Software Engineering

SOFTWARE PROJECT MANAGEMENT

Software Project Management

- Software & Project Management
  - Corporate America spends more than $275 billion each year on approximately 200,000 application software development projects
  - Most of these projects will fail for lack of skilled project management
- Management problems were more frequently dominant cause than technical problems
- Schedule overruns were more common (89%) than cost overruns (62%)

KPGM's Survey in UK

Software Project Management (2)

Success Factors

- User involvement – 20 points
- Executive Support – 15 points
- Clear Business Objectives – 15 points
- Experienced Project Manager – 15 points
- Small milestones – 10 points
- Firm basic requirements – 5 points
- Competent staff – 5 points
- Proper planning – 5 points
- Ownership – 5 points
- Others – 5 points

Software Project Management (3)

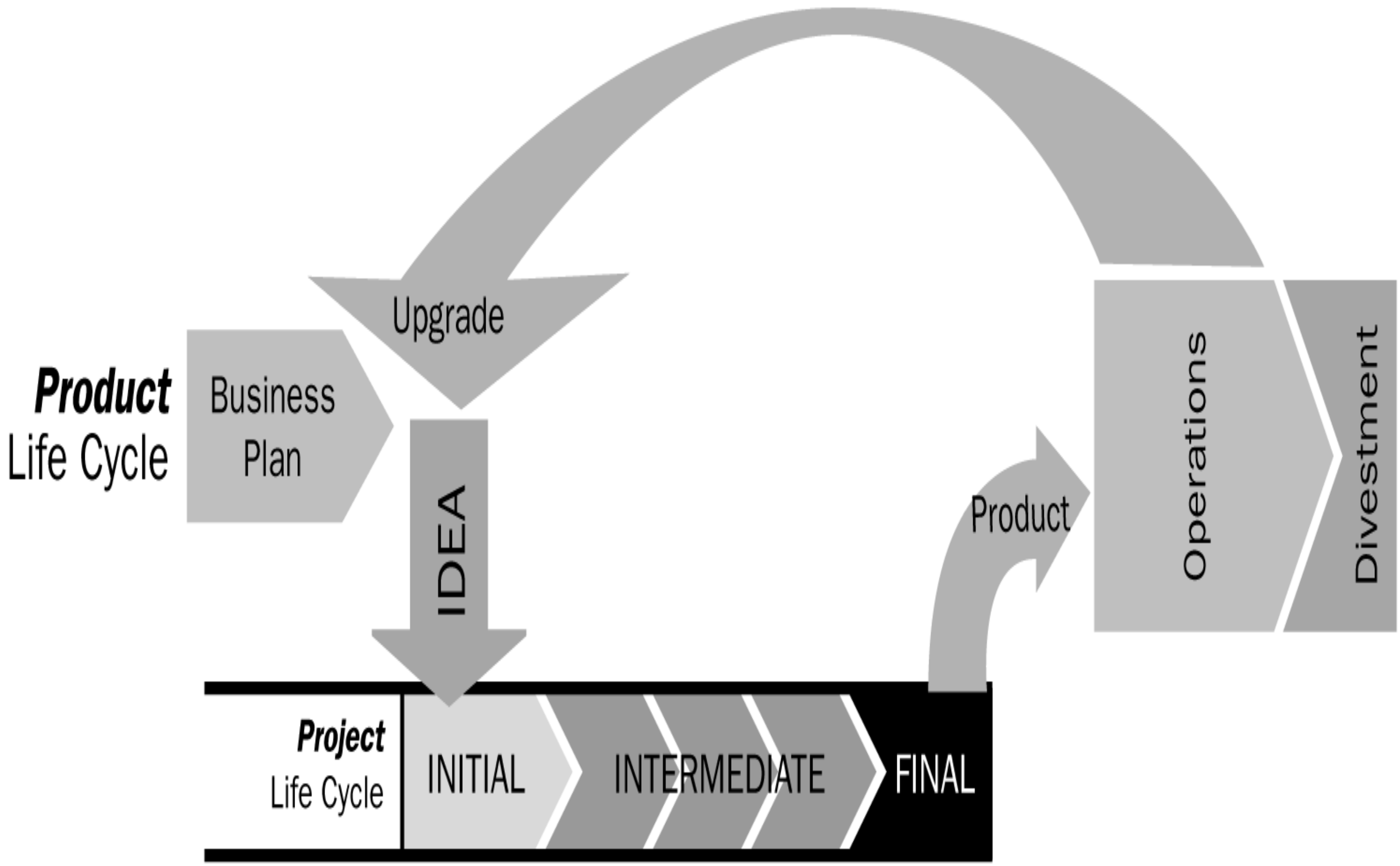
- Primary causes of software runaway
  - Project Objectives not fully specified
  - Bad planning and estimating
  - Technology new to the organization
  - Inadequate/No project management methodology
  - Insufficient senior staff on the team
  - Poor performance by Supplier of hardware/software

In a nutshell

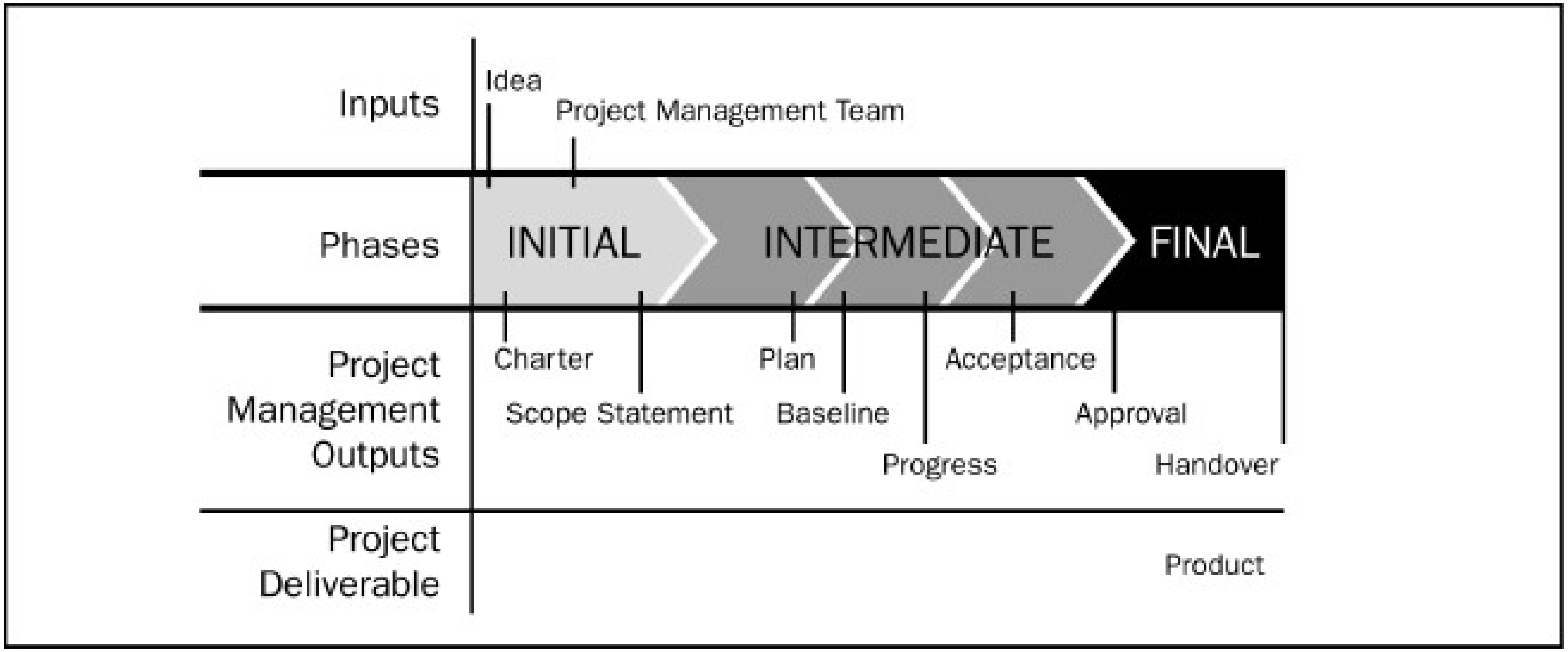
"Organizations that attempt to put software engineering discipline in place before putting project management discipline in place are domed to fail"

SEI

Product and the Project Life Cycles



Phases in a Project Life Cycle



Project Management Life Cycle

Processes/Activities of the **5 phases (Process Groups 2004)** are as:

1. Scope the Project
- State the Problem/ Opportunity
- Establish the project goal
- Define project Objectives
- Identify the success criteria
- List assumptions, risks, obstacles

2. Develop detail Plan
- Identify project activities
- Estimate activity duration
- Determine resource requirements
- Construct / analyze project network
- Prepare project proposal

3. Launch the Plan
- Recruit and organize project team
- Establish team operating rules
- Level resources
- Schedule work packages
- Document work packages

4. Monitor/ Control Progress
- Establish progress reporting system
- Install change control tools/process
- Define problem-escalation process
- Monitor project progress vs plan
- Revise Plan

5. Close Out
- Obtain client acceptance
- Install project deliverables
- Complete project documentation
- Complete post-implementation audit
- Issue final project report

Knowledge Areas for Project Management

1. Project Integration Management
2. Project Scope management
3. Project Time Management
4. Project Cost Management
5. Project Quality Management
6. Project Human Resource Management
7. Project Communications Management
8. Project Risk Management
9. Project Procurement Management

Mapping PM processes to Process Groups (Life Cycle Phases)

Phases / PM Knowledge	Initiating	Planning	Executing	Controlling	Closing
Integration Management (7)	Develop charter, Develop primary scope statement	Develop project management plan	Direct and manage project Execution	Monitor and Control project work, Integrated change control	Close Project
Scope management (5)		Scope planning, Scope definition, Create WBS		Scope Verification, Scope Change Control	
Time Management (6)		Activity definition, Act Sequencing, Act Resource Estimating, Act duration Est, Schedule Dev.		Schedule control	
Cost Management (3)		Cost Estimating, Cost Budgeting		Cost control	
Quality Management (3)		Quality planning	Perform Quality assurance	Perform Quality control	
Human Resource		Human Resource Planning	Acquire Project Team, Develop Project Team	Manage Project Team	

44 PM processes to the 5 PM Process Groups

Mapping PM processes to Life Cycle Phases…

PM Knowledge	Initiatin g	Planning	Executing	Controlling	Closing
Communicatons Management (4)		Comm. Planning	Information Distribution	Performance reporting, Manage Stakeholders	
Risk Management (6)		Risk Management Planning, Risk identification, Qualitative Risk analysis, Qualitative Risk analysis , Risk response planning		Risk monitoring & control	
Procurement Management (6)		Plan Purchases and Acquisitions, Plan Contracting	Request Seller Responses, Select Seller	Contract Administration	Contract Closure

Software Project Planning

- The purpose of the Project Plan is to define and establish the management strategy for achieving the goals of the project.
- The project development plan is used to:
  - Guide project execution.
  - Document project planning assumptions.
  - Document project planning decisions regarding alternatives chosen.
  - Facilitate communication among stakeholders.
  - Define key management reviews (as to content, extent, and timing).
  - Provide a baseline for progress measurement and project control.

Detailed Plan Development

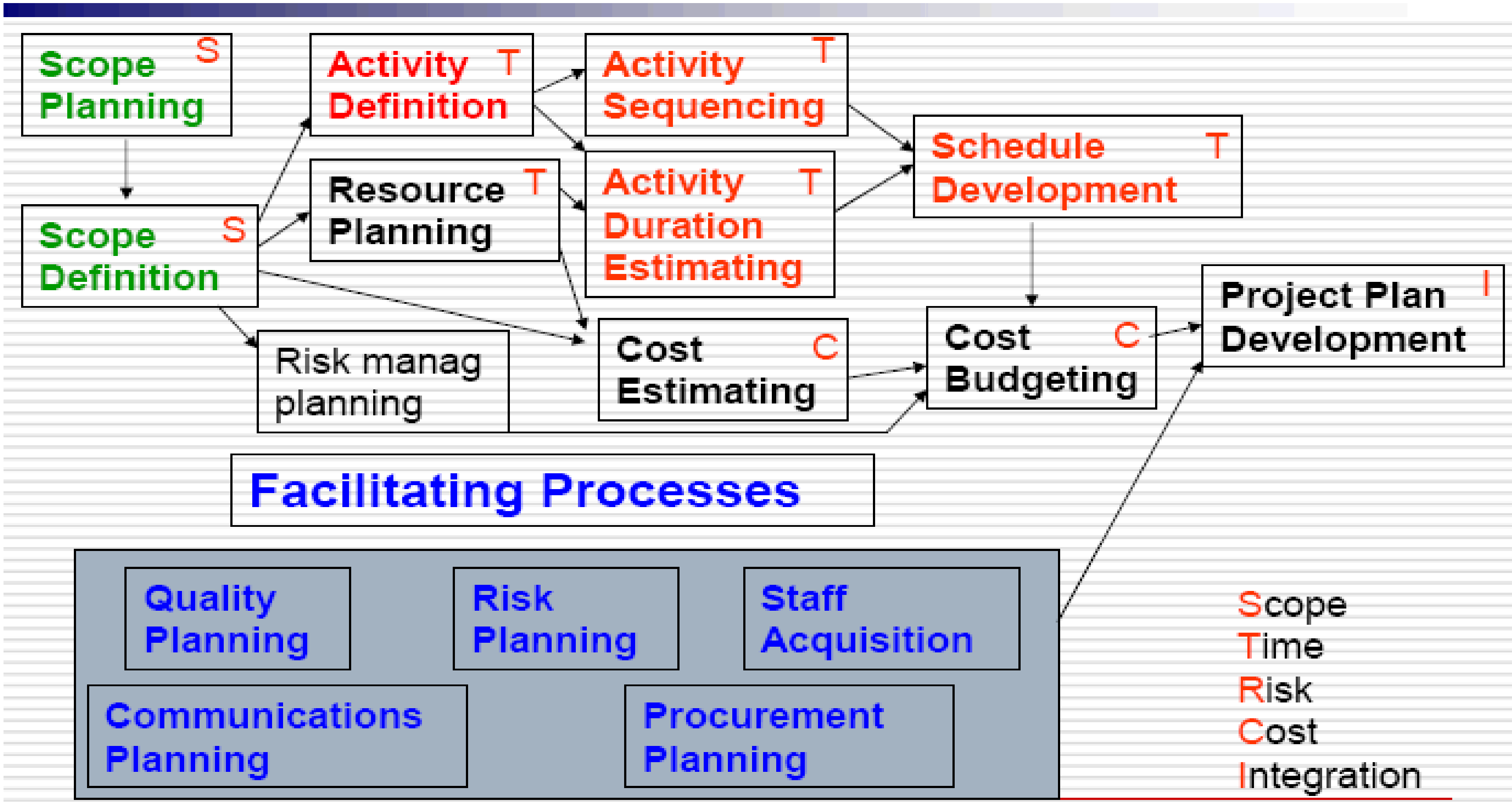
Inputs

- **Other planning outputs**
  - **Outputs of the planning processes in the other knowledge areas (scope, Time, Risk, Resource, Cost….)**
- **Historical information**
  - **Estimating databases, records of past project performance**
- **Organizational policies**
  - **Formal and informal policies including**
    - **Quality management**
    - **Personnel management**
    - **Financial controls**
- **Constraints**
  - **Factors that limit the team's options**
- **Assumptions**
  - **Factors that are considered true, real or certain**

