

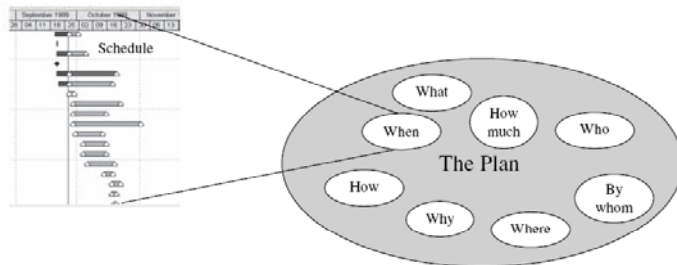
# Planning and Scheduling Techniques

## Scheduling Chapter 2

## Scheduling

- Scheduling is the determination of the timing of the activities comprising the project to enable managers to execute the project in a timely manner.
- Some questions:
  - How long is the total project duration?
  - What is the early and late times at which activities start and finish?
  - Which are the group of critical activities so that special care is taken to make sure they are not delayed?
- Scheduling = Planning + Time.

## Planning and scheduling



## WHY SCHEDULE PROJECTS?

- **Contractors** need project scheduling to:
  1. Calculate the project completion date:  
schedule meets the date specified in the contract.
  2. Calculate the start or end of a specific activity:  
Specific activities may require special attention
  3. Coordinate among subcontractors
  4. Predict and calculate the cash flow:
  5. Improve work efficiency:  
distributing workers and equipment and having efficient materials management
  6. Serve as an effective project control tool:
  7. Prove delay claims:

## Why schedule projects?

- **Project owners** and developers need project scheduling to:
  1. Get an idea on project's expected finish date:
  2. Ensure contractor's proper planning for timely finish:
  3. Predict and calculate the cash flow:
  4. Evaluate the effect of changes:
  5. Verify delay claims:
    - Owners use CPM schedules to analyze, verify, and/or dispute contractors' delay claims. A CPM schedule is vital for the owner to prove his/her case.

## Use of Scheduling

- Knowing the activities timing and the project completion time.
- Having resources available on site in the correct time.
- Making correction actions if schedule shows that the plan will result in late completion.
- Assessing the value of penalties on project late completion
- Determining the project cash flow.
- Evaluating the effect of change orders on the project completion time.

