Project Management

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Project Planning

- Before starting
  - Establish system's scope and objectives
  - Consider alternative solutions
  - Identify technical and management constraints
- As a Project Manager
  - Decompose the product function (FD)
  - Select an appropriate process model
  - Select the task set for the project
  - Decompose the tasks into smaller work items (WBS)
  - Estimate effort for each task/work item
  - Estimate completion time of the project (Task/Activity Network)

Task Set

- A task set is a collection of software engineering work tasks, milestones, work products, and quality assurance filters that must be accomplished to complete a particular project.

- To develop a project schedule, a task set must be distributed on the project timeline.

Factors Affecting Choice of Task Set

- Size of project
- Number of potential users
- Mission criticality
- Application longevity
- Stability of requirements
- Ease of communication (customer/developer)
- Maturity of applicable technology
- Performance constraints
- Embedded/Non-Embedded characteristics of project
- Project Staff
- Reengineering factors

WBS and Activity Networks

- Work breakdown structure depicts the project as a set of discrete pieces of work

- Activity networks (task network, PERT [program evaluation and review technique] charts) depict the dependencies among activities

- Activity networks can be of two types:
  - Activity on Arc
  - Activity on Node

Project Types

- Concept Development
  - To explore new business concept
- New Application Development
  - As a consequence of specific customer request
- Application Enhancement
  - Modifications to existing functions, performance, interfaces of software; observable by the end user
- Application Maintenance
  - Correct, adapt, extend existing software; not immediately obvious to end user
- Reengineering Projects
  - Redevelop an existing system

Concept Development Projects (CDP)

- Usually initiated to explore some new business concept or application of some new technology

- Task set might be like:

  1.1 Concept scoping determines the overall scope of the project.

  1.2 Preliminary concept planning establishes the organization's ability to undertake the work implied by the project scope.

  1.3 Technology risk assessment evaluates the risk associated with the technology to be implemented as part of the project scope.

  1.4 Proof of concept demonstrates the viability of a new technology in the software context.

  1.5 Concept implementation implements the concept representation in a manner that can be reviewed by a customer and is used for "marketing" purposes when a concept must be sold to other customers or management.

  1.6 Customer reaction to the concept solicits feedback on a new technology concept and targets specific customer applications.

Refinement of Major Tasks

- Macroscopic schedule must be refined to create a detailed project schedule.

- Refinement begins by taking each major task and decomposing it into a set of subtasks (with related work products and milestones).

Refinement of Major Tasks (WBS of CDP)

