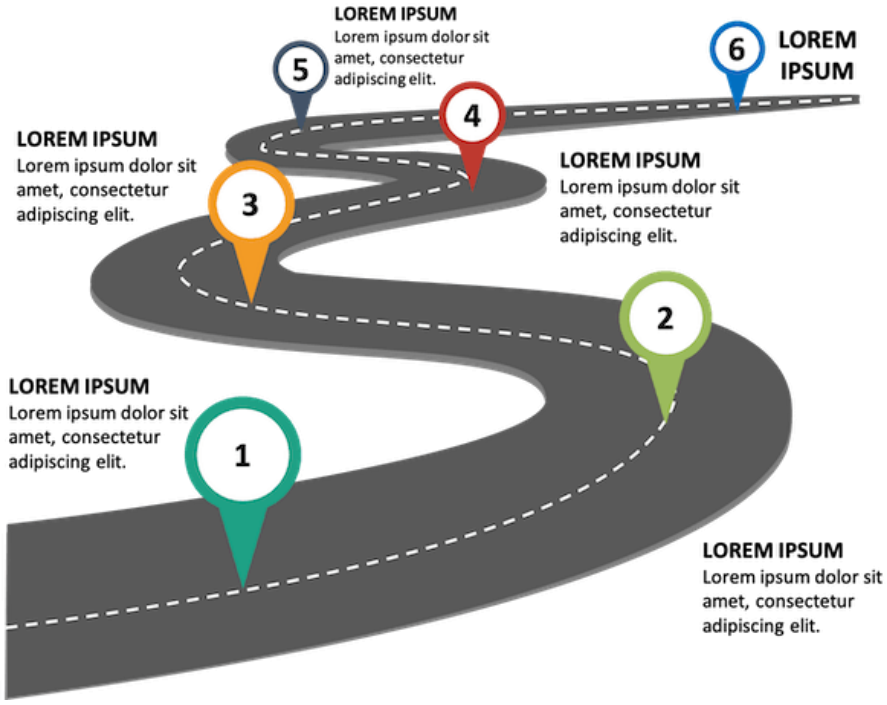
- Effort costs (the dominant factor in most projects)
  - Salaries of engineers involved in the project
  - Costs of building, heating, lighting
  - Costs of networking and communications
  - Costs of shared facilities (e.g library, staff restaurant, etc.)
  - Costs of pensions, health insurance, etc.
- Other costs
  - Hardware and software costs
  - Travel and training costs

Task for Project Planning: 5-Develop a project schedule

- A schedule is required to track progress toward achieving these commitments and to ensure that the required project commitments are met.



•[Timeline PowerPoint Template]



•[Roadmap PowerPoint Template]

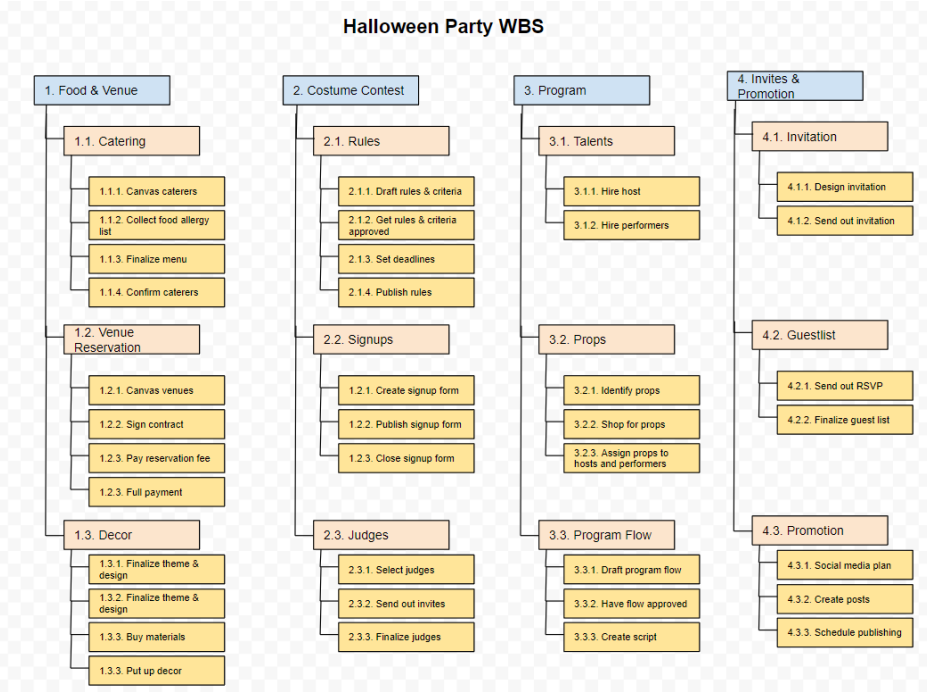
Task for Project Planning: 5-Develop a project schedule

