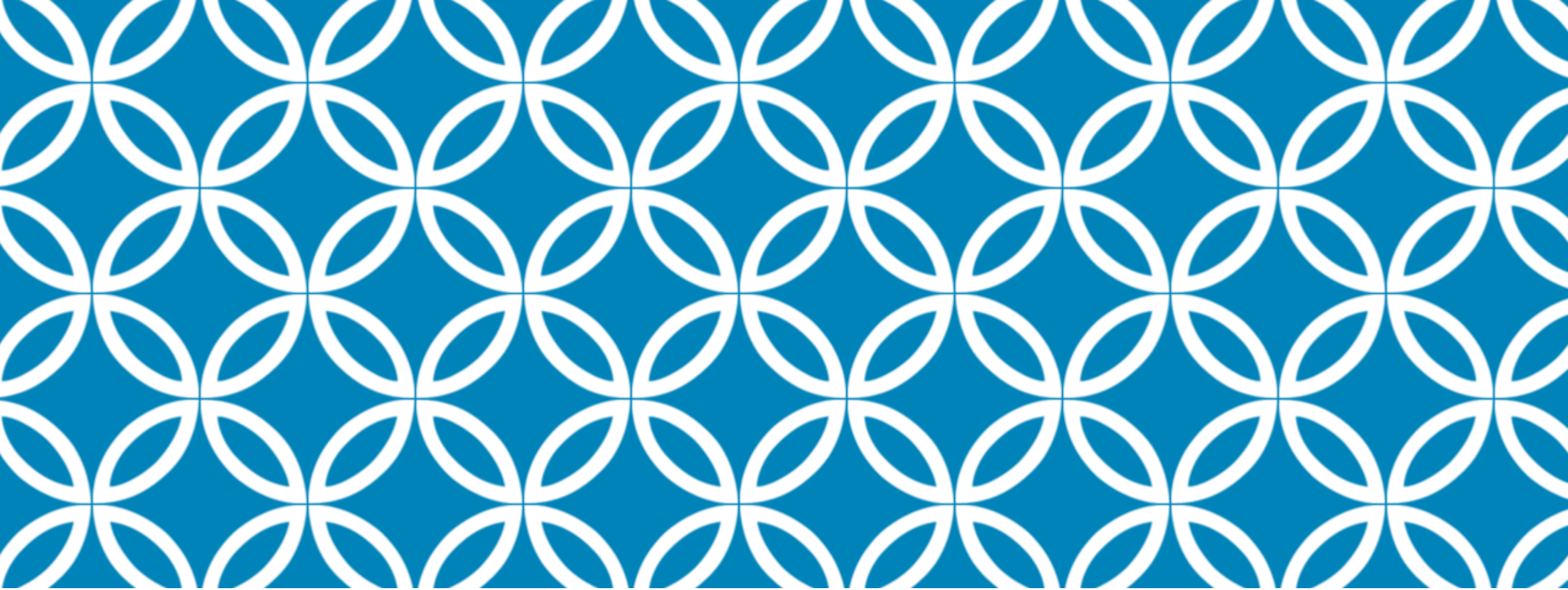


PROJECT SCHEDULING AND RESOURCE ALLOCATION

GENERAL PRACTICE

- On large projects, lots of small tasks occur to accomplish a larger goal
  - Some tasks are dependent on other
  - Other tasks are independent
- Project manager's objectives
  - Define all project tasks
  - Build an activity network that depicts their interdependencies
  - Identify the tasks that are critical
  - Build a timeline depicting the plan and progress of each task
  - Track task progress to ensure that delay is recognized

WHAT IS PROJECT SCHEDULING?