Outputs

- **Project Plan (Proposal)**
- **Supporting Details**

Planning Process Flow



The Project Plan

Contents

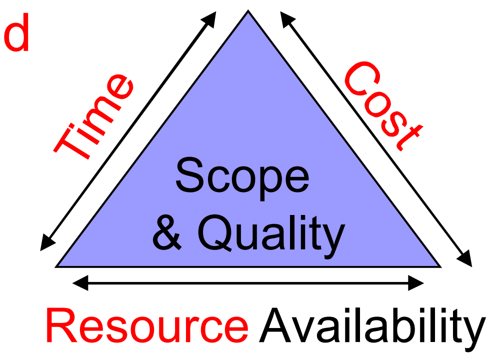
Many format; common sections are: (kathy -62)

- Introduction or Overview
  - Project Name, Description and Need it addresses, Sponsor's name, Name of PM, Deliverables (Brief), Reference Material, List of definitions.
- Project Organization
  - Org. chart, Responsibilities, Other Org. or process related info.
- Management and Technical Approach
  - Manag. Objectives, project control, Risk Manag., Staffing, Technical Processes.
- Project Scope
  - Major Work Packages/WBS, Key Deliverables, Other Work related Info.,
- Project Schedule
  - Summary/Detail Schedules
- Budget
  - Summary/Detail budget,

Scope Definition

The first step - define the Scope

- Projects are dynamic systems that must be kept in equilibrium
- Not easier at all, as shown from the dynamics of the situation
- Area inside the triangle (Scope & Quality) is bound by the Lines (Cost, Time, Resource)



"Scope" **The term may refer to:**

a) **Product scope - the features and functions that are to be included in a product or service.**
b) **Project scope - the work that must be done in order to deliver a product (with the specified features and functions).**

1. ***Product Scope*** **is defined in the product requirements and is the subject of the product life cycle**
2. ***Project Scope*** **is defined in the project charter and is the subject of the project plan**

(Kathy-ch4)

PROJECT ANALYSIS

Step 1 - Conceptual understanding of the project. The aim here is to understand the goals, risks, constraints, context and features to be delivered. Note that you may need a short burst of requirements gathering to start off!

Step 2 - Choose an approach or lifecycle model to develop the system (Project and product lifecycles).

Step 3 - For each of the phases in the approach a ***Work Breakdown*** **structure** to complete the task.

Decomposition

subdividing the major project deliverables into smaller, more manageable Components (products) in sufficient detail to support future project activities (planning, executing, controlling, and closing); requires Steps:

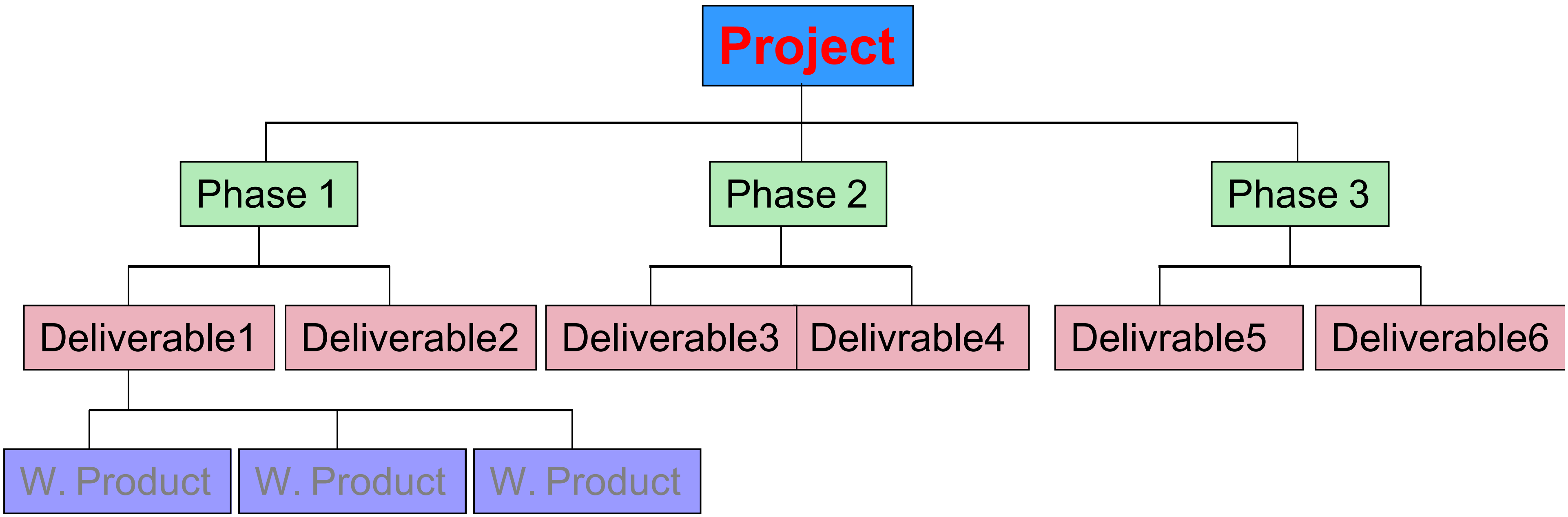
1) Identify the major elements (deliverable) of the project.
2) Identify constituent elements (Work Products) of the deliverable.
3) Decide if adequate cost and duration estimates can be developed at this level of detail for each element.
4) Verify the correctness of the decomposition.

1. Identify the major elements of the project.

- In general, the major elements will be the project deliverables and project management product. For example:
  - The phases of the project life cycle may be used as the first level of decomposition with the project deliverables repeated at the second level.
  - The organizing principle within each branch of the WBS may vary.

Major elements ……

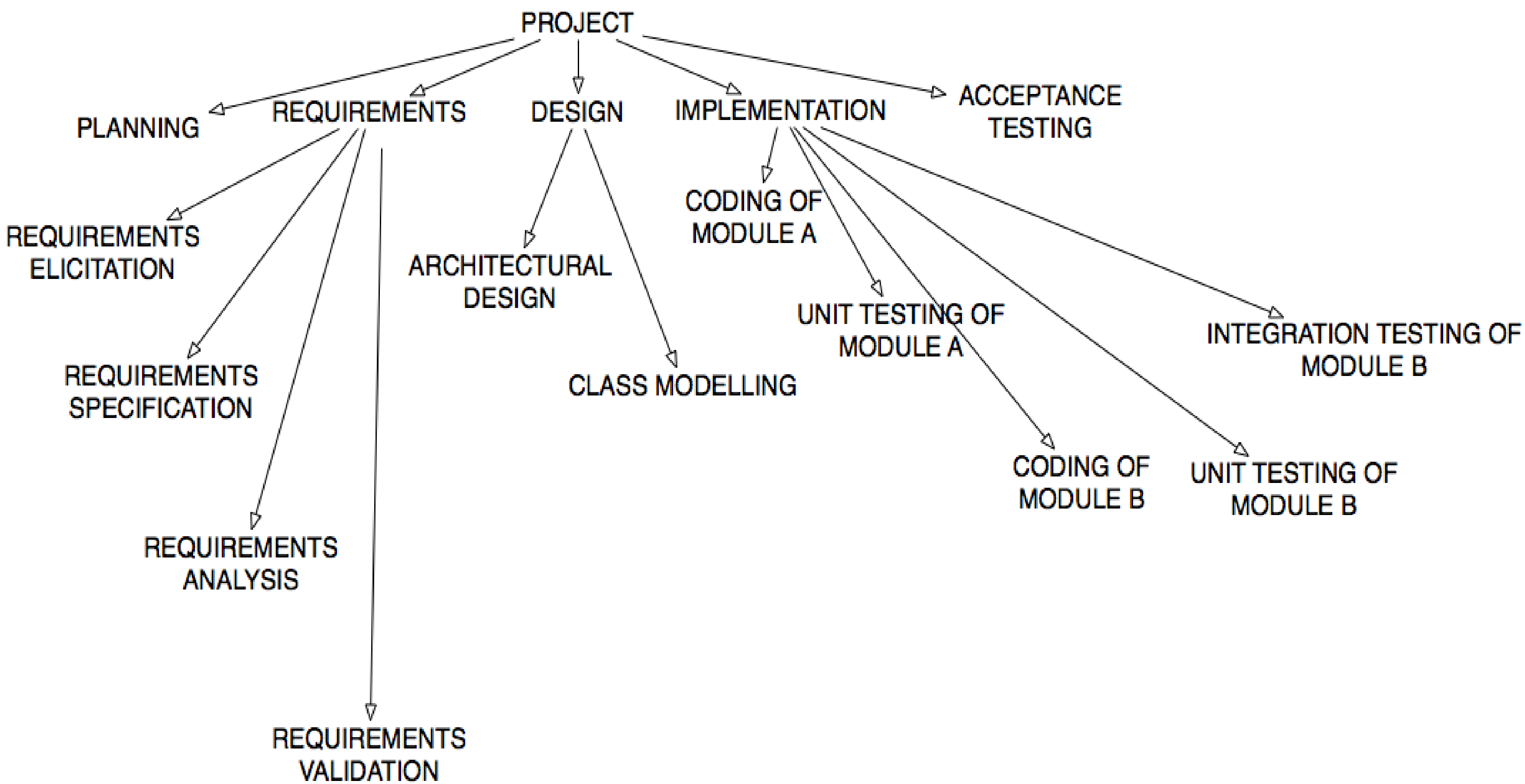
- **Supporting and organizational processes provide further elements for the WBS**
  - **Identify which supporting and organizational processes need to be invoked**
  - **Establish which activities from these processes are to be performed, and when**



2. Identify constituent elements: project product and activities

1) **Constituent elements should be described in terms of tangible, verifiable results in order to facilitate performance measurement.**
2) **Like major elements, the constituent elements should also be defined in terms of how the work of the project will actually be accomplished.**
3) **Tangible, verifiable results can include services as well as products**
4) **status reporting could be described as weekly status reports**
5) **Making sure we have identified all the things the project is to create help to ensure that all activities needed to carry out are accounted for (and we can make accurate estimates)**
6) **Project products have activities to create them and vice versa activities produce something (tangible product)**
7) **Products include large number of technical products including management and the quality of the project (e.g Planning documents would be management product).**

PROJECT ANALYSIS BY WORK BREAKDOWN STRUCTURES



WORK BREAKDOWN - THE 100% RULE

The 100% Rule*...states that the WBS includes 100% of the work defined by the project scope and captures all* deliverables *- internal, external, interim -in terms of the work to be completed, including project management.*

Purpose of Creating WBS

- Improve accuracy of cost, time, and resource estimates.
- Define a baseline for performance measurement and control.
- Facilitate clear responsibility assignments.

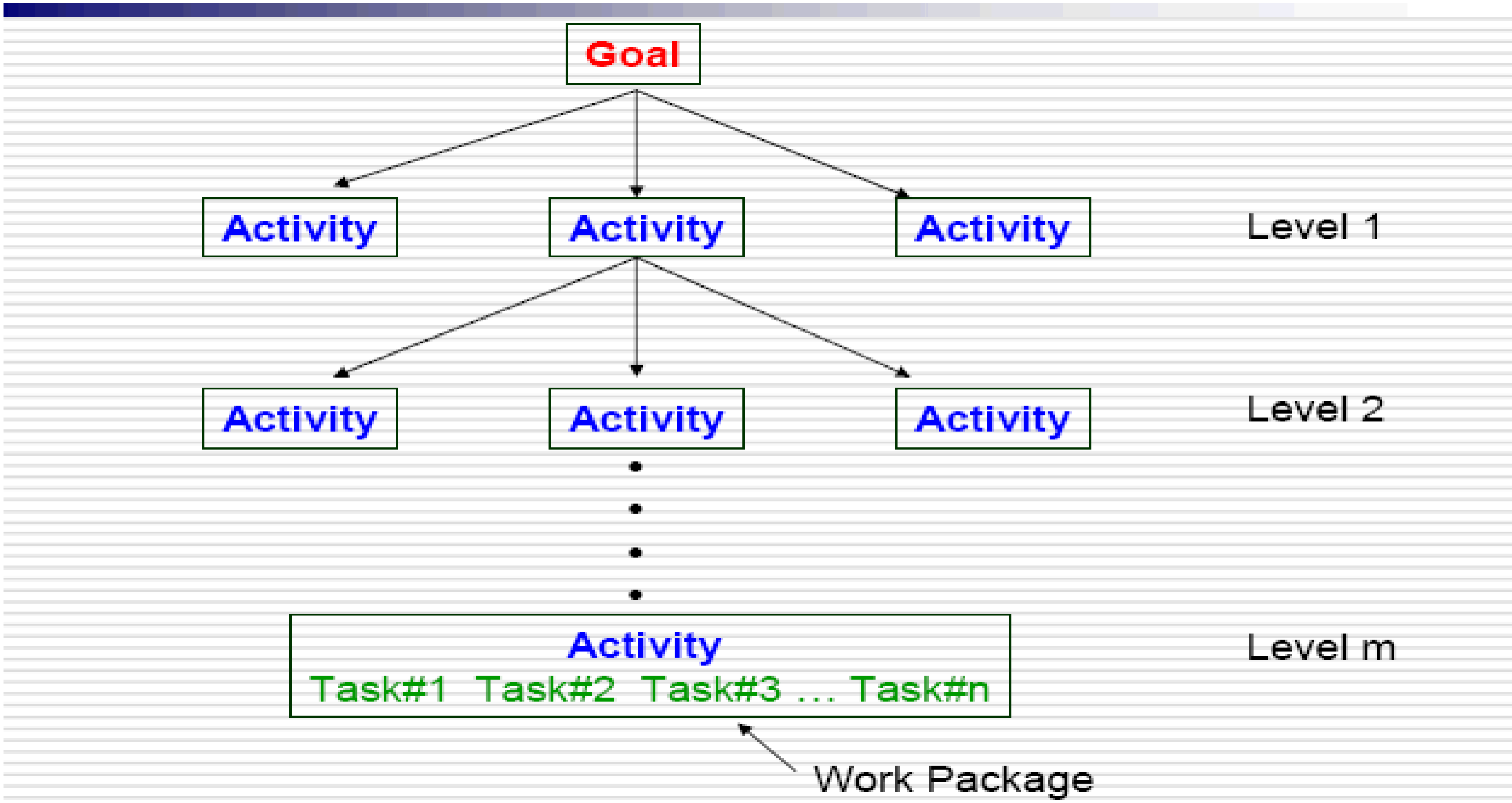
Work Break Down Structure

- displays and defines the product to be developed or produced by hardware, software, support, and/or service element, and relates the work scope elements to each other and to the end product(s).
- A WBS, up to level 3, is developed during the proposal as level three of the WBS is the normal reporting level of external contractual information. Standards are to be followed if required by the customer (like U.S. government MIL-STD-881).
- After Contract award, the Project Manager expands the WBS into a Contract Work Breakdown Structure (CWBS) as the initial step in the planning process.
- WBS expansion will extend the CWBS a minimum of one level below the negotiated external reporting level. Why?
- This sets up (1) the framework for work scope definitions and (2) assignments to the functional organizations.
- One and only one CWBS exists for each contract and once created will exist for the life of the contract.
- Only a formal contract change will effect a change in the WBS……