Steps to develop a project schedule:

- Defining objectives
- Work Breakdown Structure
- Sequencing the activities
- Estimating the activity costs and durations
- Reconciling with time constraints
- Reconciling with resource constraints
- Reviewing

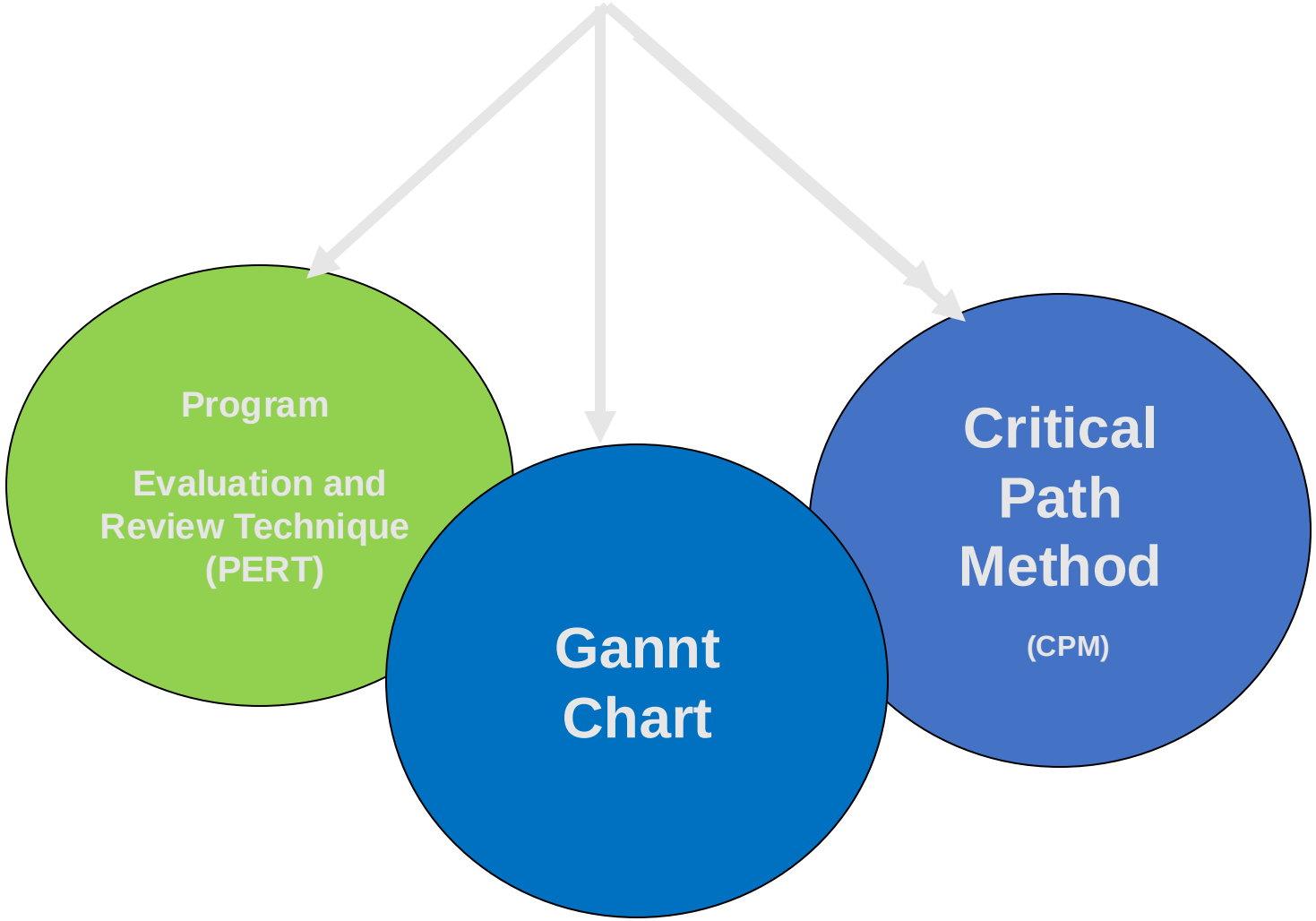
Project Management Tools : Work Breakdown Structure

- The Work Breakdown Structure is the first and most important tool in project planning.
- It's a hierarchical breakdown of your project goal into actionable work items.The breakdown gives clarity on the time and resources that would be needed and hence helps in setting the planned constraints for a project.
- WBS helps not only in planning but also in the execution phase of your project.
- Managing these parts is easier not only in terms of tracking the work but also in case of setbacks.