- Scheduling distributes estimated effort across the planned project duration by allocating the effort to specific tasks
- During early stages of project planning, a macroscopic schedule is developed
- Later, each task is refined into a detailed schedule
- Project Scheduling can be viewed from two different perspectives
  - First view - an end-date for release of a computer-based system has already been established and fixed
    - The software organization is constrained to distribute effort within the prescribed time frame
  - Second view, assume that rough chronological bounds have been discussed but that the end-date is set by the software engineering organization
    - Effort is distributed to make best use of resources and an end-date is defined after careful analysis of the software
  - The first view is encountered far more often that the second

BASIC PRINCIPLES OF PROJECT SCHEDULING

- Compartmentalization
  - The project must be compartmentalized into a number of manageable activities, actions, and tasks; both the product and the process are decomposed
- Interdependency
  - The interdependency of each compartmentalized activity, action, or task must be determined
  - Some tasks must occur in sequence while others can occur in parallel
  - Some actions or activities cannot commence until the work product produced by another is available
- Time allocation
  - Each task to be scheduled must be allocated some number of work units
  - In addition, each task must be assigned a start date and a completion date that are a function of the interdependencies
  - Start and stop dates are also established based on whether work will be conducted on a full-time or part-time basis

PROJECT SCHEDULING

BASIC PRINCIPLES OF PROJECT SCHEDULING CONTD…

- Effort validation
  - Every project has a defined number of people on the team
  - As time allocation occurs, the project manager must ensure that no more than the allocated number of people have been scheduled at any given time
- Defined responsibilities
  - Every task that is scheduled should be assigned to a specific team member
- Defined outcomes
  - Every task that is scheduled should have a defined outcome for software projects such as a work product or part of a work product
  - Work products are often combined in deliverables
- Defined milestones
  - Every task or group of tasks should be associated with a project milestone
  - A milestone is accomplished when one or more work products has been reviewed for quality and has been approved

OBJECTIVES OF PROJECT SCHEDULING

- Completing the project as early as possible by determining the earliest start and finish of each activity.
- Calculating the likelihood a project will be completed within a certain time period.
- Finding the minimum cost schedule needed to complete the project by a certain date.
- Investigating the results of possible delays in activity's completion time.
- Progress control.
- Smoothing out resource allocation over the duration of the project.

TYPES OF PROJECT SCHEDULES

1. Master schedule

   Master schedules are general summaries of the overall project, from start to finish.

2. Milestone schedule

   Milestone schedules list all of the project's significant events, and are often presented to senior managers so that they can see the project's progress.

3. Detailed schedule

   Detailed project schedules are the most operational of the three, breaking down all of the activities, tasks and action steps that need completing.

DEVELOPING A PROJECT SCHEDULE

- Define the type of schedule
- Define precise and measurable milestones
- Estimate task duration
- Define priorities
- Define the critical path
- Document assumptions
- Identify risks
- Review results

FACTORS AFFECTING PROJECT SCHEDULING

- Size of the project
- Number of potential users
- Mission criticality
- Application longevity
- Stability of requirements
- Ease of customer/developer communication
- Maturity of applicable technology
- Performance constraints
- Embedded and non-embedded characteristics
- Project staff
- Reengineering factors

TASK NETWORK

- Also called an activity network
- It is a graphic representation of the task flow for a project
- It depicts task length, sequence, concurrency, and dependency
- Points out inter-task dependencies to help the manager ensure continuous progress toward project completion
- The critical path
  - A single path leading from start to finish in a task network
  - It contains the sequence of tasks that must be completed on schedule if the project as a whole is to be completed on schedule
  - It also determines the minimum duration of the project

TOOLS FOR PROJECT SCHEDULING

PERT Chart:

- A graphical representation of a project's schedule
- Shows the sequence of tasks, which tasks can be performed simultaneously