## Common Scheduling techniques

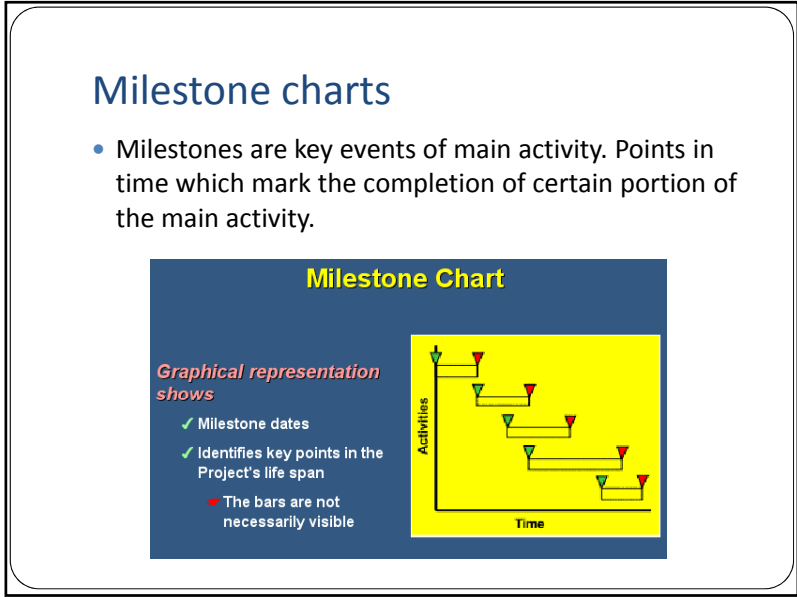
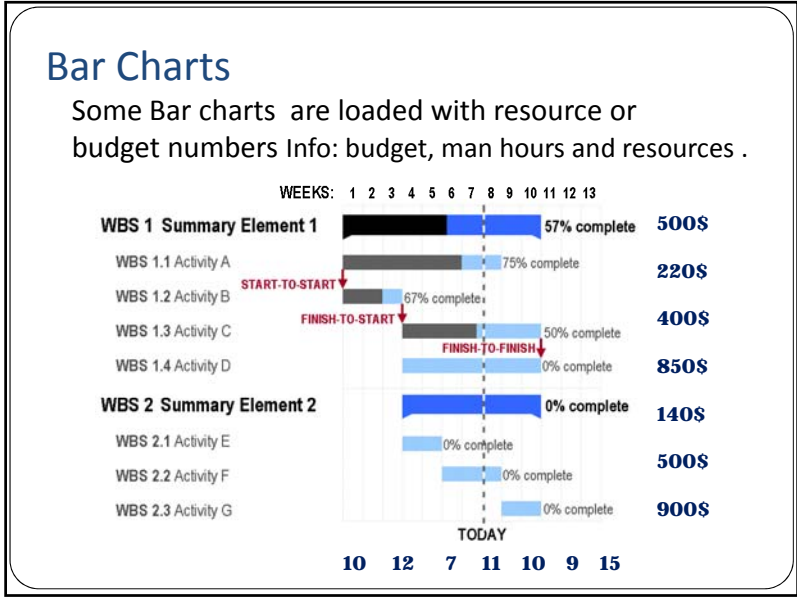
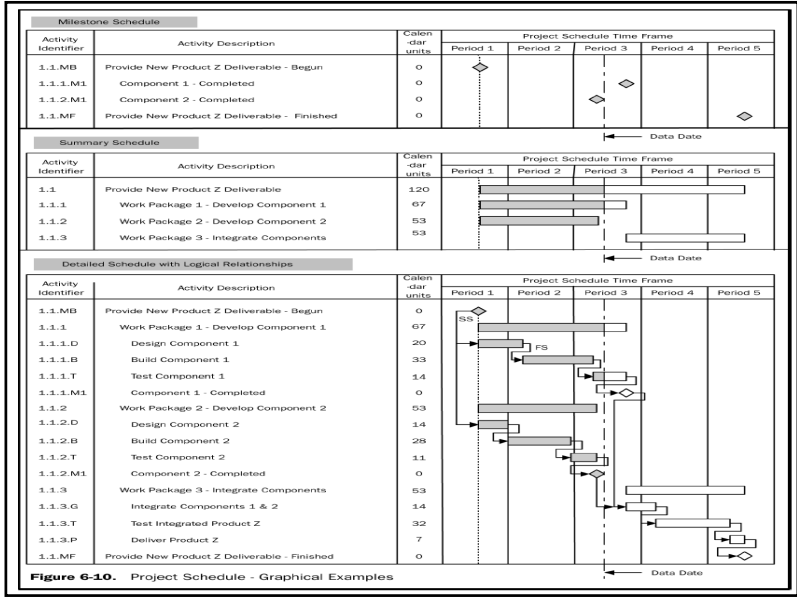
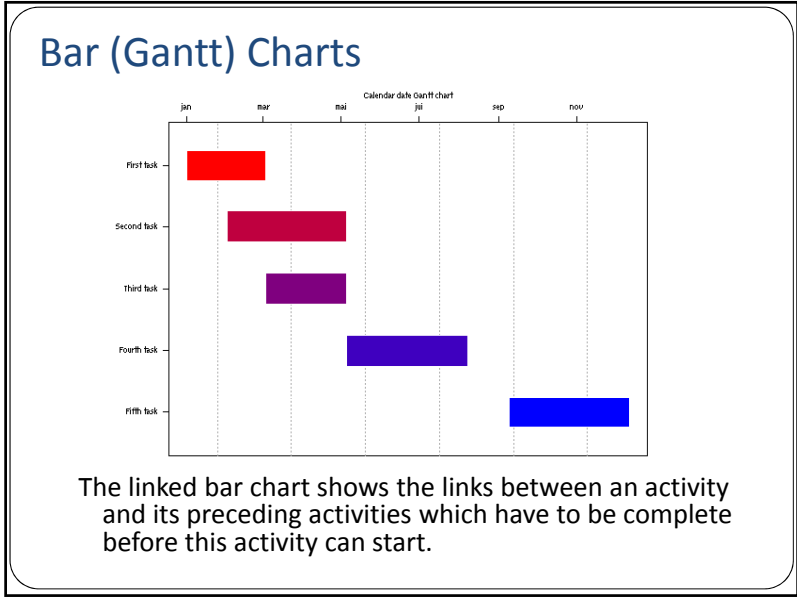
- The scheduling techniques widely used in construction management are:
  - Bar Charts
  - Network methods CPM/PERT /PDM
  - Line of Balance (LoB)

## Bar Charts

- A bar chart is "a graphic representation of project activities, shown in a time-scaled bar line with no links shown between activities"
- Gantt (1917) alternatively called a Gantt chart.
- Many variations of bar charts have evolved
- Before a bar chart can be constructed for a project, the project must be broken into activities or a tasks (WBS).

<u>Item</u>	<u>Activity</u>
M 10	Mobilization

  
 Bars ( days, weeks or Months )



## Advantages of bar charts

- Time –scaled
- Simple to prepare and understand
- Can be loaded with other information (budget, man hours, resources, etc.)
- Can be more effective and efficient if CPM based (bar charts did not perish or lose importance)
  - Practically, bar (Gantt) Charts are obsolete as a scheduling method.
  - However, it is very live and popular as a reporting method for projects scheduled using CPM networks and calculations.

## Disadvantages of bar charts

- 1- Does not show logic
  - 2- Not practical for projects with too many activities
- We can use bar charts to show:
1. A small group of the activities (subset)
  2. Summary schedules

## Networks techniques

- Network techniques are quite useful for proper planning, scheduling and controlling of activities
- Networks are graphical representations to analyze various work components of the project
  - Arrow networks
  - Node networks
- Arrow networks were more popular in the 1960s and 1970s, then precedence diagrams (an advanced form of node diagrams) became the choice for network scheduling.
- There are two basic Scheduling techniques:
  - Critical path method (CPM)
  - Program evaluation and review technique (PERT)