Task for Project Planning: 5-Develop a project schedule

Project Scheduling



PERT

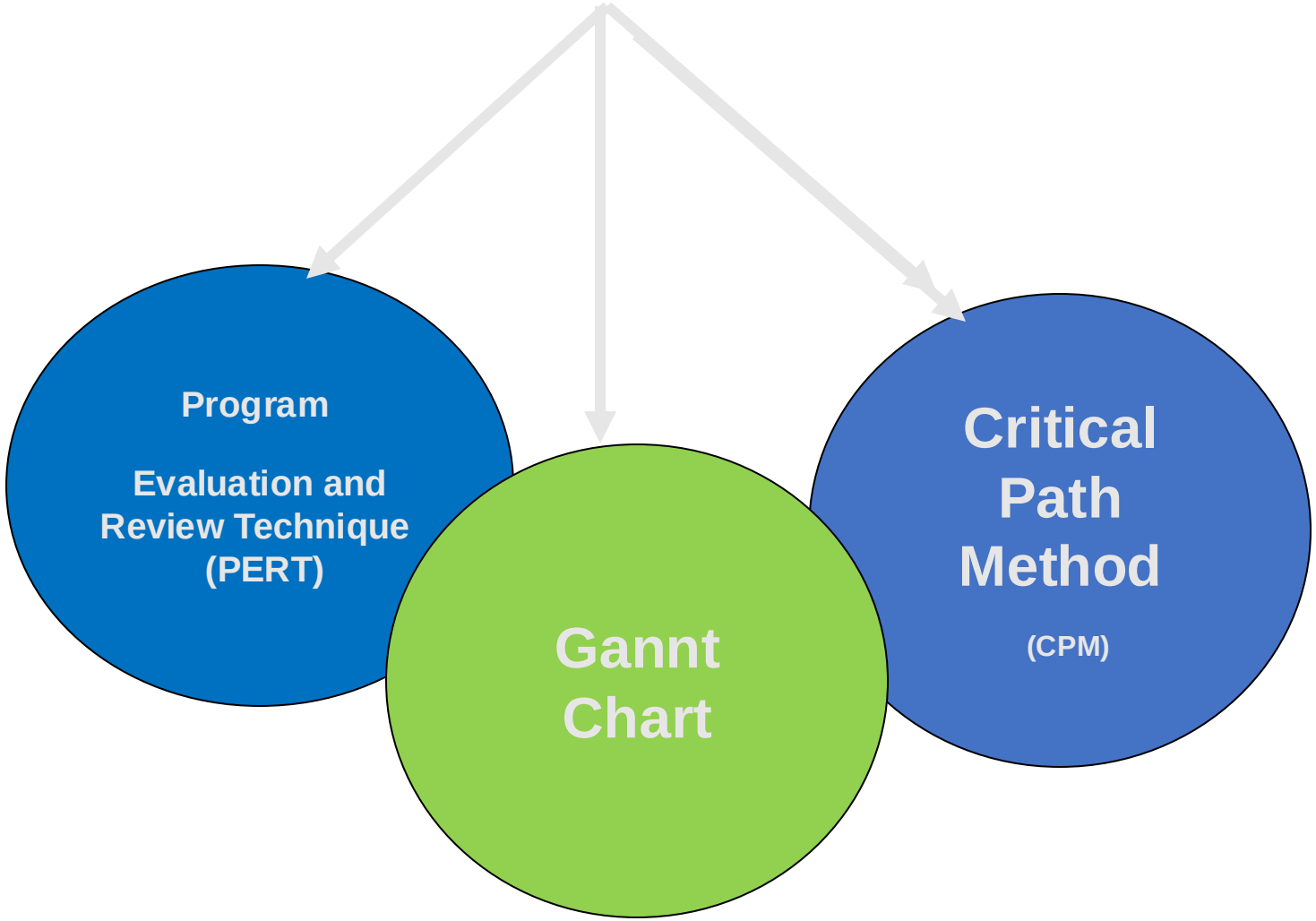
Calculate duration using PERT equation

- **Formula: (P+4M+O)/6**

Task	Optimistic (O)	Most Likely (M)	Pessimistic (P)
Task A	2 Wks	4 Wks	5 Wks
Task B	1 Wks	2 Wks	3 Wks
Task C	2 Wks	3 Wks	4 Wks
Task B	3 Wks	5 Wks	8 Wks
Completion	**8 Wks**	**14 Wks**	**20 Wks**