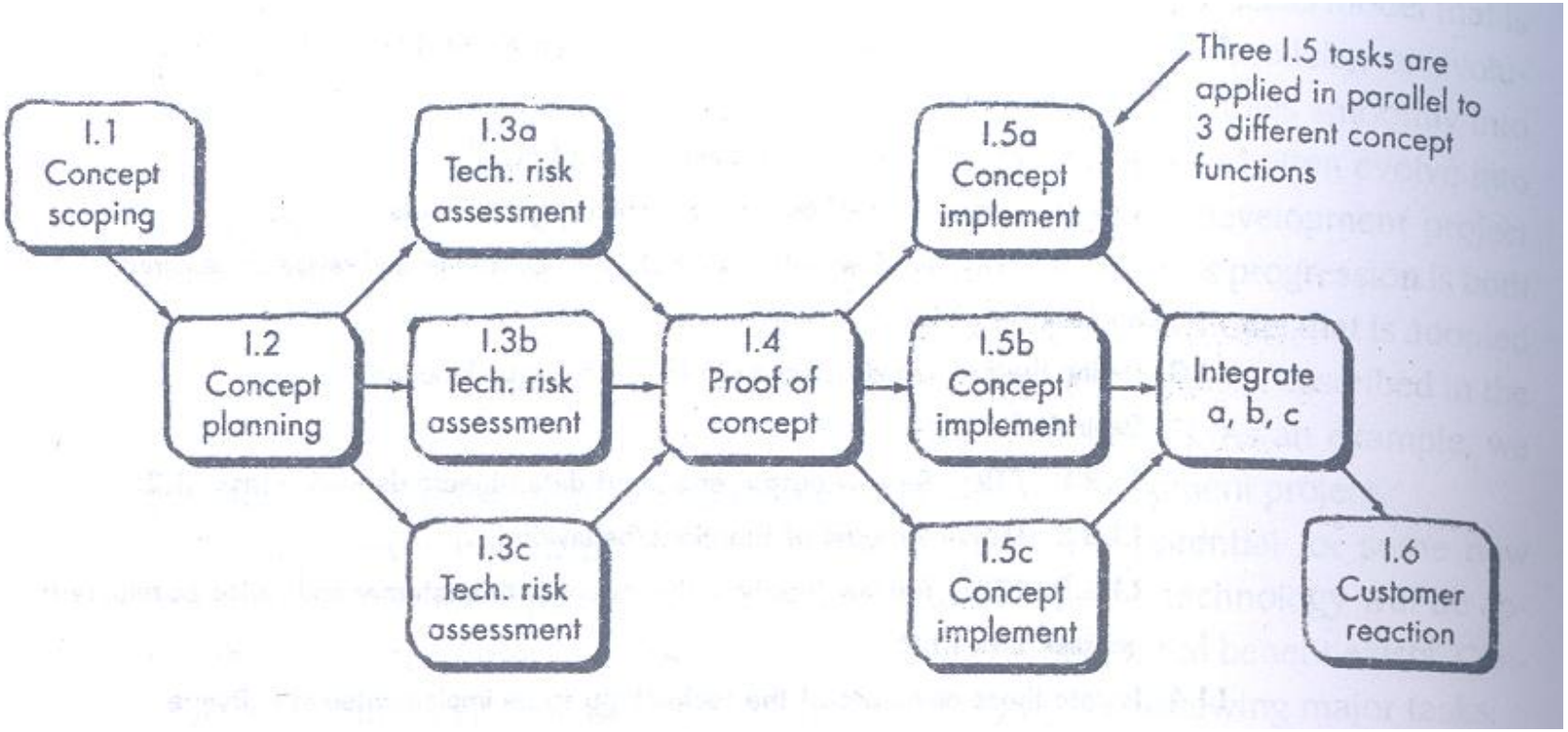
Gantt Chart:

- Illustrates the start and finish dates of the terminal elements and summary elements of a project.