Task definition: Task 1.1 Concept Scoping

1.1.1 Identify need, benefits and potential customers;

1.1.2 Define desired output/control and input events that drive the application;

Begin Task 1.1.2

    1.1.2.1 TR: Review written description of need[14]

    1.1.2.2 Derive a list of customer visible outputs/inputs

    1.1.2.3 TR: Review outputs/inputs with customer and revise as required;

endtask Task 1.1.2

1.1.3 Define the functionality/behavior for each major function;

Begin Task 1.1.3

    1.1.3.1 TR: Review output and input data objects derived in task 1.1.2;

    1.1.3.2 Derive a model of functions/behaviors;

    1.1.3.3 TR: Review functions/behaviors with customer and revise as required;

endtask Task 1.1.3

1.1.4 Isolate those elements of the technology to be implemented in software;

1.1.5 Research availability of existing software;

1.1.6 Define technical feasibility;

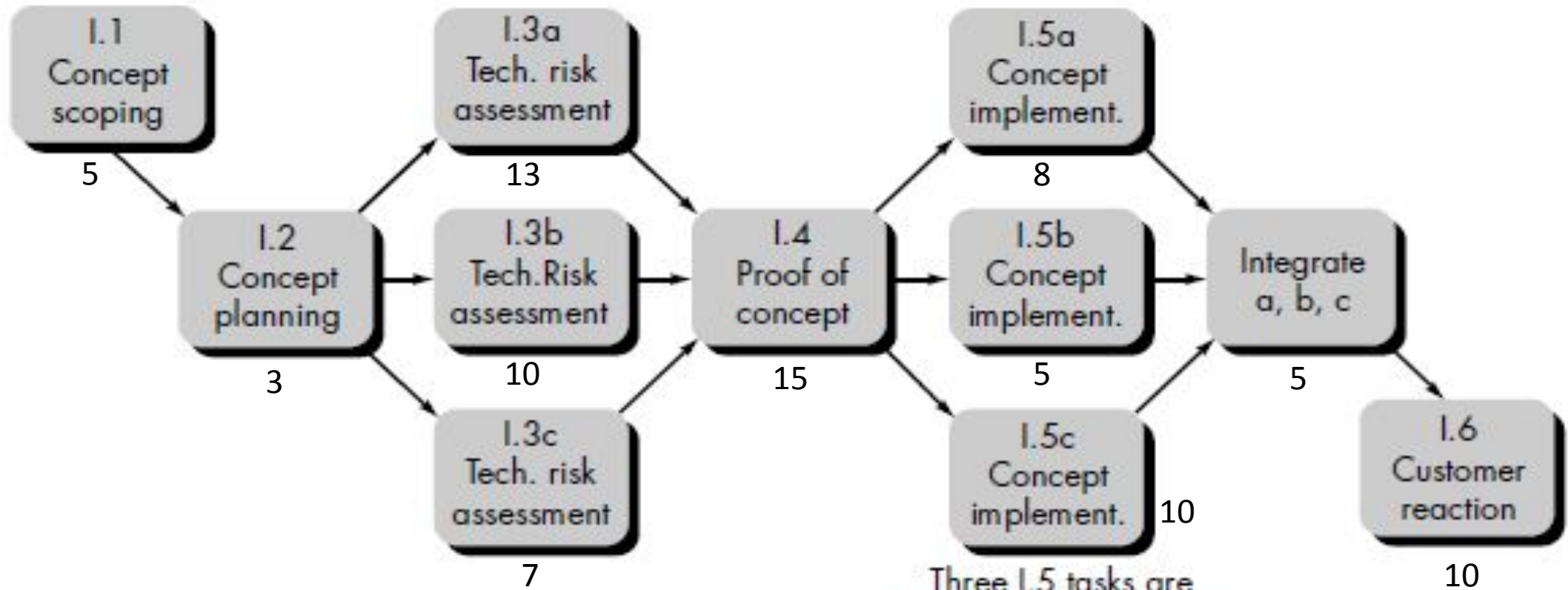1.1.7 Make quick estimate of size;

1.1.8 Create a Scope Definition;

endtask definition: Task 1.1

Activity Network

- A *task network,* also called an *activity network,* is a graphic representation of the task flow for a project.

- The task network is a useful mechanism for depicting inter task dependencies and determining the critical path.

Activity Network of CDP

Activity on Node (AoN) Graph

Estimating Completion
Critical Path Method

- Minimum amount of time required to complete a project
  - Reveals those activities that are most critical to completing the project on time
- **Real time (actual time):** estimated amount of time required for the activity to be completed
- **Available time:** amount of time available in the schedule for the activity's completion
- **Slack time:** the difference between the available time and the real time for that activity

Estimating Completion
Critical Path Method

- **Critical path**: the slack at every activity is zero
  - can be more than one in a project schedule

- **Slack time** =
  - available time – real time
  - latest start time – earliest start time

- Paths????

- Longest Path???

Exercise
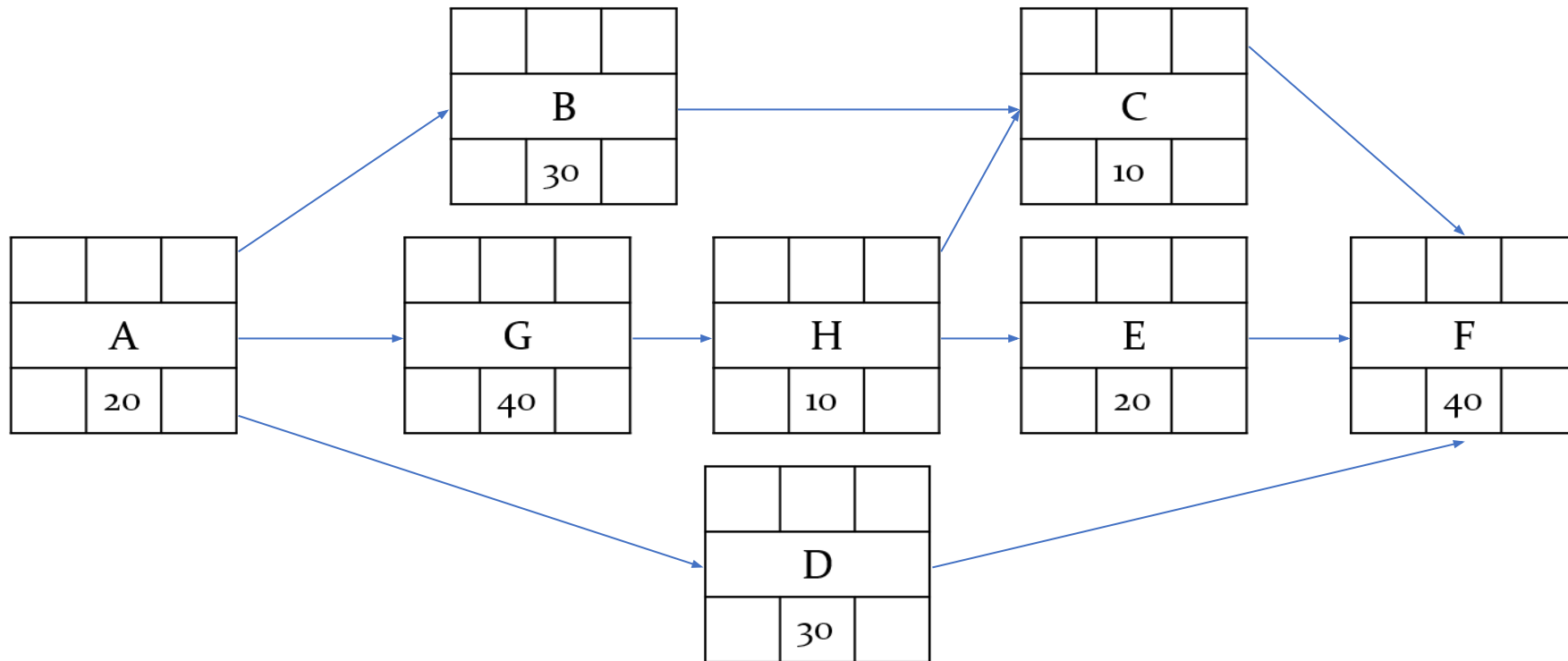
Exercise
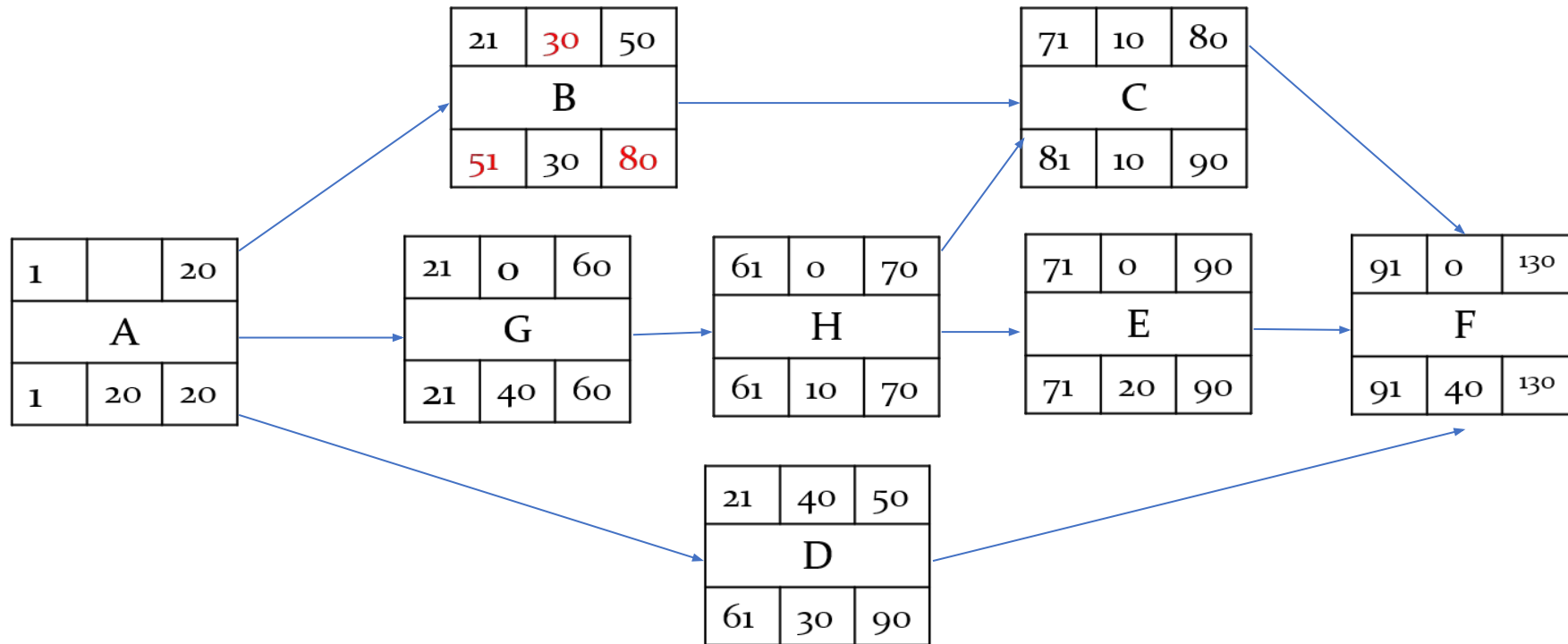
Exercise

Q. The diagram below shows the PERT chart for a software project. Each task is represented by an oval. Numbers inside ovals represent task durations in weeks. Arrows indicate task dependencies.

Identify the tasks on the critical path. Show your working clearly e.g. indicate start and end times of each task.

Exercise

Timeline/Gantt Charts

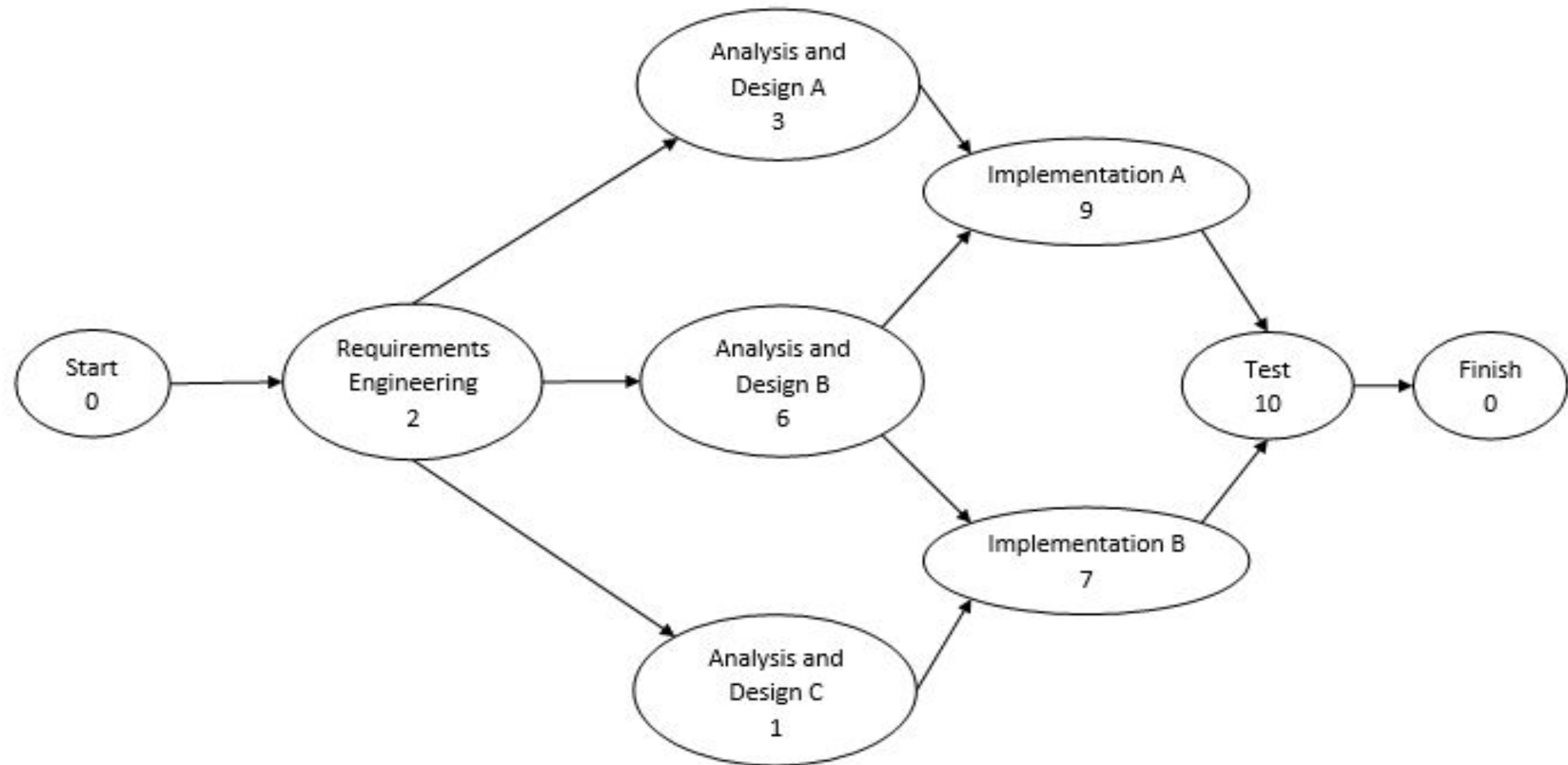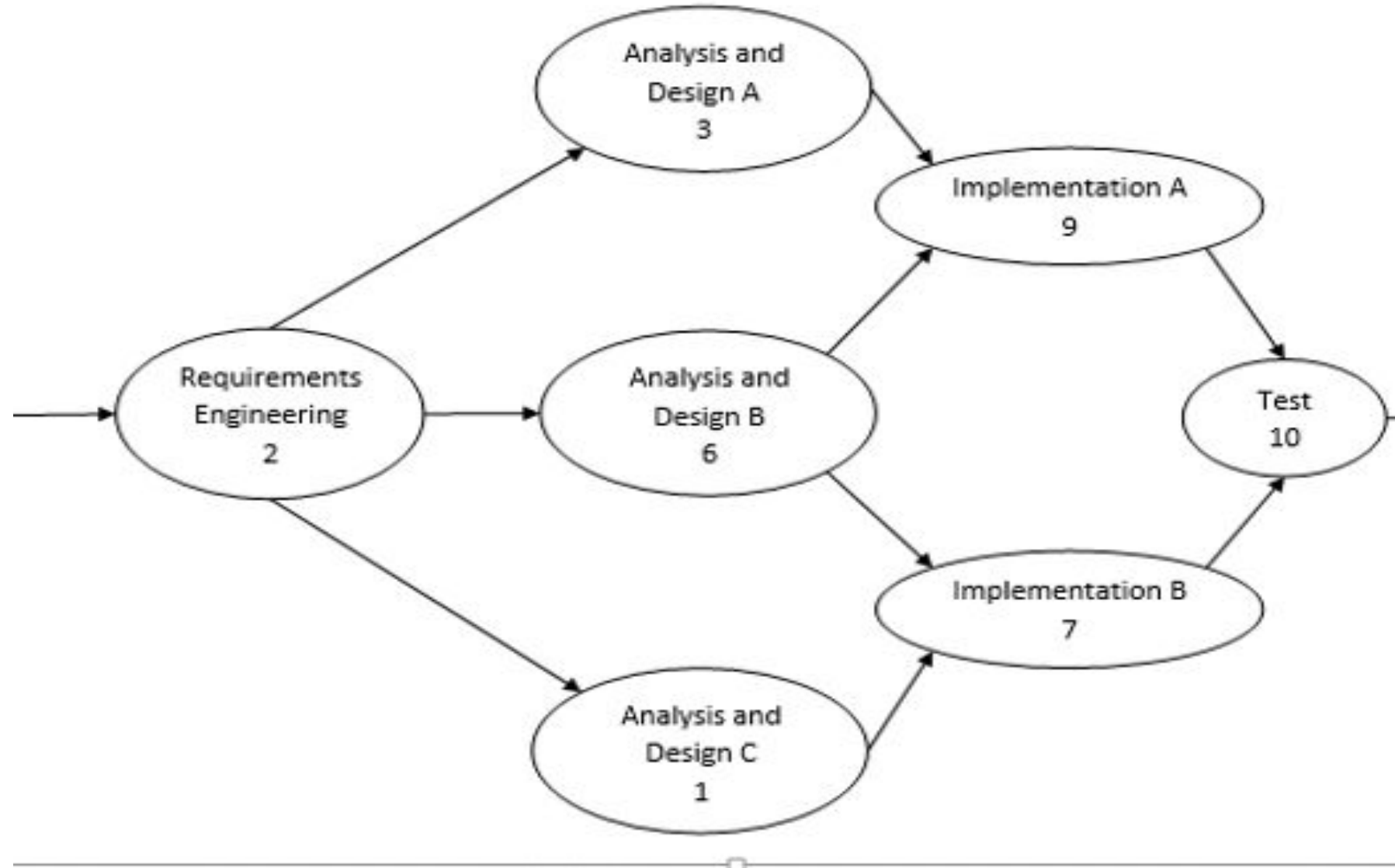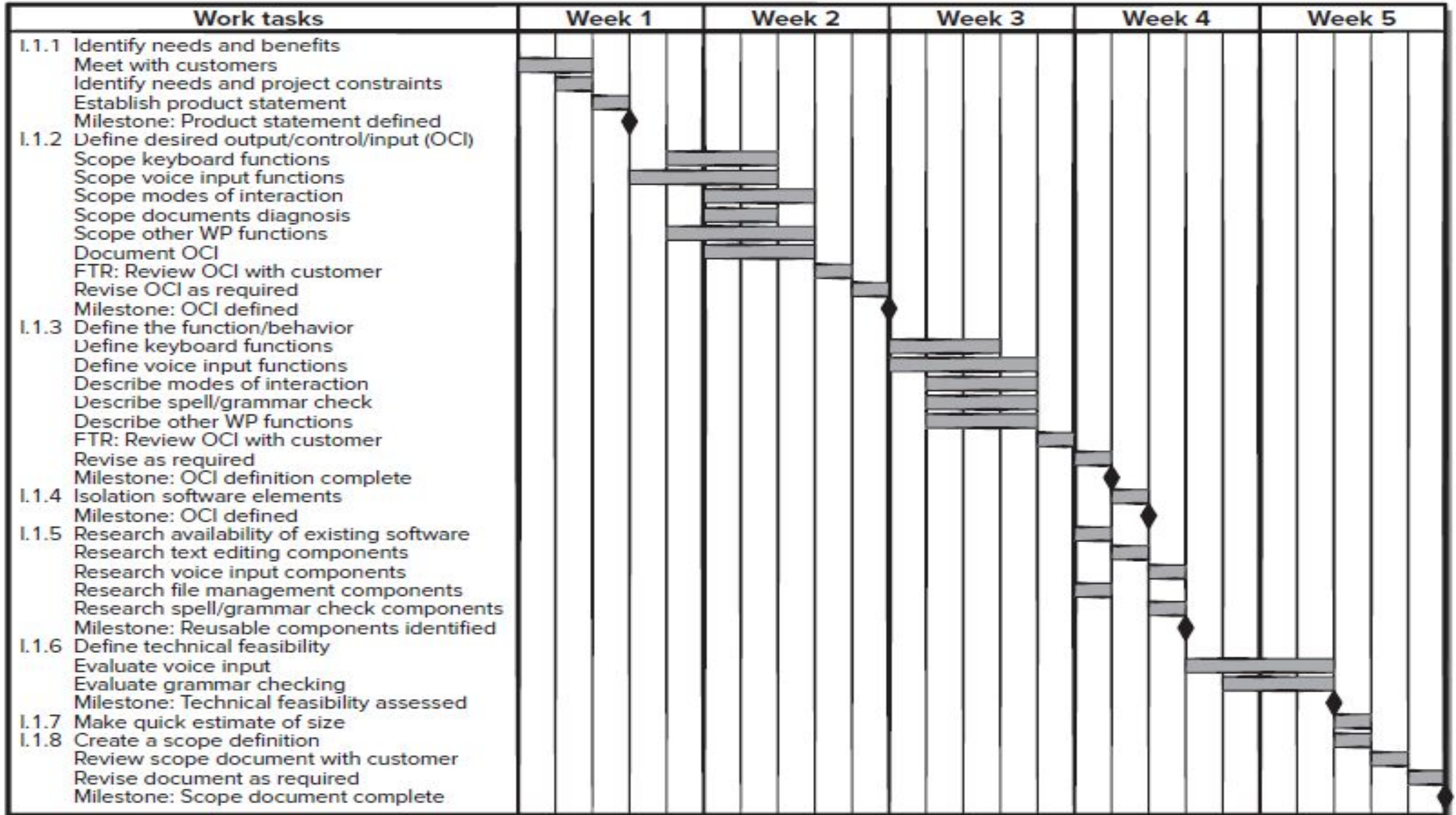| Work tasks	Week 1	Week 2	Week 3	Week 4	Week 5
I.1.1 Identify needs and benefits					
Meet with customers	▬				
Identify needs and project constraints	▬				
Establish product statement	▬				
Milestone: Product statement defined	◆				
I.1.2 Define desired output/control/input (OCI)					
Scope keyboard functions		▬			
Scope voice input functions		▬			
Scope modes of interaction		▬			
Scope documents diagnosis		▬			
Scope other WP functions		▬			
Document OCI		▬			
FTR: Review OCI with customer		▬			
Revise OCI as required					
Milestone: OCI defined		◆			
I.1.3 Define the function/behavior					
Define keyboard functions			▬		
Define voice input functions			▬		
Describe modes of interaction			▬		
Describe spell/grammar check			▬		
Describe other WP functions			▬		
FTR: Review OCI with customer			▬		
Revise as required			▬		
Milestone: OCI definition complete			◆		
I.1.4 Isolation software elements				▬	
Milestone: OCI defined				◆	
I.1.5 Research availability of existing software					
Research text editing components				▬	
Research voice input components				▬	
Research file management components				▬	
Research spell/grammar check components					
Milestone: Reusable components identified				◆	
I.1.6 Define technical feasibility					
Evaluate voice input				▬	
Evaluate grammar checking				▬	
Milestone: Technical feasibility assessed				◆	
I.1.7 Make quick estimate of size					▬
I.1.8 Create a scope definition					▬
Review scope document with customer					▬
Revise document as required					▬
Milestone: Scope document complete					◆

Project Table

Work tasks	Planned start	Actual start	Planned complete	Actual complete	Assigned person	Effort allocated	Notes
I.1.1 Identify needs and benefits							Scoping will require more effort/time
Meet with customers	wk1, d1	wk1, d1	wk1, d2	wk1, d2	BLS	2 p-d	
Identify needs and project constraints	wk1, d2	wk1, d2	wk1, d2	wk1, d2	JPP	1 p-d	
Establish product statement	wk1, d3	wk1, d3	wk1, d3	wk1, d3	BLS/	1 p-d	
Milestone: Product statement defined	wk1, d3	wk1, d3	wk1, d3	wk1, d3			
I.1.2 Define desired output/control/Input (OCI)							
Scope keyboard functions	wk1, d4	wk1, d4	wk2, d2		BLS	1.5 p-d	
Scope voice input functions	wk1, d3	wk1, d3	wk2, d2		JPP	2 p-d	
Scope modes of interaction	wk2, d1		wk2, d3		MLL	1 p-d	
Scope documents diagnosis	wk2, d1		wk2, d2		BLS	1.5 pd	
Scope other WP functions	wk1, d4	wk1, d4	wk2, d3		JPP	2 p-d	
Document OCI	wk2, d1		wk2, d3		MLL	3 p-d	
FTR: Review OCI with customer	wk2, d3		wk2, d3		all	3 p-d	
Revise OCI as required	wk2, d4		wk2, d4		all	3 p-d	
Milestone: OCI defined	wk2, d5		wk2, d5				
I.1.3 Define the Function/behavior							