Task for Project Planning: 5-Develop a project schedule

Project Scheduling



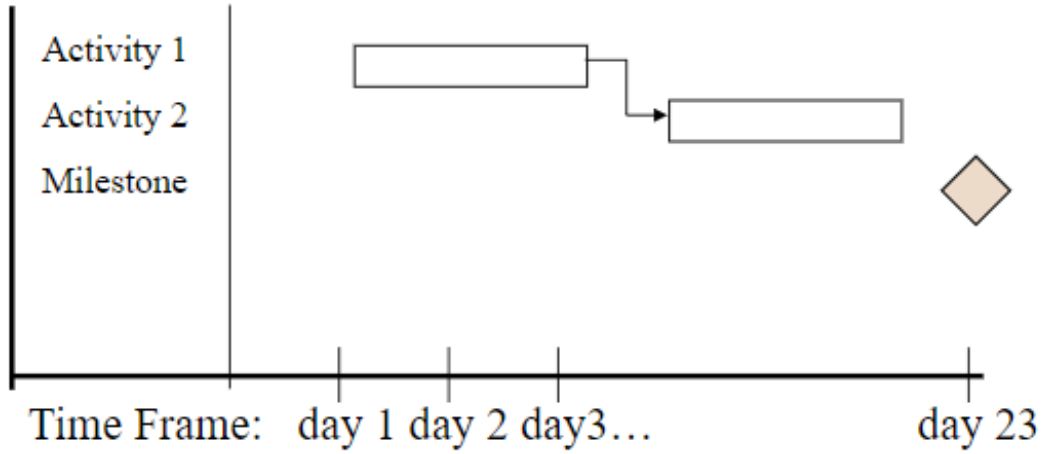
Gannt Chart

- A Gantt chart is a visualization of your project timeline and the dependencies between your various work items.
- It provides a complete picture of the work breakdown structure and aids in allocating resources efficiently, be it time, money or human resources.
- Gantt charts are helpful in keeping track of the project schedule, checking for any deviations from the project plan and identifying delays.
- if things don't go as planned, Gantt charts help in identifying the critical tasks that will ensure your project gets completed on time.