Work Breakdown Structure II

- The WBS is used to report status externally to the customer. The CWBS is used internally to plan in detail and to collect status information on a periodic bases.
- The Customer, not the contractor, is the primary owner of the WBS.
- The CWBS is *not* a "people organization chart"; it is a "work scope chart".
- The resource charges must go directly into a single Task Plan element and not split between two or more Task Plan elements.
- The WBS/CWBS will serve multiple functions (e.g. Design To Cost (DTC), Life Cycle Cost (LCC), Engineering Bill(s) of Material (EBOM), Manufacturing Bill (s) of Material (MBOM), as well as the product structure of the end items) in one format.
- Never lose sight of the fact that the WBS is used for TECHNICAL PLANNING and STATUS ACHIEVEMENT.

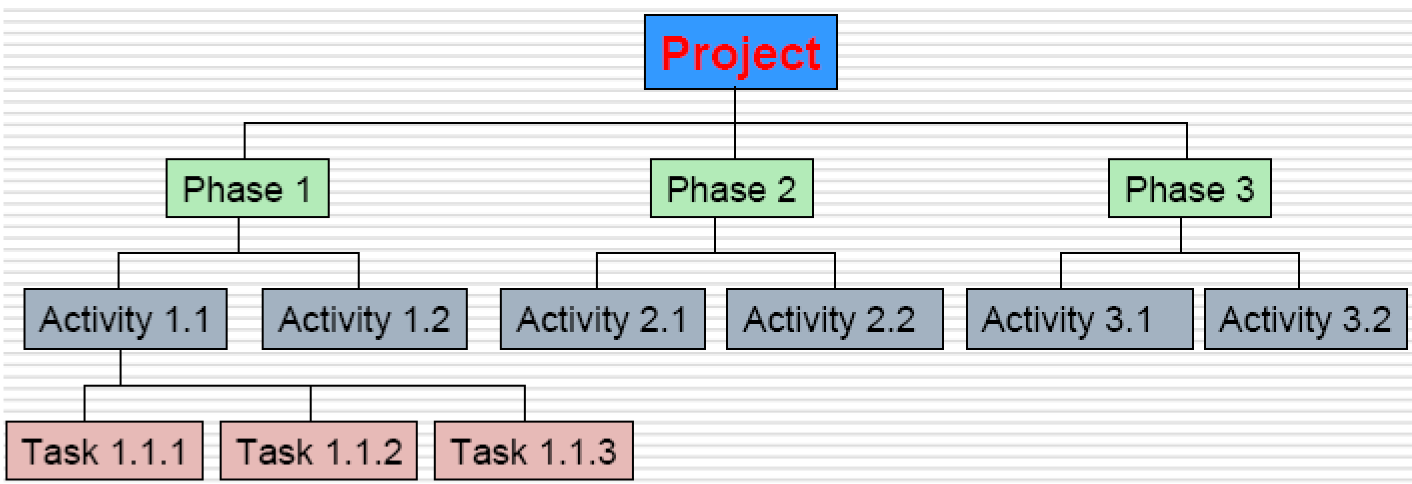
Hierarchy of WBS



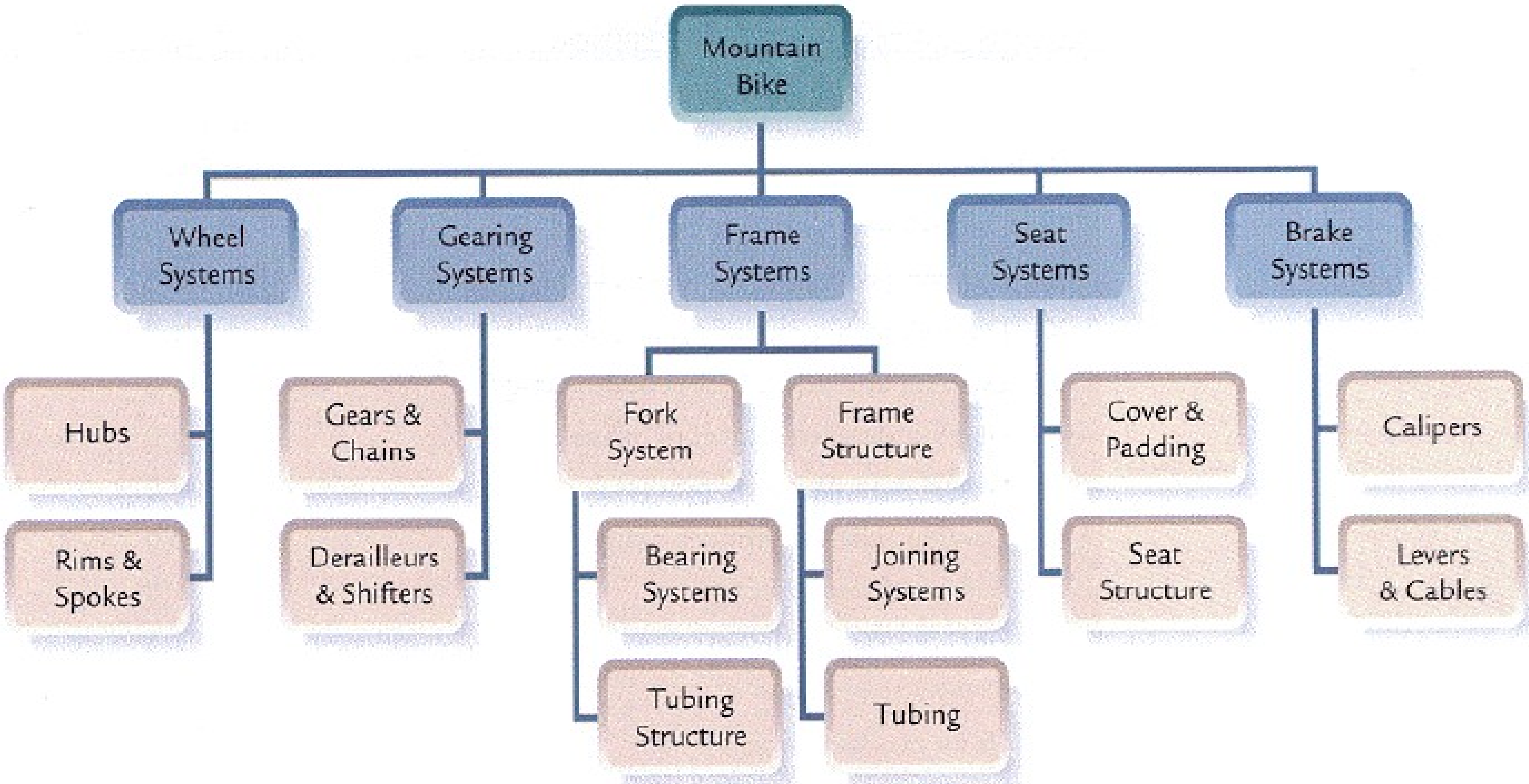
Design of WBS

- A WBS is normally presented in chart form
- The WBS should not be confused with the method of presentation
  - drawing an unstructured activity list in chart form does not make it a WBS.
- Each item in the WBS is generally assigned a unique identifier
  - These identifiers are often known collectively as the *code of accounts*.
  - The items at the lowest level of the WBS are often referred to as *work packages*.

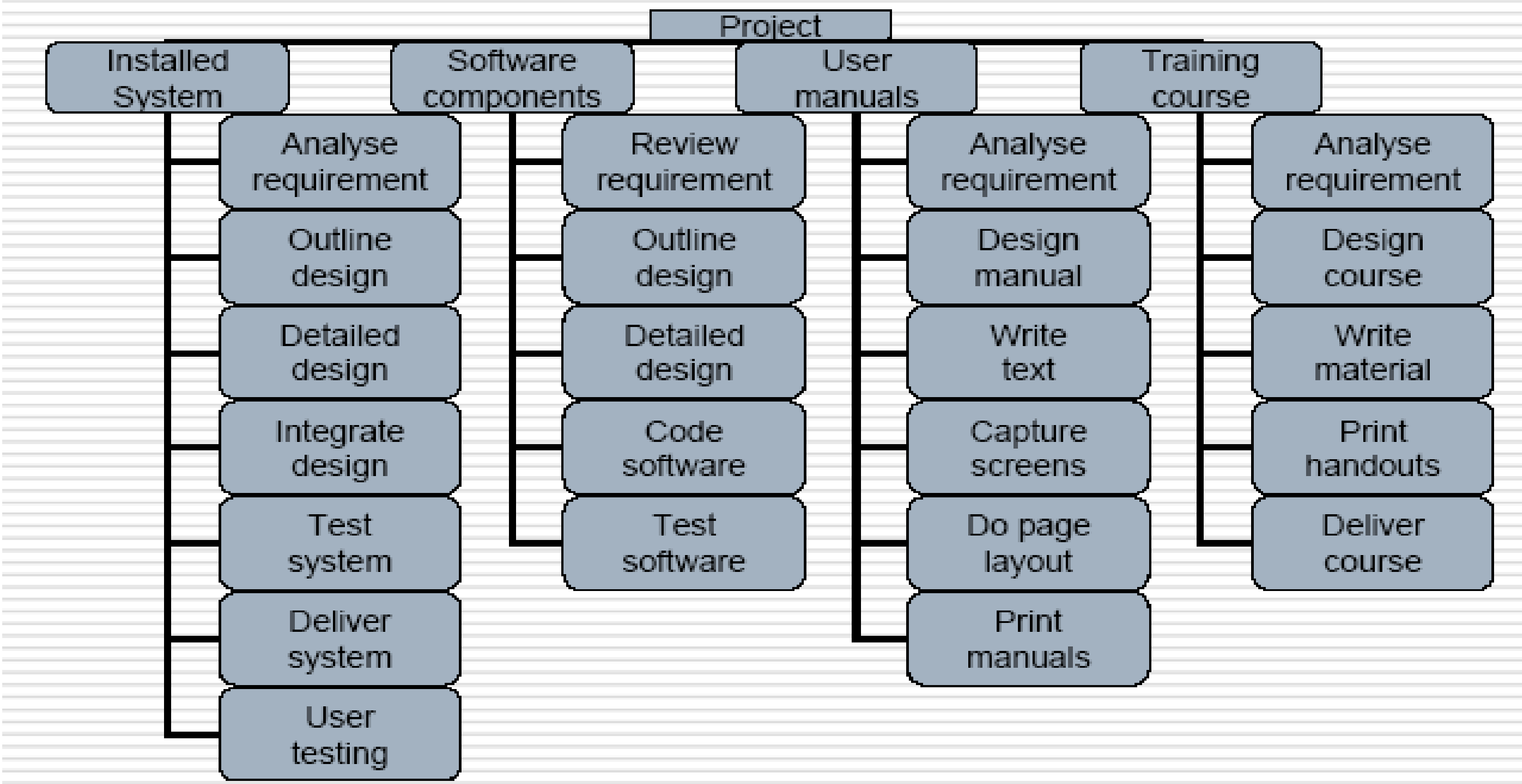
List-form WBS with 3 level code of account (Royce-144)