Work Breakdown Structure:

- What are tasks to be done to complete the project

EXAMPLE OF TASK NETWORK

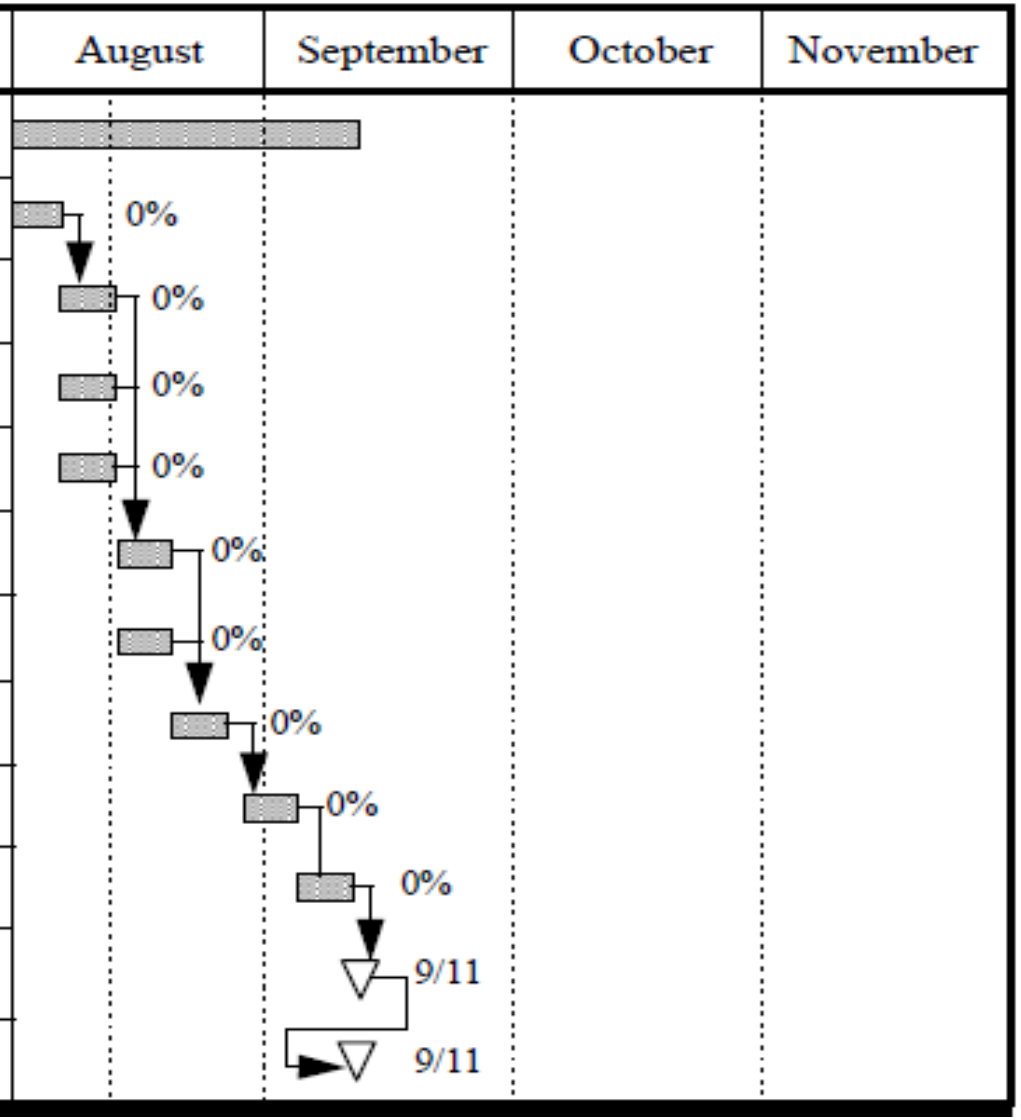


TIMELINE CHART

- Also called as Gantt chart
- A Gantt chart provides a graphical illustration of a schedule that helps to plan, coordinate, and track specific tasks in a project
- Developed in 1917 by Henry L. Gantt
- It is constructed with a horizontal axis representing the total time span of the project, broken down into increments (for example, days, weeks, or months) and a vertical axis representing the tasks that make up the project
- Is common in reporting status and defining the schedule for simple and small projects with few interrelationships.