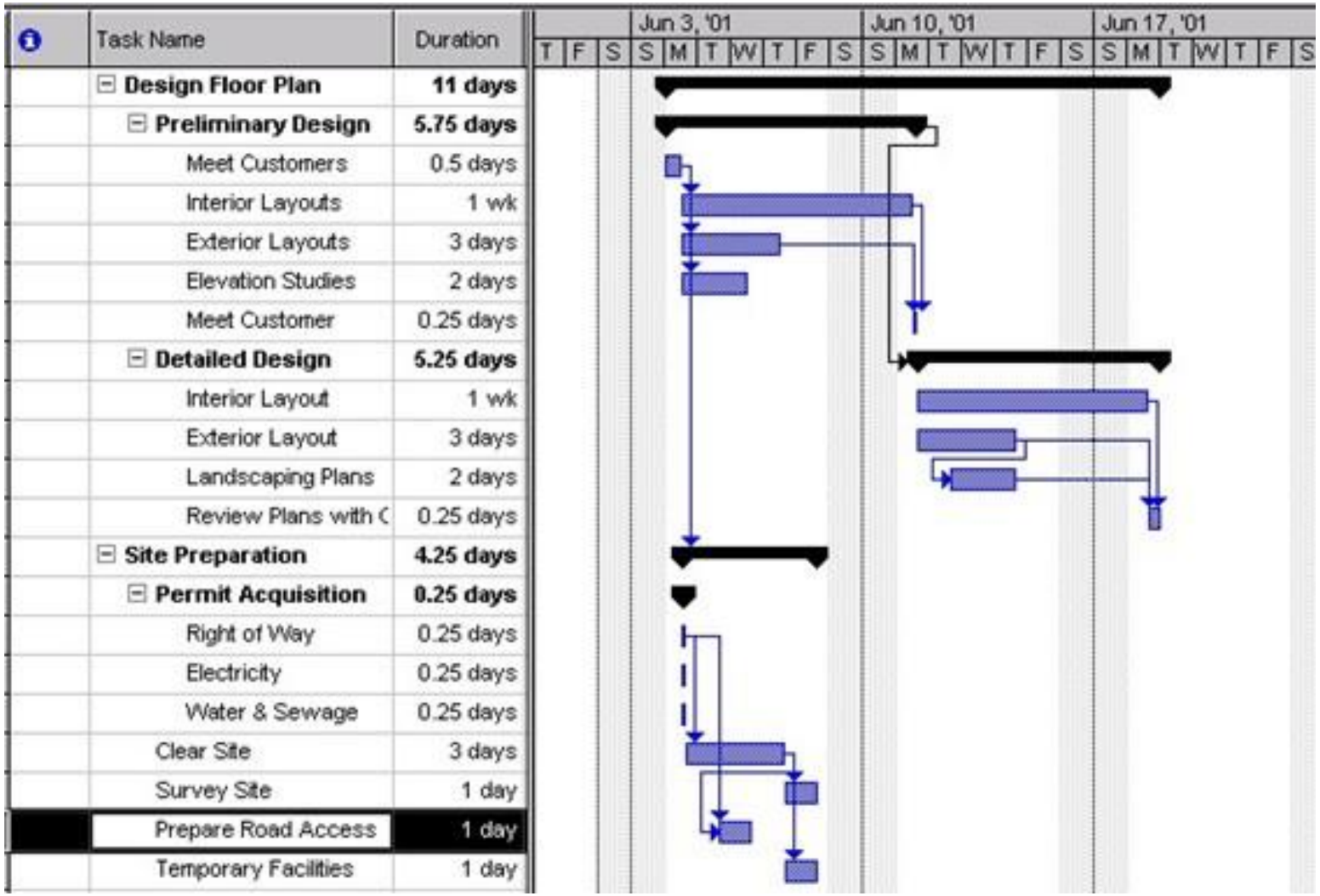
Building Gannt Chart

- List all tasks and milestone along with vertical axis
- List time frames along horizontal axis
- Create box the length of each activity time duration
- Milestones: create a diamond on the day the milestone is scheduled to be completed
- Show dependencies between activities