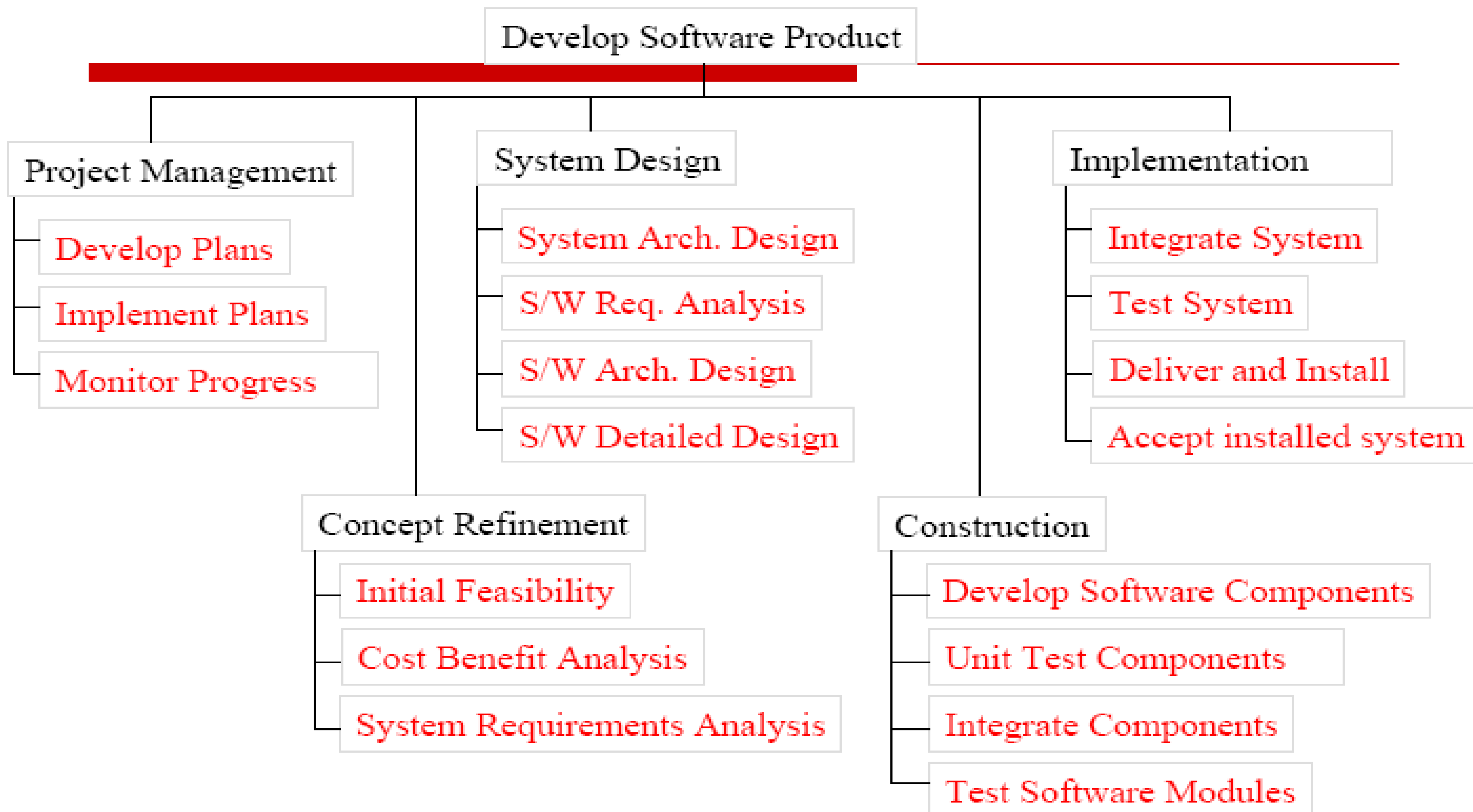
Product Based WBS



Deliverables Based WBS



WBS Template for Software Development Project



WBS Framework

A framework dictating the number of levels and the nature of each level may be imposed on a WBS (e.g. IBM recommended **five levels):**

- **Level 1:** Project.
- **Level 2:** Deliverables (such as software, manuals and training courses)
- **Level 3:** Components; Which are the key work items needed to produce deliverables (e.g. modules and tests required to produce the system software)
- **Level 4:** Activities (**Work-packages** which are major work items, or collections of related tasks, required to produce a component)
- **Level 5:** Tasks (tasks that will normally be the responsibility of a single person).

Activity Planning

Activity/Task List

- Tasks (Leaves of WBS/PBS as Activity Plan) and the precedence analysis (as Activity Sequencing) results in this management deliverable.
- Example format: We can make first two columns and start working on the next two (durations estimation and precedence requirements in parallel).

Activity		Duration (weeks)	Precedents
A	Hardware selection	6	
B	Software design	4	
C	Install hardware	3	A
D	Code & test software	4	B
E	File take-on	3	B
F	Write user manuals	10	
G	User training	3	E,F
H	Install & test system	2	C,D

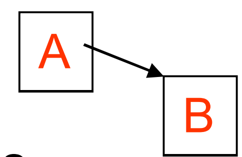
Precedence Analysis

- Involves reviewing activities and determining dependencies
  - Mandatory dependencies: inherent in the nature of the work; hard logic (like testing after coding)
  - Discretionary dependencies: defined by the project team; soft logic (Wait for feedback on prototype before detail design)
  - External dependencies: involve relationships between project and non-project activities (e.g. supply of hardware)
- You *must* determine dependencies in order to use critical path analysis

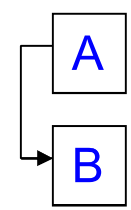
Network Planning Models

- Approaches to **scheduling;** that achieve separation between the **logical** (relationships) and the **physical** (constraints/execution); use **networks** to **model** the project.
- i.e. represent project's activities and their relationships as a network.
- first stage in creating a network model: represent the activities and their interrelationships as a graph.

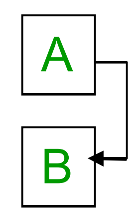
Task Dependencies (relationships)



Finish-to-start (FS): Task (B) cannot start until task (A) finishes

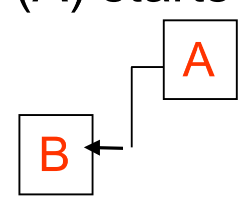


Start-to-start (SS): Task (B) cannot start until task (A) starts

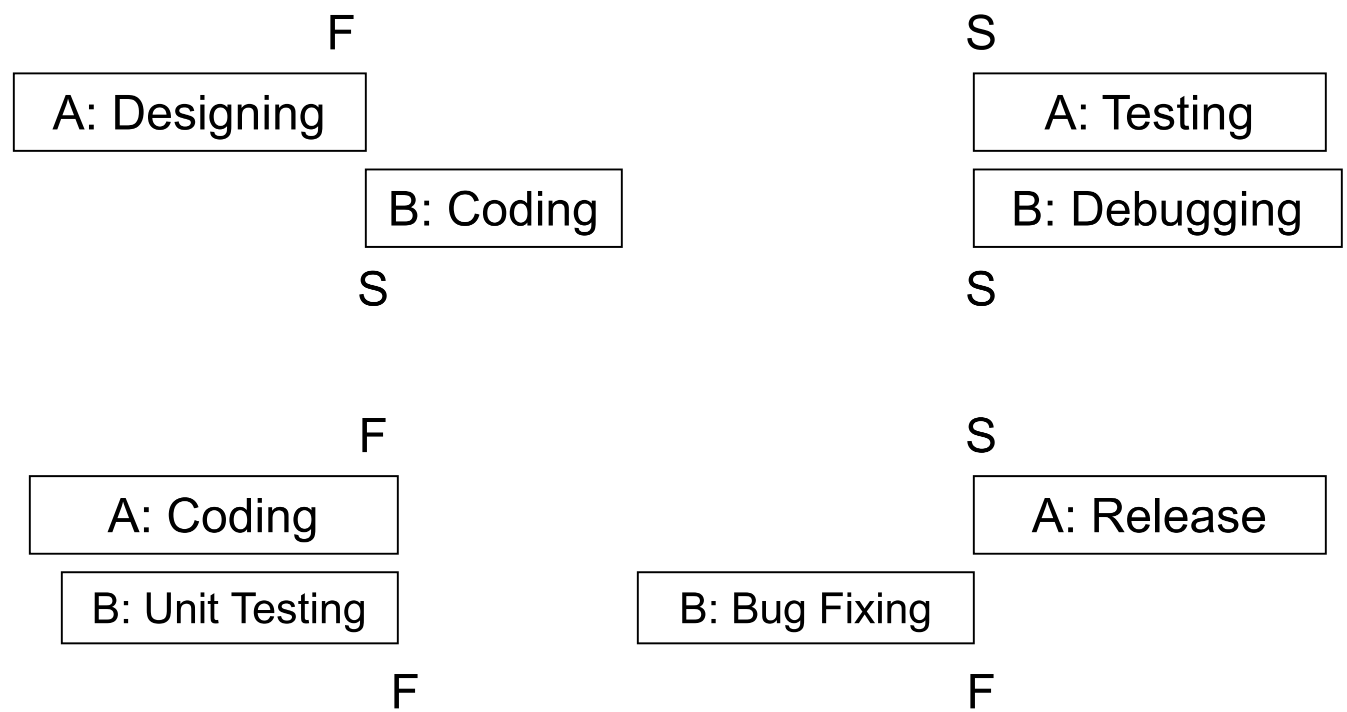


Finish-to-Finish (FF): Task (B) cannot finish until task (A) finishes

Start-to-finish (SF): Task (B) cannot finish until task (A) starts



Scheduling as precedence



Project Network Diagrams

- Project network diagrams (PND) are the preferred technique for showing activity sequencing
- A project network diagram is a schematic display of the logical relationships among, or sequencing of, project activities

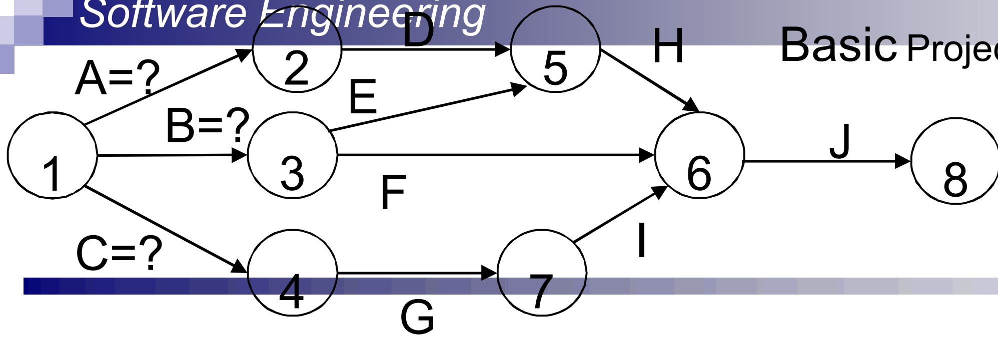
Arrow Diagramming Method (ADM)

- Also called activity-on-arrow (AOA) project network diagrams
- Activities are represented by arrows
- Nodes or circles are the starting and ending points of activities
- Can only show finish-to-start dependencies

Precedence Diagramming Method (PDM)

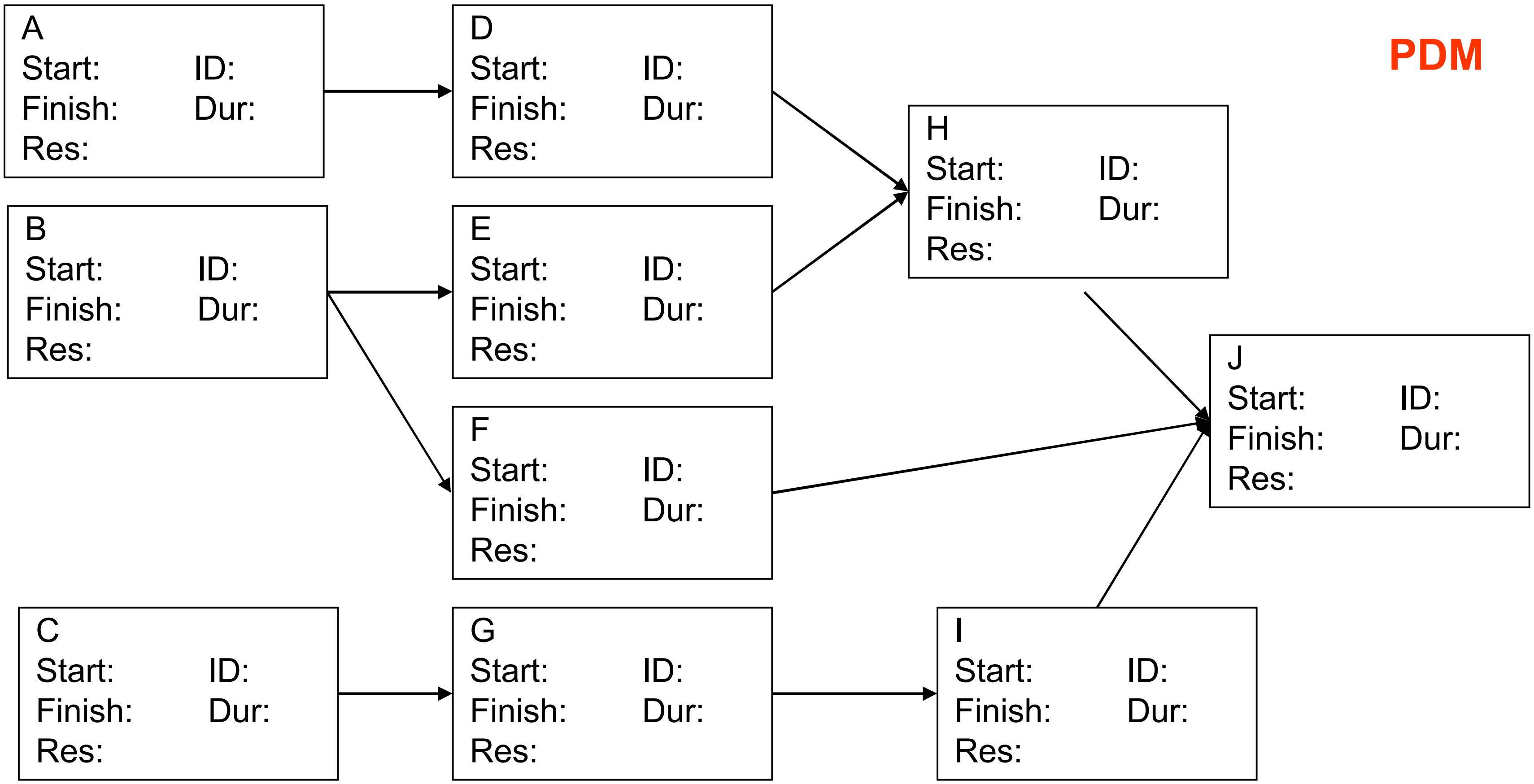
- Activities are represented by boxes
- Arrows show relationships between activities
- More popular than ADM method and used by project management software
- Better at showing different types of dependencies

Basic Project Network Diagrams (PND)…..



AOA (ADM);
CPM adds more inf at nodes

PDM



Task Box of MS Project 2000: Activity Name Start: ID: Finish: Dur: Resource:

Network model

CPM

- represents activities as links (arrowed lines) in the graph
- nodes (circles) represent the events of activities start and finish.