EXAMPLE OF TIMELINE CHART

ID	Task Name	Project	Stage
1	REQUIREMENTS DEFINITION (Analysis Stage)		RD
2	Prepare for Analysis		RD
3	Define System Requirements (Business Mode)		RD
4	Analyze the Current System		RD
5	Reassess Application Architecture Requirements		RD
6	Develop and Evaluate Alternative Solutions		RD
7	Outline Transition, Security, and Training Plan		RD
8	Plan the Next Stage		RD
9	Prepare Material for Business Management Review		RD
10	Conduct the Business Management Review		RD
11	RD Approved by IS Dir, DMA Dir, Cust Sponsor, and Process Team		RD
12	Approval to Proceed to Next Stage		RD



RESOURCE ALLOCATION

- Resource: Any person, item, tool, or service needed by the project that is either scarce or has limited availability.
- Resource allocation is the distribution of resources – usually financial - among competing groups of people or programs.
- Goal of Resource Allocation is to Optimize Use of Limited Supply.
- Requires making trade-offs
  - time constrained
  - resource constrained
- For Example: When we talk about allocation of funds for healthcare, we need to consider three distinct levels of decision-making.
  - Level 1: Allocating resources to healthcare versus other social needs.
  - Level 2: Allocating resources within the healthcare sector.
  - Level 3: Allocating resources among individual patients.

RESOURCE ALLOCATION CONTINUED

- Resource allocation can be used as a control mechanism
- Allocating more, less, or different physical resources can affect the progress of activities, and can affect their cost and/or the quality of outputs/deliverables as well
- Assigning more, less, or different employees also can affect project performance
- Allocating more or less funds to an activity is yet another way to affect project performance

Resource allocation is used to assign the available resources in an economic way.

It is the scheduling of activities and the resources required by those activities while taking into consideration both the resource availability and the project time.

RESOURCE REQUIREMENTS- PROJECT CYCLE

- Establish task list
- Estimate task duration
- Identify requirements
- Begin staffing and procurement processes to acquire the resources needed
- Assign resources to tasks

RESOURCE CONFLICTS

- Sometimes a limited resource is needed (at the same time) by several activities in one project or by different activities in multiple projects (so some of the activities must wait)
- Setting priority rules for which activity get the constrained resource first can be a means of project control
- In the case of multiple projects, the goals and importance of all the projects should be considered

RESOURCE LOADING

- Amount of specific resources that are scheduled for use on specific activities or projects at specific times.
- Usually a list or table.
- The loads (requirements) of each resource type are listed as a function of time period.
- Resource loading gives a general understanding of the demands a project or set of projects will make on a firm's resources.

RESOURCE ALLOCATION PROCESS

Challenge

- To properly identify resources required to meet project objectives (schedule, performance, cost)

Allocation Process

- identifies durations and the relationships of key activities
- compares the resources required by each of the activities to the specified project resource availability.

RESOURCE ALLOCATION PROCESS

Resource allocation builds from schedule dates which determine when resources of a given type are required:

- The scheduled start determines when the resources will be available
- The schedule finish projects when the resources will no longer be required
- Availability of these resources may vary throughout the life of a project

RESOURCE ALLOCATION

The resource allocation requirements may be influenced by the need for establishing availability from a ***fixed time*** or a ***fixed resource*** perspective.

RESOURCE ALLOCATION

Fixed Time

- a fixed time requirement will not allow the “finish” date (the date the activity is scheduled to end and the date the resource is no longer expected to be needed) to be exceeded
  - Extra resources over and above the stated requirement may be allocated to make sure the end-date is held constant.
  - In effect , this is answering the question: Given the resources I have planned - is the time allotted sufficient to complete my project?

RESOURCE ALLOCATION

Fixed Resource

- a fixed resource constraint will not allow for exceeding the amount of resources allocated (independent of progress or expanded need for the resource).
  - Extra resources to compensate for slow progress or other factors are not available to meet specific time schedules
  - In effect, this is answering the question: Are the resources available sufficient to complete my project on time?

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