with arrows

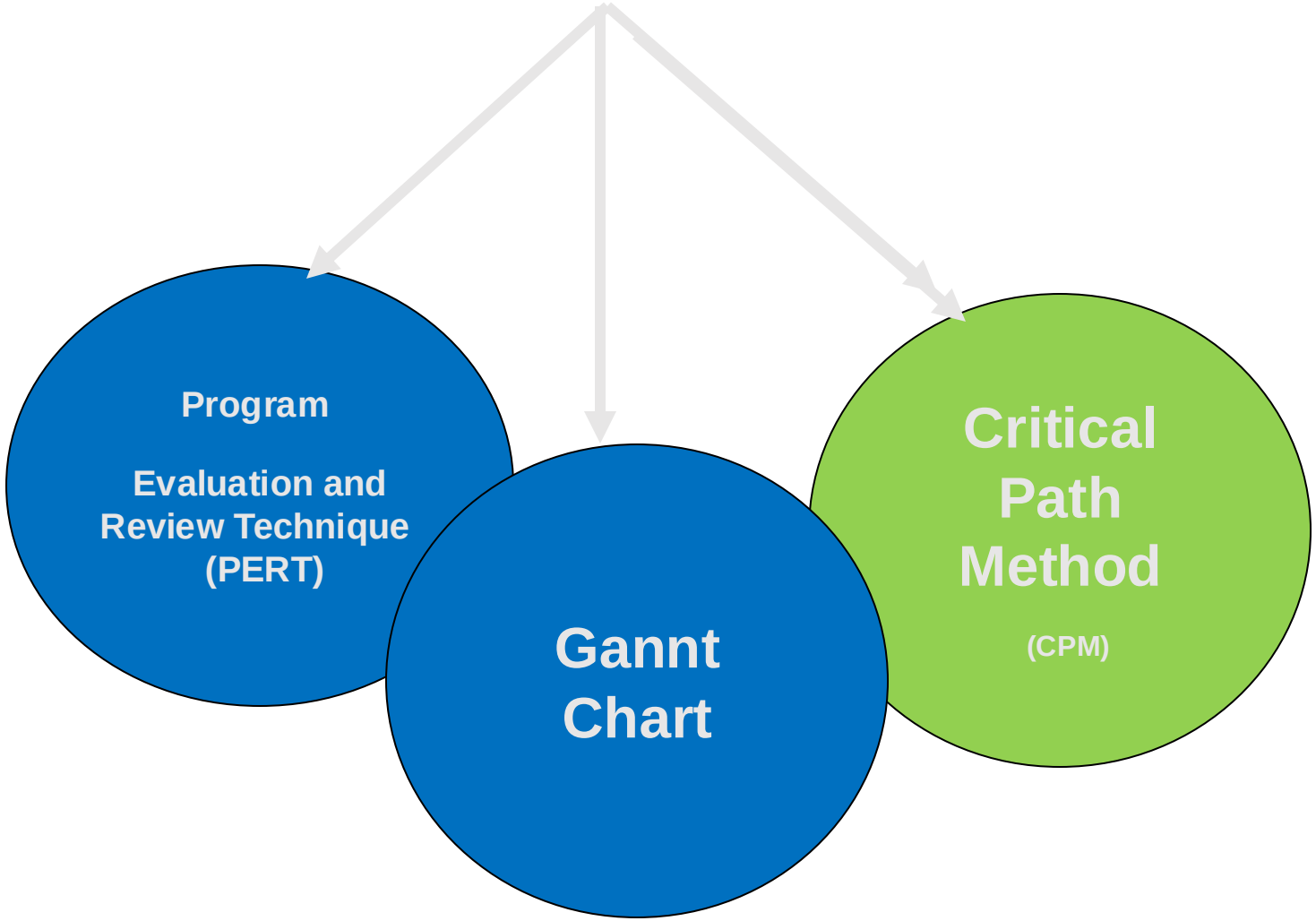


Building Gannt Chart

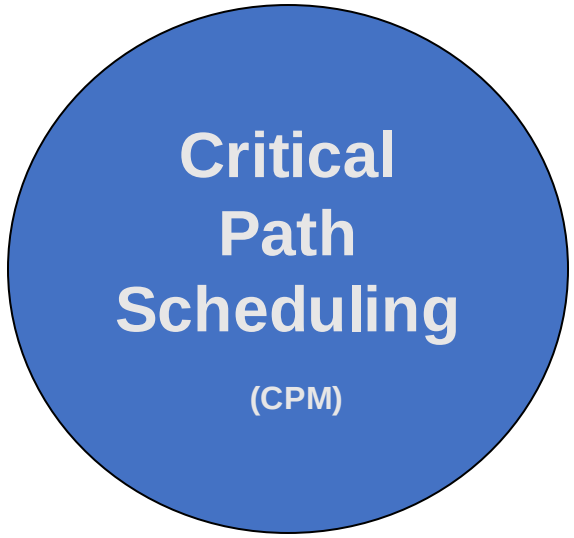


Task for Project Planning: 5-Develop a project schedule

Project Scheduling



Task for Project Planning: 5-Develop a project schedule



- CPM: A scheduling technique whose order and duration of a sequence of task activities directly affects the completion date of a project.

Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Identify activities

The first step of the CPM process, is to list all the activities required to create deliverables at each level of WBS(Work Breakdown Structure).

ACTIVITY
1. Requirements Collection
2. Screen Design
3. Report Design
4. Database Design
5. User Documentation
6. Programming
7. Testing
8. Installation

Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Estimate task duration

ACTIVITY	TIME ESTIMATE (in weeks) o	r	p	EXPECTED TIME (ET) $\frac{o + 4r + p}{6}$
1. Requirements Collection	1	5	9	5
2. Screen Design	5	6	7	6
3. Report Design	3	6	9	6
4. Database Design	1	2	3	2
5. User Documentation	3	6	7	5.5
6. Programming	4	5	6	5
7. Testing	1	3	5	3
8. Installation	1	1	1	1

Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Identify all dependencies:

1.Tasks that depend on other tasks for their completion, i.e. dependent tasks

2.Tasks that are independent of others and can be done in parallel to others, i.e. concurrent tasks

ACTIVITY	PRECEDING ACTIVITY
1. Requirements Collection	—
2. Screen Design	1
3. Report Design	1
4. Database Design	2,3
5. User Documentation	4
6. Programming	4
7. Testing	6
8. Installation	5,7

Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Create a network diagram:

Rules to create network diagram:

- A project network should have only one start node
- A project network should have only one end node
- A node has a duration
- Links normally have no duration
- “Precedents” are the immediate preceding activities
- Time moves from left to right in the project network
- A network should not contain loops

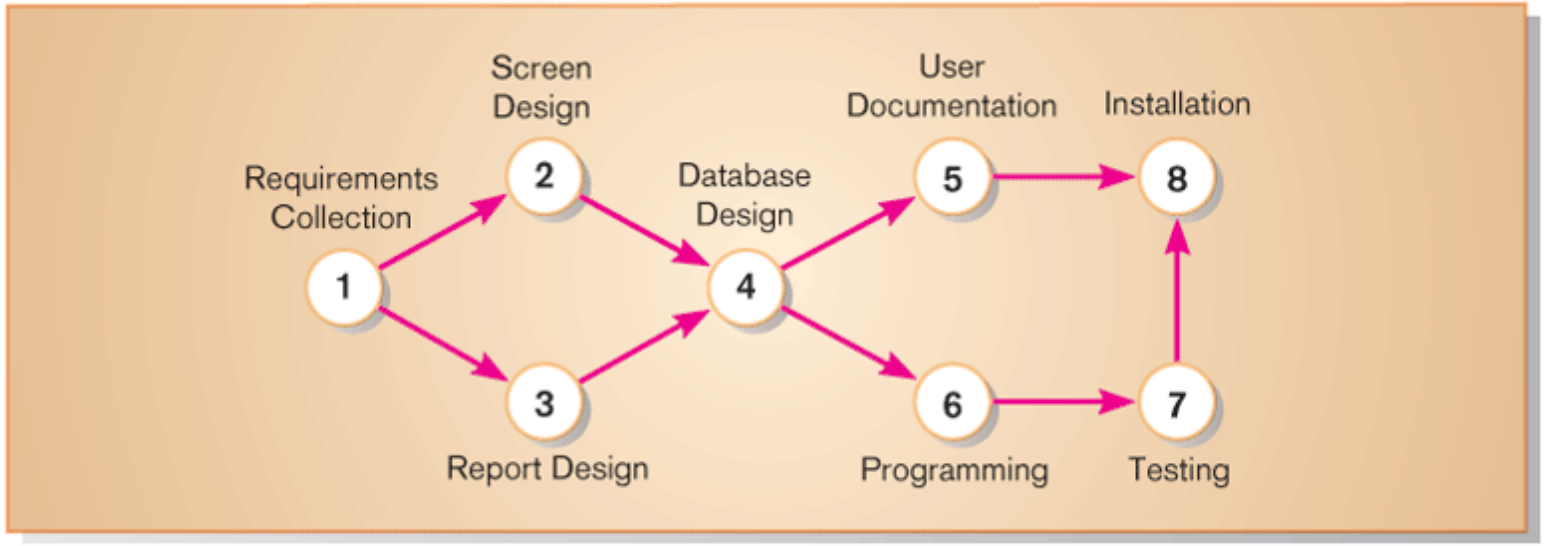
Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Create a network diagram:

It is also known as a critical path analysis chart.

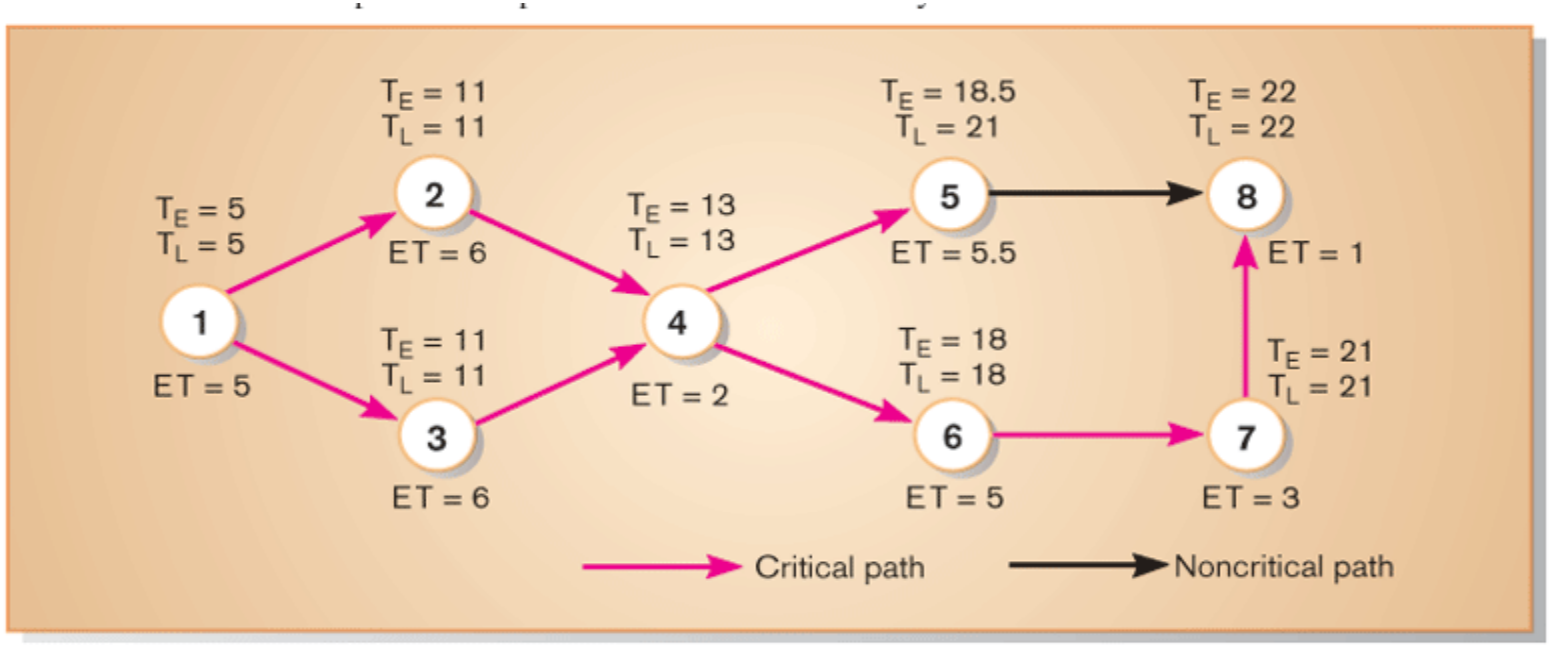


Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Estimate the duration of each activity



Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Calculate the Critical Path

ACTIVITY	T_E	T_L	SLACK $T_L - T_E$	ON CRITICAL PATH
1	5	5	0	✓
2	11	11	0	✓
3	11	11	0	✓
4	13	13	0	✓
5	18.5	21	2.5	
6	18	18	0	✓
7	21	21	0	✓
8	22	22	0	✓

Recall

- *Slack time:* the time an activity can be delayed without delaying the project
- Critical path – contains activities with slack time = 0.