Rules for CPM network construction

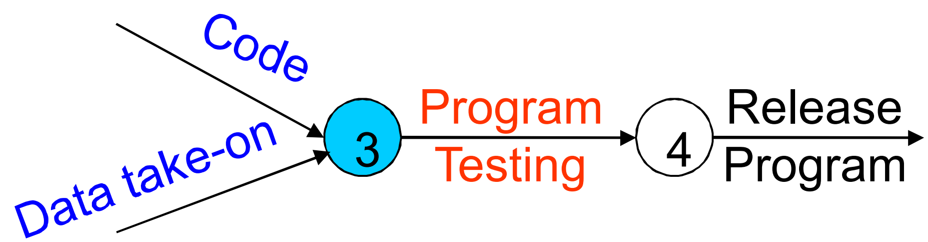
Nodes:

- A project network may have only one start node (node 1) that designates the points at which the project may start. All activities coming from that node may start immediately; resources are available.
- Network may have only one end node; designates the completion of the project and a project may only finish once.
- Nodes are events have no duration (instantaneous points in time).
- **source node:** event of the project becoming ready to start and
- **Sink node:** is the event of the project becoming completed.
- **Intermediate nodes**: represent two simultaneous events – the event of all activities (**leading in** to a node) having been **completed** and the event of all activities (**leading out** of that node) being in a position to be **started.**

A link represents an activity (and has duration)

Examples:

Node 3 is an event indicates that both "Code' and "Data take-on" have been completed and "program Testing" can be started



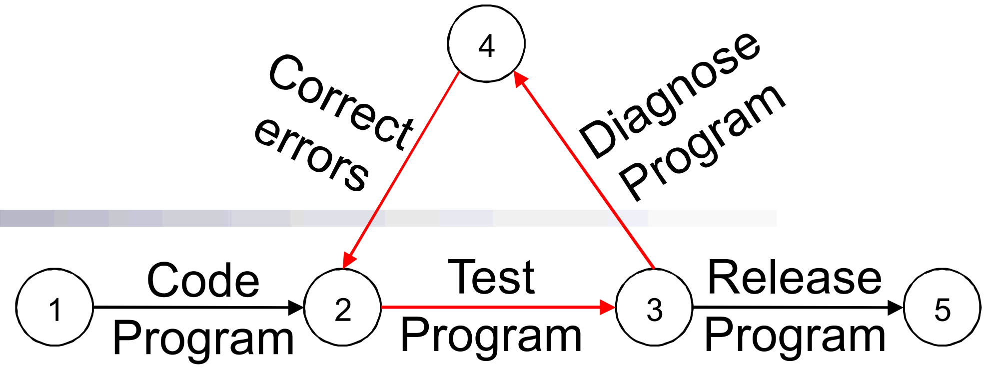
Precedents are the immediate preceding activities

both activities "Code' and "Data take-on" are called **Precedents** of "program Testing" (**not of** "Release Program") and;
"program Testing" is **Precedent of** "Release Program".

- **Time moves from left to right**
- **Nodes are numbered sequentially**

❖ Network may not contain loops

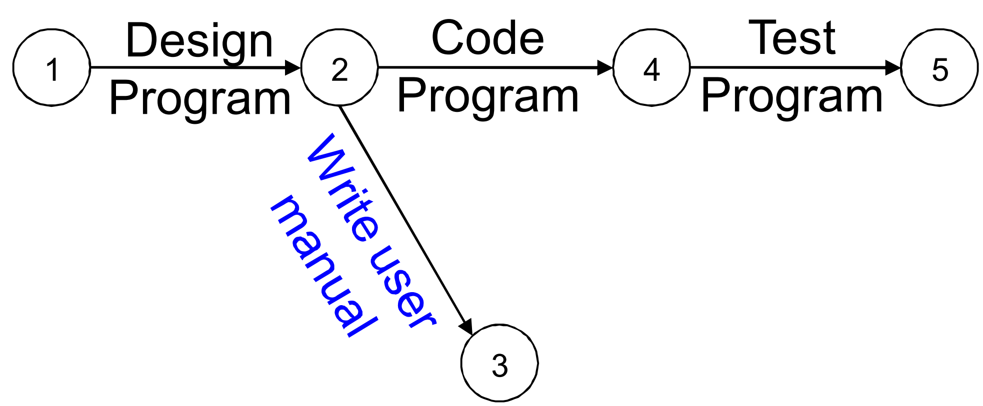
1) If we know the # of times to repeat a set of activities (e.g. test-diagnose-correct) then we can draw that set a straight sequence, repeating it the appropriate number of times.
2) If we do not know then we cannot calculate the duration of the project.



A loop represents impossible sequence

Network may not contain dangles

A dangling activity such as "Write user manual" cannot exist, as it would suggest two completion points.



Using dummy activities

Two paths within a network have a common event although they are, in other respects independent, a logical error like the following might occur.

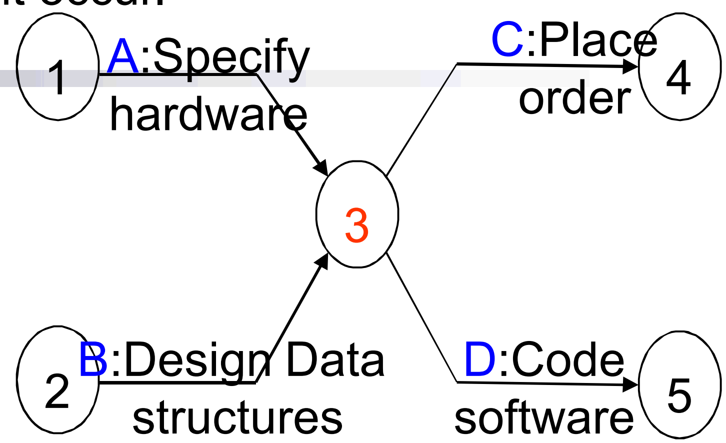
Practical Situation (Case1):

A > C (A precedent of C)

A, B > D (A & B precedent of D)

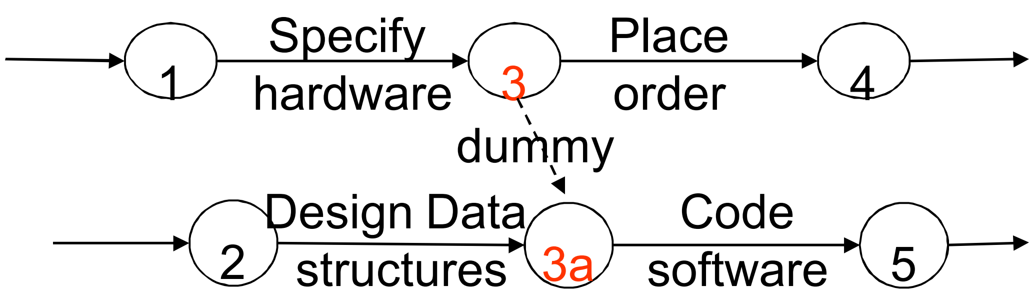
Network shows (incorrectly):

A, B > C, D (Both precedent of Both)



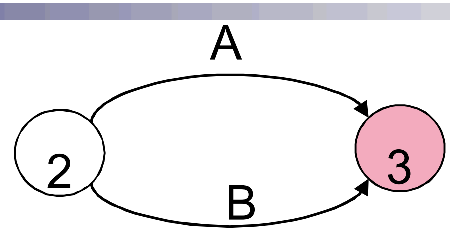
Two paths with a common node.

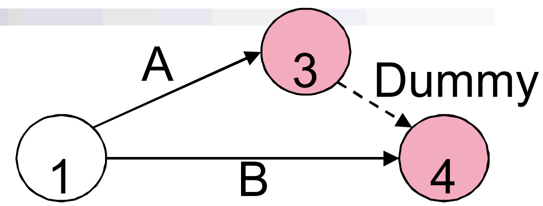
We can resolve this problem by separating the two (more or less) independent paths and introduce a **dummy activity to link broken event** (3). This effectively breaks unwanted link between "design data structure" and "place order".



Two paths linked by a dummy activity

- **Dummy activities**, shown as dotted lines in the network diagram, have a zero duration and use no resources.
- **Case 2:** The **use of a dummy** activity where two activities share the same start and end nodes makes it easier to **distinguish** the activity end-points*

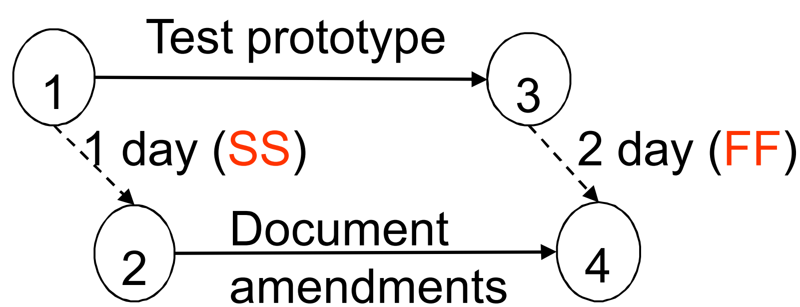




Representing lagged activities

- We might come across situations where we wished to undertake two activities in parallel but there is a lag between the two (time difference between start or finish).
- Impossible to show (like "amendment recording" can start after "testing" and finish a little after the completion of "testing").
- It is better to show Each stage as a separate node.

Such parallel activities with a time lag between them are represented with pairs of dummy activities

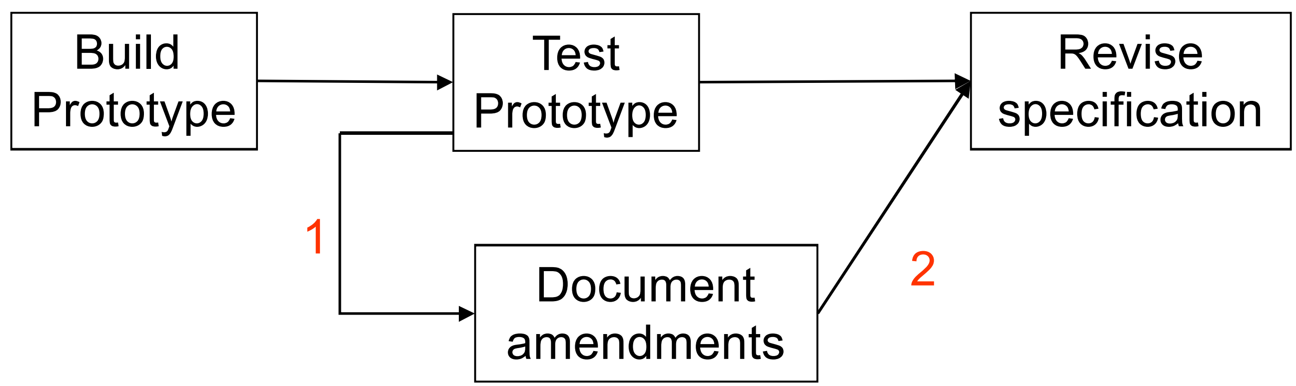


Precedence Networks (PN/PDM)

- Where CPM networks use links to represent activities and nodes to represent events, **precedence networks** use **boxes** (nodes) to represent **activities** (known as work items) and **links** to represent **dependencies**.
- The **boxes** may carry task descriptions and duration estimates and the **links** may contain a duration denoting a lag between the completion/start of the next.
- It contains much more information than the CPM network and we do not need to keep a separate activity table.
- Analysis of precedence networks proceeds in exactly the same ways.

An other advantage of PN is that they can represent parallel lagged activities (Which required use of dummy activities in CPM network) much more elegantly.

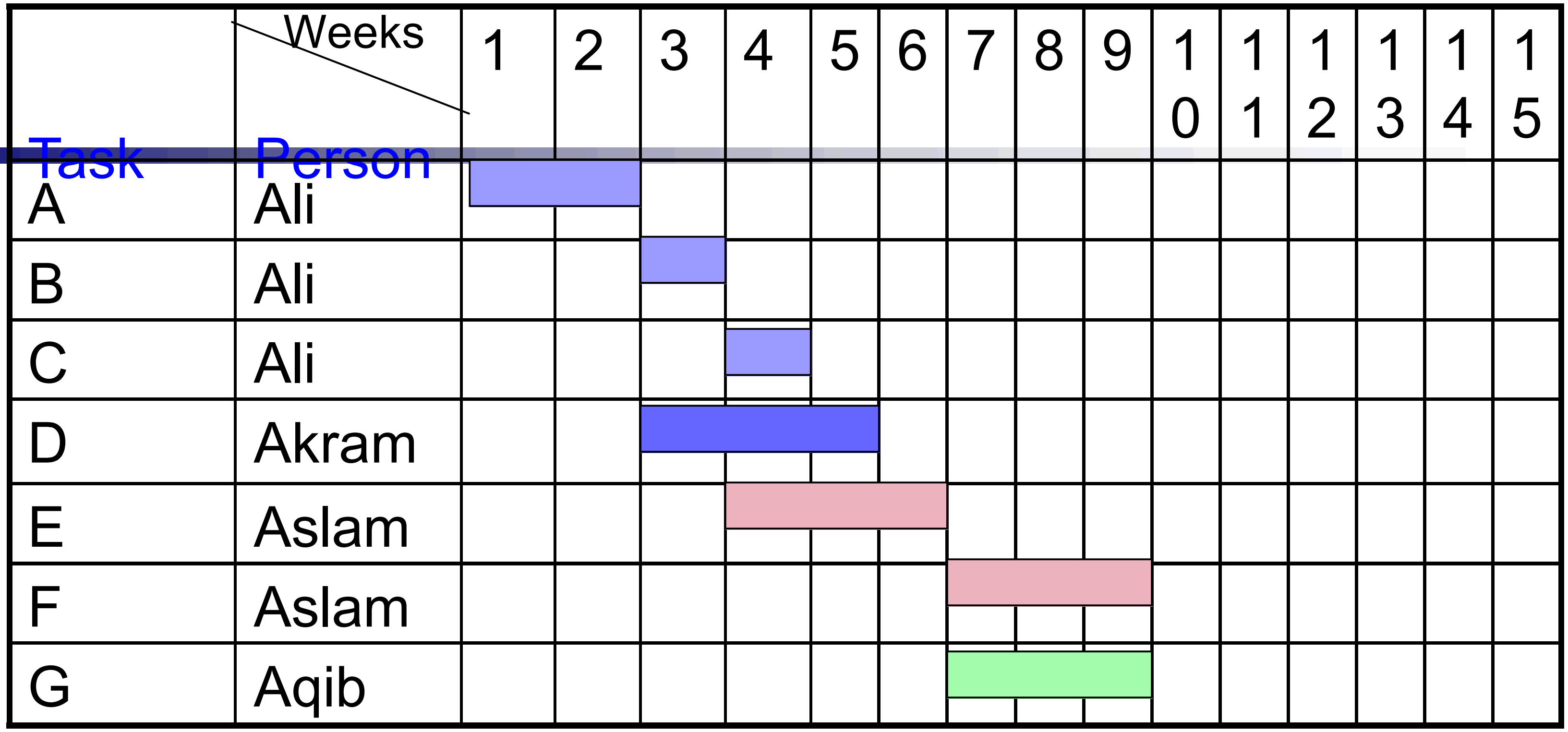
Parallel lagged activities in a precedence network.



Sequencing and Scheduling activities

- We require a schedule that clearly indicates when each of the project's activities is planned to occur and what resources it will need.
- We might present a schedule for a small project using a bar chart (next slide).
- The chart shows taking account of the nature of the development process (i.e., certain tasks must be completed before others may start) and the resources that are available (e.g., activity C follows B as Ali cannot work on both simultaneously).
- We have sequenced the tasks (i.e., identified the dependencies) and scheduled them (i.e., specified when they should take place).
- For small projects, this combined sequencing-scheduling approach might be quite suitable, particularly where we wish to allocate individuals to particular tasks at an early planning stage.
- On larger projects it is better to separate out these two activities: to sequence the task according to their logical relationships and then to schedule them taking into account resources and other factors.

Schedule for small Project: plan as a bar chart



A: Overall Design
B: Specify Module 1
C: Specify Module 2
D: GUI Design
E: Code Module 1
F: Code Module 2
G: Testing Module 1

***Part-I concludes by Having:**

1. **Activity List and**
2. **Sequencing and**

We continue for: In Part-II

1. **Activity Resource Est**
2. **Activity Duration and**
3. **Scheduling**

++

Activity Schedule

- Activity Resource estimating (2004) ◄
- Activity duration estimating
- Schedule development
  - CPM (ideal plan)
  - Risk Analysis
  - Resource Allocation
- Schedule control

Six Methods for Estimating Activity Duration

Estimating activity duration is challenging. You can be on familiar ground for some activities and totally unfamiliar ground for others.

1) Similarity to other activities
2) Historical data
3) Expert advice
4) Delphi technique
5) Three-point technique
6) Wide-band Delphi technique

1. Similarity to Other Activities (Analogy)

Activities in your WBS may be similar to ones already undertaken. Recollections of those activities and their duration can be used to estimate the present activity's duration.

2. Historical Data

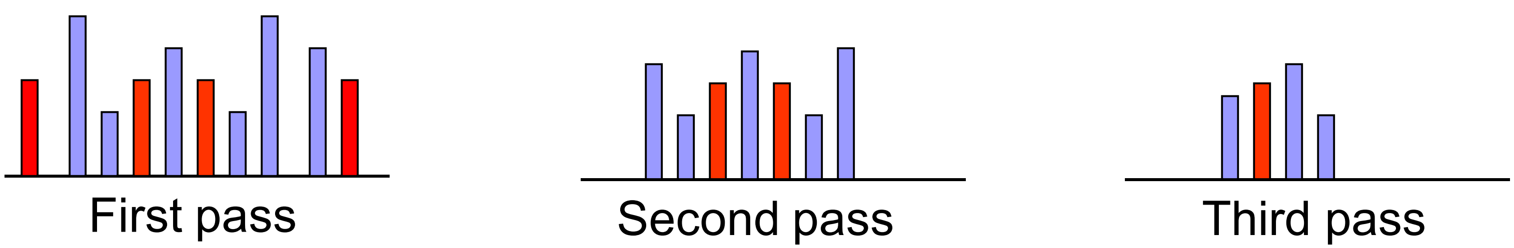
- The recorded data becomes your knowledge base for estimating activity duration.
- Orgs have recorded not only estimated and actual duration but also the characteristics of the activity, the skill set of the people working on it, and other variables that they found useful.

3. Expert Advice

When the project involves a breakthrough technology or being used for the first time in the organization, there may not be any local experience or even professional skilled. In these cases, you will have to appeal to outside authorities.

4. Delphi technique

- Can produce good estimates in the absence of expert advice.
- This is a group technique that extracts and summarizes the knowledge of the group to arrive at an estimate.
- Group members are asked (individually) to make their best guess of the activity duration. The results are tabulated and presented to the group in a histogram labeled 1st Pass.
- Whose estimates fall in the outer quartiles are asked to share the reason for their guess. After listening to the arguments, each group member is asked to guess again. Results are presented as 2nd Pass.
- Similarly a 3rd guess is made, and plotted.



5. Three-point Technique (PERT Est)*

- The variation may be tightly grouped around a central value, or it might be widely dispersed.
- In the first case, you would have a considerable amount of information on that activities duration as compared to the latter case, where you would have very litter or none.
- You could make probabilistic statement about their likelihood in any case.
- You need three estimates of activity duration: optimistic, pessimistic, and most likely.
- Optimistic time as the shortest duration (one has had or might expect to experience if every thing happens as expected);
- Pessimistic time is that duration that would be experienced (or has been experienced) if everything that could go wrong did go wrong and yet the activity was completed.
- Finally, the most likely time is that time usually experienced.

O: Optimistic
P: Pessimistic
M: Most Likely

$$Est = \frac{O+4M+P}{6}$$

6. Wide-Band Delphi Technique

- Combining the Delphi and three-point methods results in the wideband Delphi technique.
- It involves a panel, as in the Delphi technique. Members are asked, at each iteration, to give their optimistic, pessimistic, and most likely estimates for the duration of the chosen activity.

Schedule development :Adding the time dimension

Moving from Logical to Physical network model:

- we are now ready to start thinking about when each activity should be undertaken (Physically).

CPM

project network analysis technique used to predict total project Duration and concerned with two primary objectives:

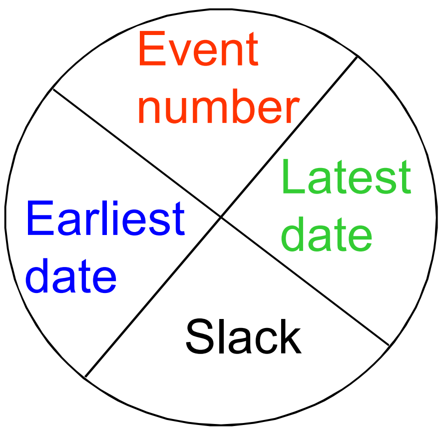
- Planning the project in such a way that it is completed as quickly as possible; and
- Identifying those activities where a delay in their execution is likely to affect the overall end date of the project or 'later activities' start dates.

Network Analysis: The network is then analyzed by carrying out:

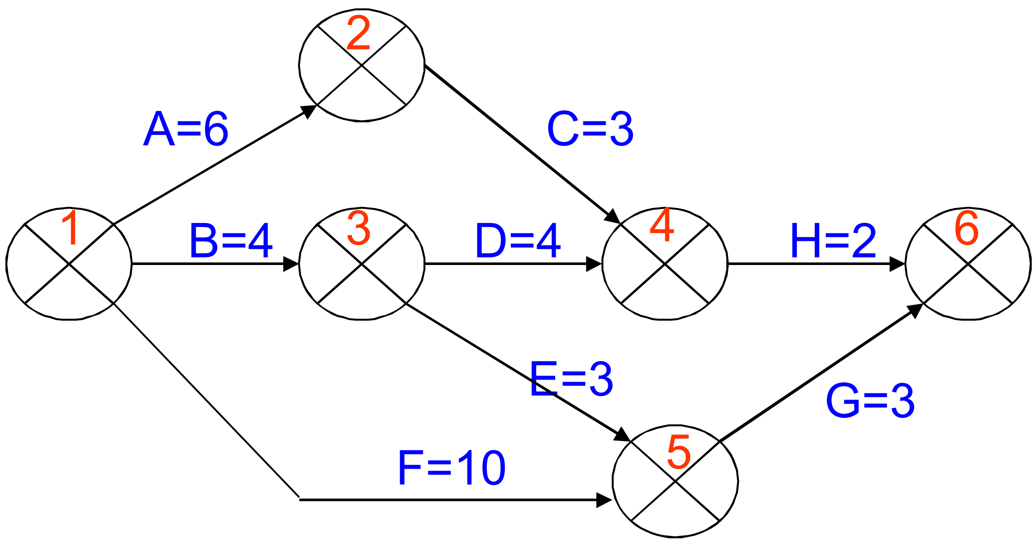
- **forward pass**, to calculate the earliest dates at which activities may commence and the project be completed, and a
- **backward pass**, to calculate the latest start dates for activities and the critical path.

Constructing CPM Network

- Typically information about **events** is recorded on the network (and **activity-based** information is generally held on a separate activity table).
- common convention is to divide the node circle into quadrants to show the event number, the latest and earliest dates, and the event slack.



CPM node

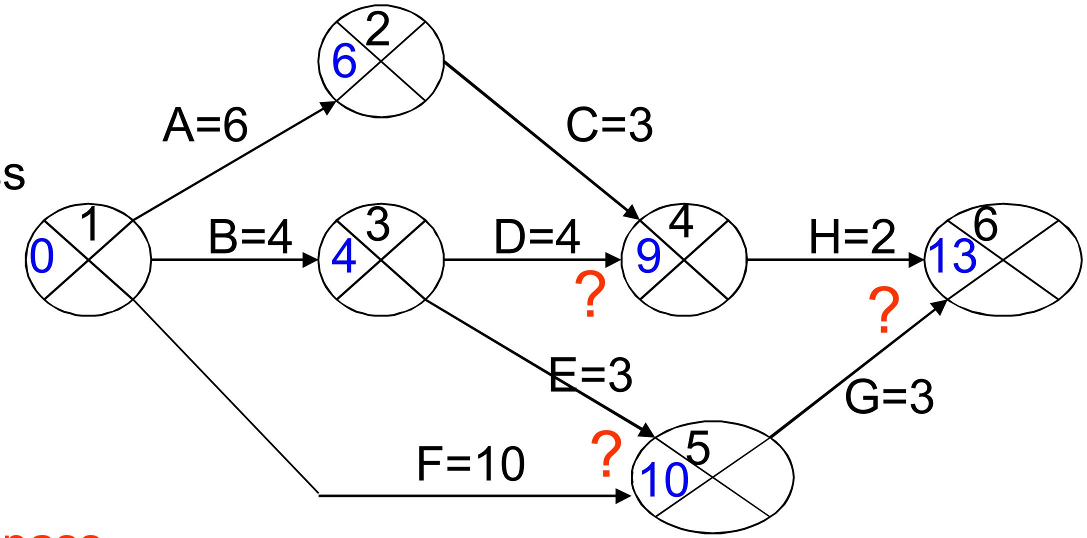


The forward pass

- carried out to calculate the earliest date on which **each event** may be achieved and the earliest dates on which **each activity** may be started and completed.
- **Earliest** dates for **events** are recorded on the network diagram and for **activities** on the activity table.

Forward Pass

CPM network after forward pass



Activity table after the forward pass

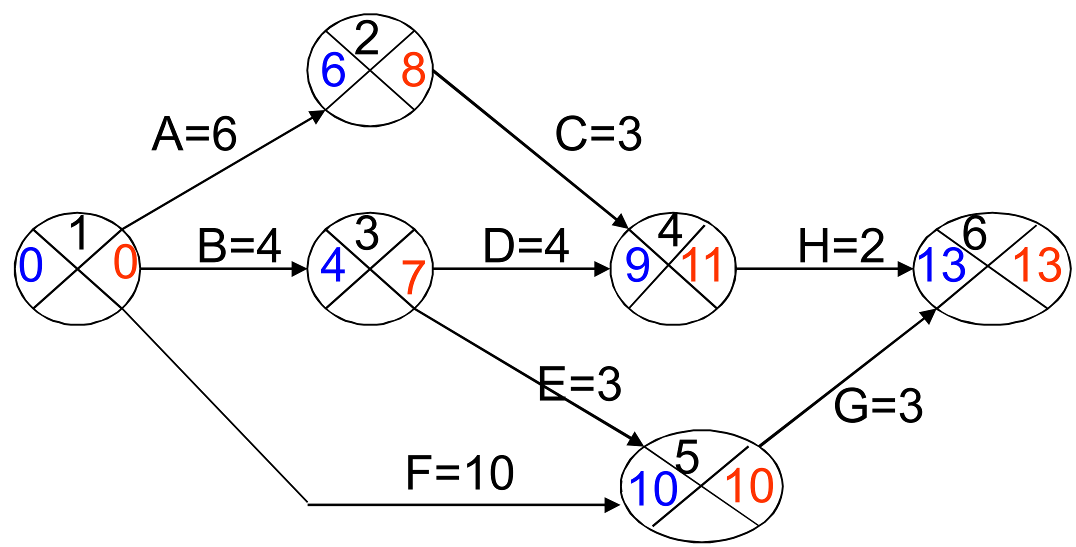
Activity	Duration (weeks)	Earliest start date	Latest start date	Earliest finish date	Latest finish date	
A	6	0		6		
B	4	0		4		
C	3	6		9		
D	4	4		8		
E	3	4		7		
F	10	0		10		
G	3	10		13		
H	2	9		11		

Backward Pass

- to calculate the **latest date** at which each event may be achieved, and each activity started and finished, **without delaying** the end date of the **project.**
- we assume that the latest finish date for the project is the same as the earliest finish date.

Rule:

- The latest date for an event is the latest start date for all activities commencing from that event.
- In case more activities, we take the earliest of the latest start dates for those activities. (e.g. latest start dates for A=2, B=3, F=0; and earliest among all =0 for event#1)



CPM network after backward pass

Up date the activity table

For Latest start and finish dates

Activity	Duration (weeks)	Earliest start date	Latest start date	Earliest finish date	Latest finish date	Slack
A	6	0	2	6	8	2
B	4	0	3	4	7	3
C	3	6	8	9	11	2
D	4	4	7	8	11	3
E	3	4	7	7	10	3
F	10	0	0	10	10	0
G	3	10	10	13	13	0
H	2	9	11	11	13	2

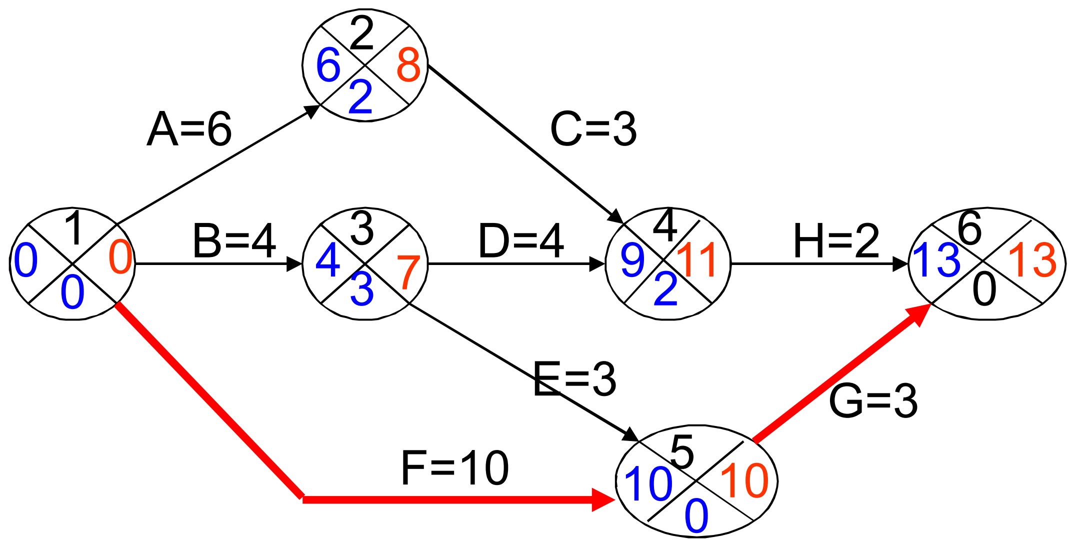
Critical Path

- **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**

- Any delay on the critical path will delay the project.
- **Slack:** The difference between the earliest date and the latest date for an event – measure of how late an event may be **without affecting** the **end date** of the project.
- Any event with a **slack of zero** is **critical:** any delay in achieving that event will delay the completion date of the project as a whole.
- There will always be at least one path through the network joining those **critical events** – this path is known as the **critical path.**

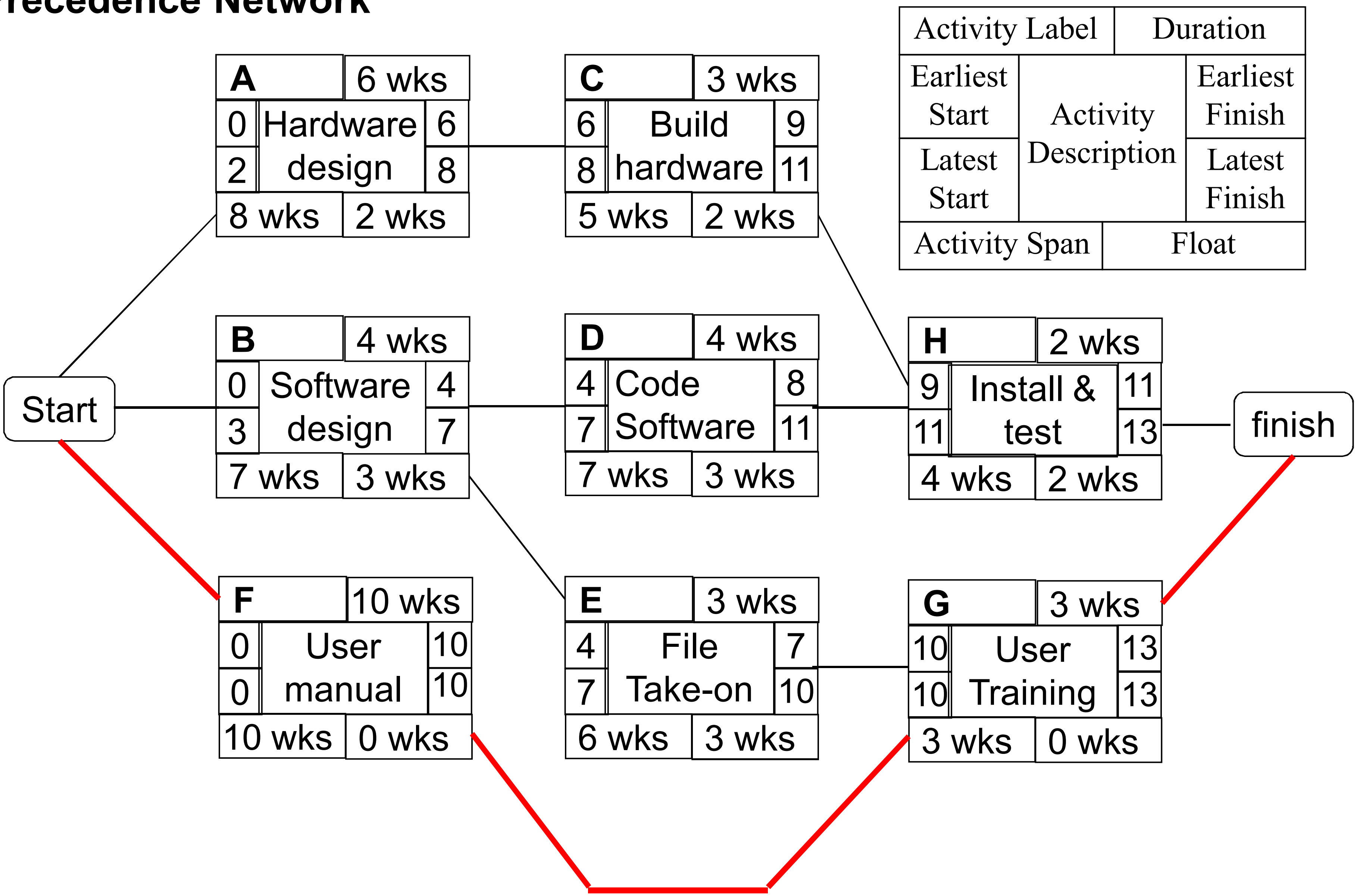
significance of critical path is two-fold.

1. **In planning:** it is the critical path that we must shorten if we are to reduce the overall duration
2. **In managing:** must pay attention to monitoring activities on the critical path so that the effects of any delay or resource unavailability are detected at the earliest opportunity.



The Critical path

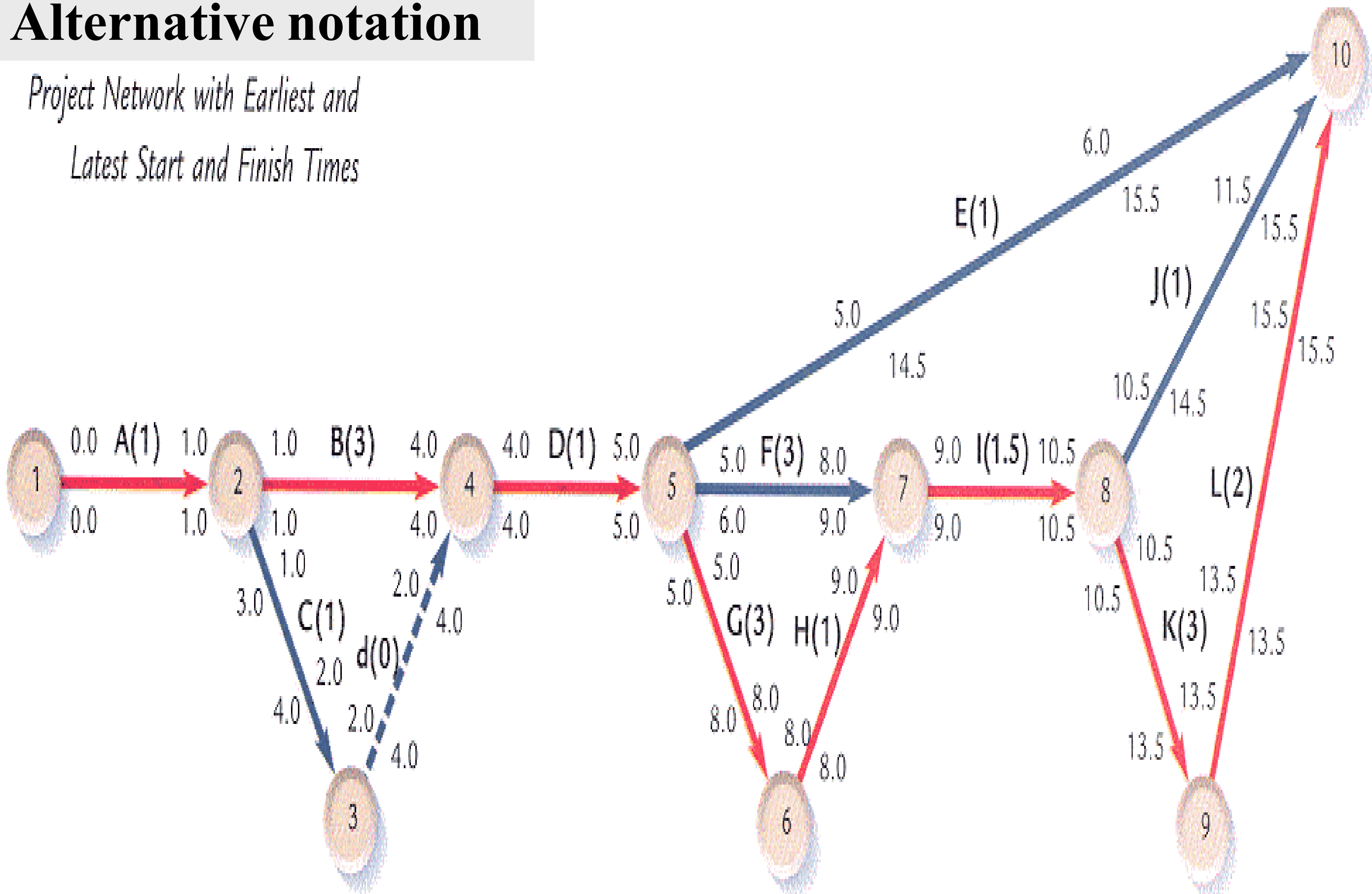
Precedence Network



The critical path through activities F and G is shown as a heavy line.

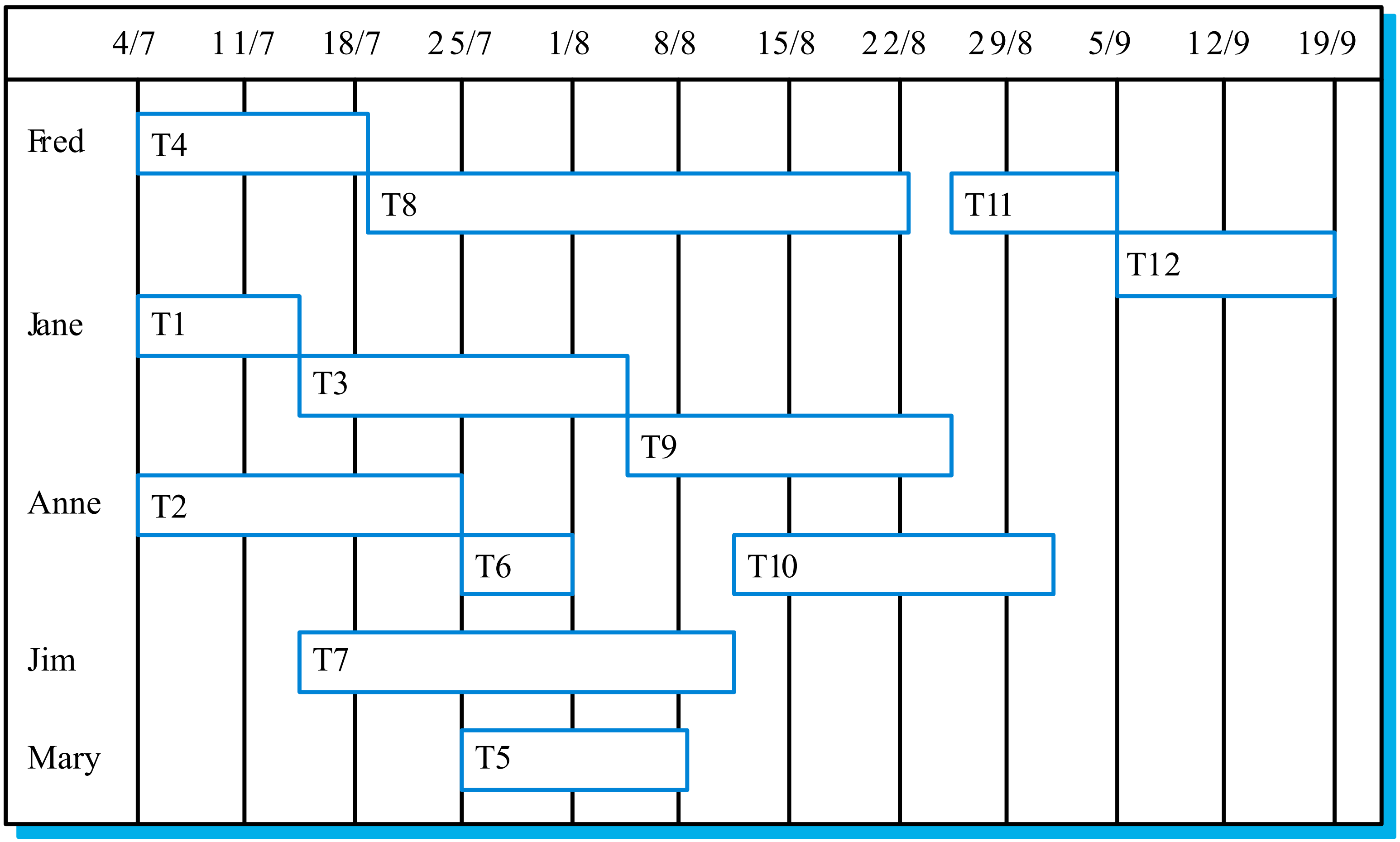
Alternative notation

Project Network with Earliest and Latest Start and Finish Times



Gantt Chart

Activity Schedule and Staff allocation



Case Study: Portion of Detailed Schedule (ACIC)

Module	Program	Task	Duration (days)	Effort (days)	Start Date	End Date
-	-	Requirement	8.89	1.33	7/10/00 8:00	7/21/00 17:00
-	-	Design review	1	0.9	7/11/00 8:00	7/12/00 9:00
-	-	Rework after design review	1	0.8	7/12/00 8:00	7/13/00 9:00
History	UC17	View history of party details, UC17	2.67	1.87	7/10/00 8:00	7/12/00 17:00
History	UC7	Code walkthrough UC17	0.89	0.27	7/14/00 8:00	7/14/00 17:00
History	UC19	Code walkthrough UC19	0.89	0.27	7/14/00 8:00	7/14/00 17:00

* Why the duration is mostly > Effort

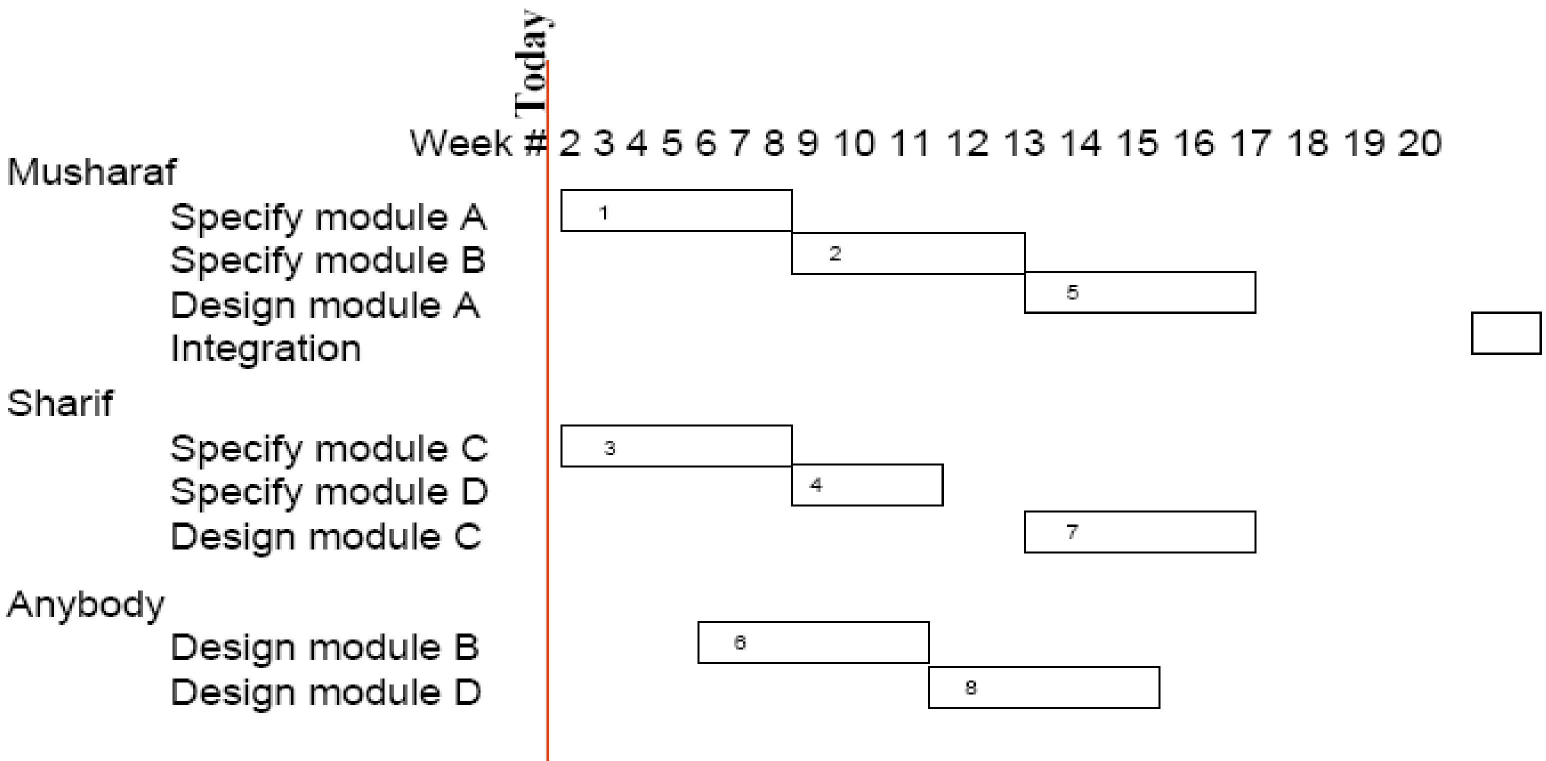
Module	Program	Task	Duration (days)	Effort (days)	Start Date	End Date
-	-	Rework after code walkthrough	0.89	2.49	7/17/00 8:00	7/17/00 17:00
-		Rework after testing	0.89	0.71	7/18/00 8:00	7/18/00 17:00
History	UC17	Test, UC 17	0.89	0.62	7/18/00 8:00	7/18/00 17:00
History	UC19	Test, UC 19	0.89	0.62	7/18/00 8:00	7/18/00 17:00
Configuration	-	Reconciliation	0.89	2.49	7/19/00 8:00	7/19/00 17:00
Management	-	Scheduling and tracking	7.11	2.13	7/10/00 8:00	7/19/00 17:00
Quality	-	Milestone analysis	0.89	0.62	7/19/00 8:00	7/19/00 17:00

Project Monitoring and Control

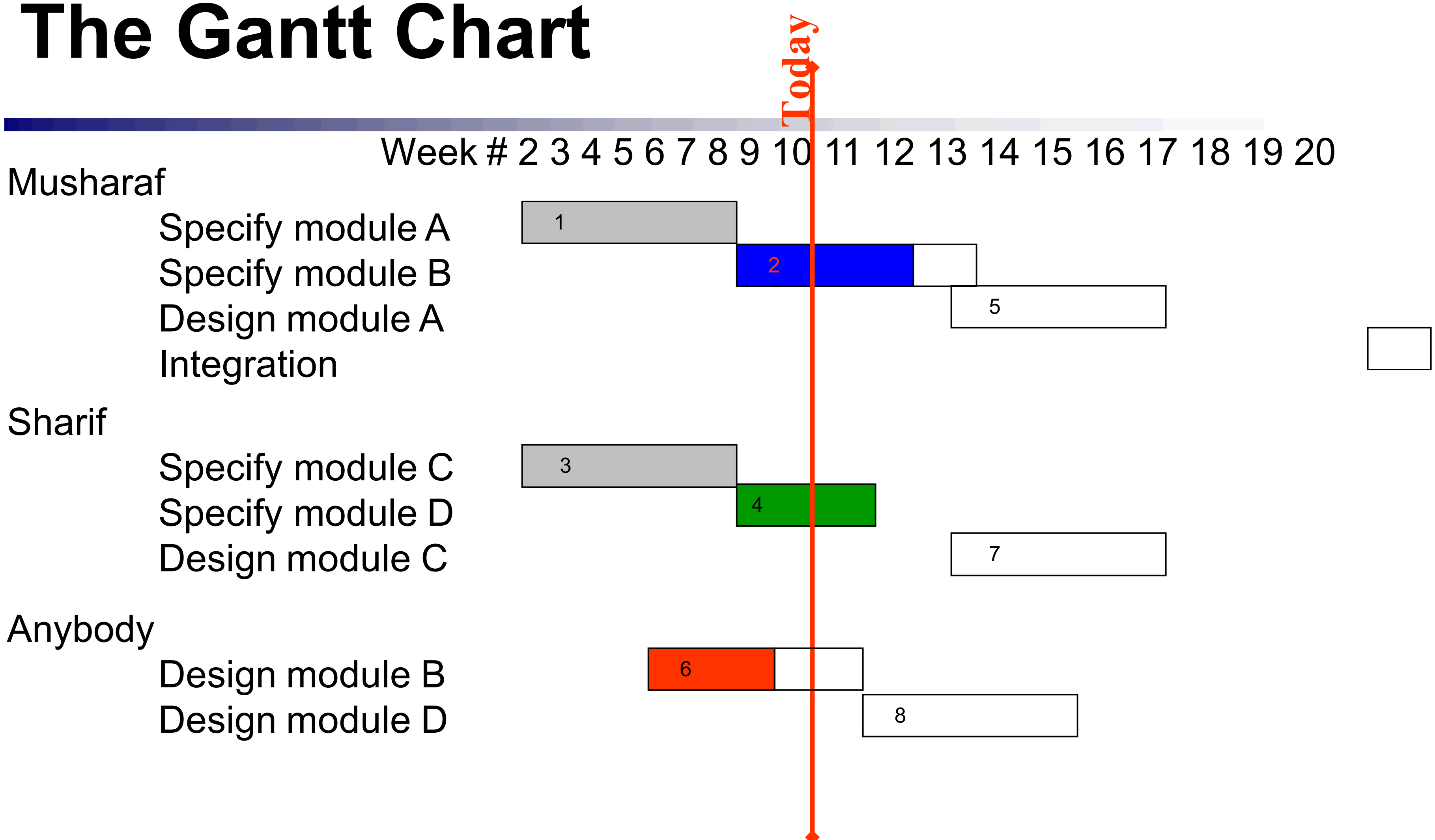
Project Progress Monitoring

(1) The Gantt Chart

Updated chart regularly with a 'today cursor' provides an immediate visual indication of which activities are ahead or behind schedule.

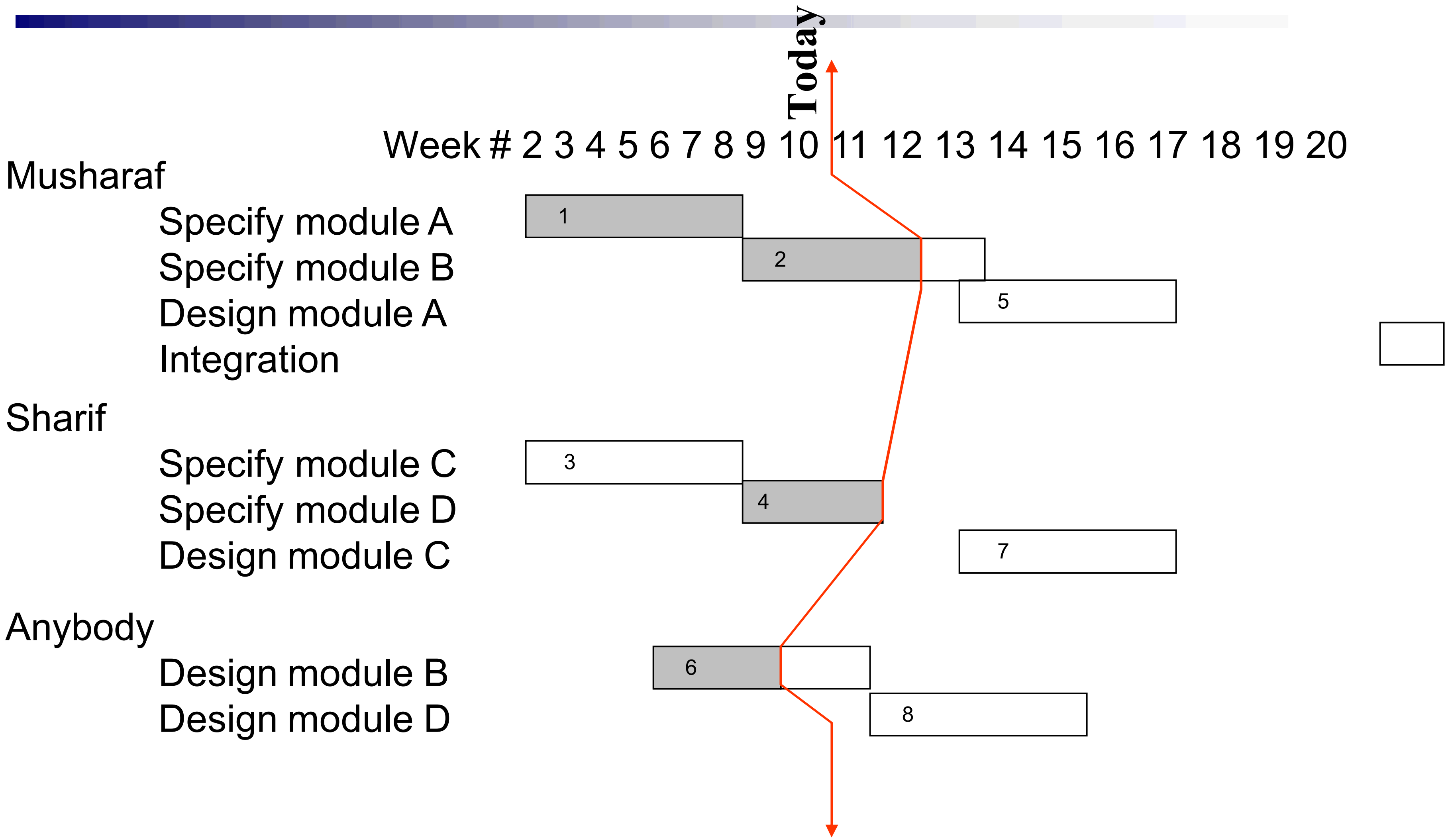


The Gantt Chart



Activity 2 Ahead, 4 completed ahead, 6 behind

(2) Project Slip Chart



Categories of reporting

Report type	Examples	Comments
Oral formal regular	Weekly or monthly progress meetings	While reports may be oral formal written minutes should be kept
Oral formal ad-hoc	End-of-stage review meetings	While largely oral, likely to receive and generate written reports
Written formal regular	Job sheets, progress reports	Normally weekly using forms
Written formal ad-hoc	Exception reports, change reports	
Oral informal	Canteen discussion, social interaction	Often provides early warning; must be baked up by formal reporting

Monthly Project Status Reports

General Information:	
Agency name: Fast House, Pakistan	Date: May 04, 2001
Contact Name: Professor	Phone: 111-128-128
Project ID: 786	For the period beginning: April 01, 2009 and ending: April 30, 2009
Name of the project: Political System of Pakistan	
Project Start Date: August 14, 1947	Current Phase: Struggling

Key Milestones for the Overall Project **revised on** <date>:

Milestone	Original Date	Revised Date	Actual Date

Milestones **Planned for this month** and **Accomplished** this month

Planned for Next Month

Not completed