Task for Project Planning: 5-Develop a project schedule

Step by step Critical Path Calculation

(CPM)

Class assignment :Calculate the Critical Path

Task	Preceding activity	Duration
A		3
B	A	5
C	A	4
D	B	6
E	B,C	7
F	D,E	4

Task for Project Planning: 6-Analyze risks

- The objective of this activity is to identify and assess the potential risks to project success.
- They should be identified during the project approval process so all stakeholders are aware of the potential for failure.

Task for Project Planning: 6-Analyze risks

Risk identification classifies as:

- Technology risks.
- People risks.
- Organisational risks.
- Tools risks.
- Requirements risks.
- Estimation risks.

Task for Project Planning: 6-Analyze risks

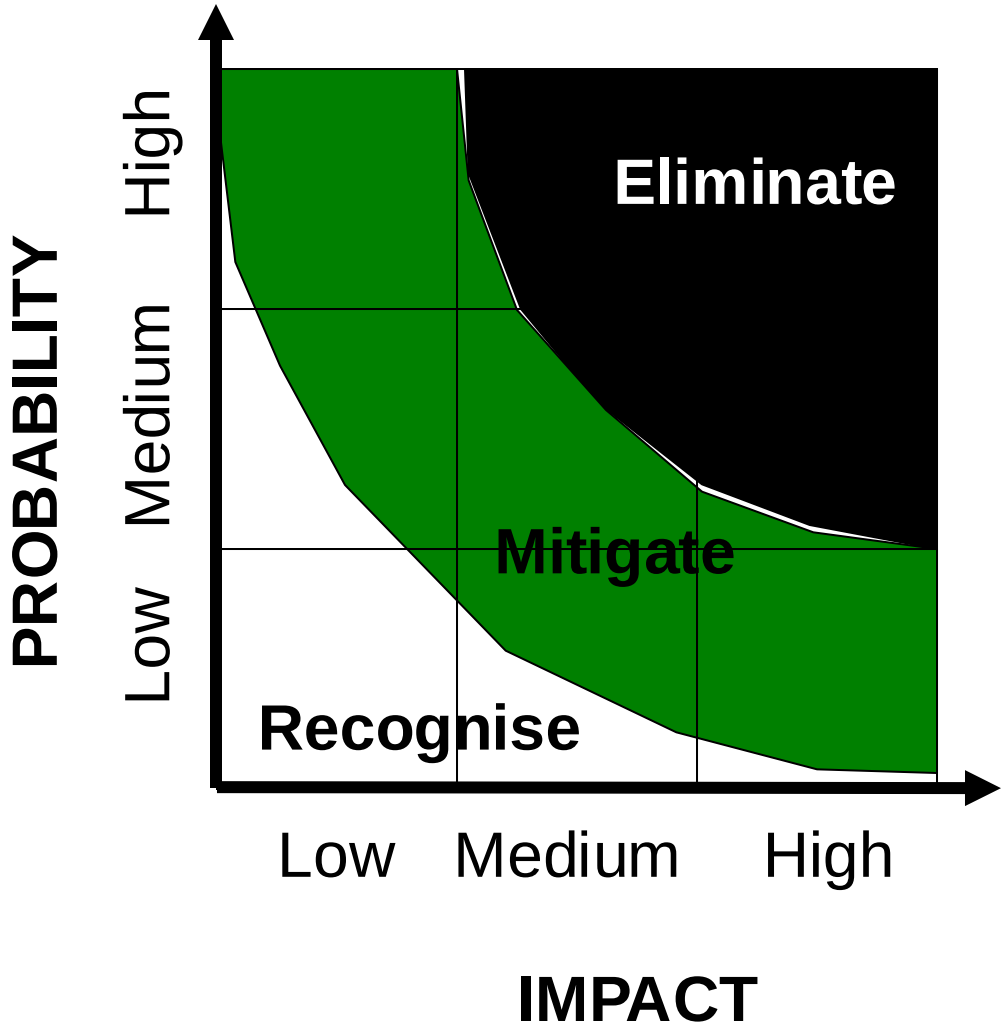
Estimate risk probability:

- Very low (< 10%)
- Low (10-25%)
- Moderate (25-50%)
- High (50-75%)
- Very high (> 75%)

Establish risk seriousness:

- Insignificant
- Tolerable
- Serious
- Catastrophic

Task for Project Planning: 6-Analyze risks



Benefit of Planning:

- Planning and scheduling are valuable communication and management tools for projects.
- Provides an agenda for the project
- Provides measure of progress
- Provides bases for optimization

Questions: