Lecture 5
Time Planning

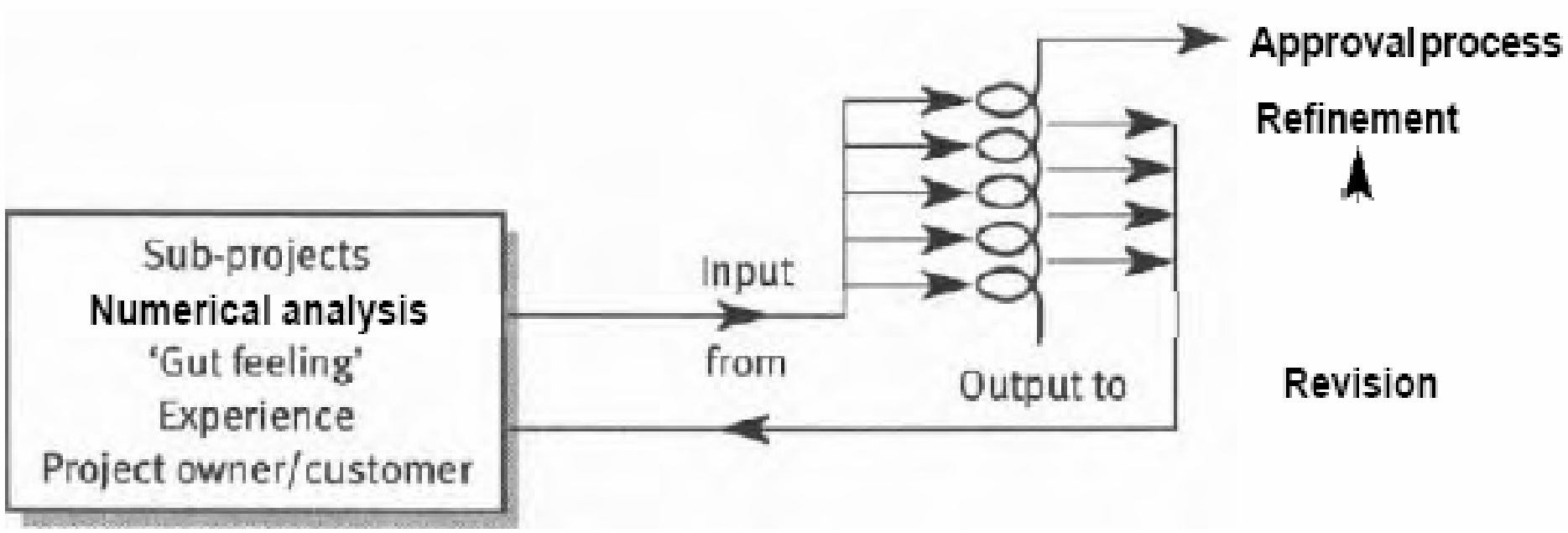
Learning Objectives

- Demonstrate basic tools for the modelling of time, cost and quality requirements of projects;
- Carry out basic calculations on a project plan;
- Make these plans amenable to optimisation (improvement and risk avoidance);
- Undertake a first attempt at resource allocation;
- Identify the benefits and pitfalls of fast-track projects.

Process

- identify the constituent activities
- determine their logical sequence
- prepare estimates of time and resource
- resent the plan in a readily intelligible format

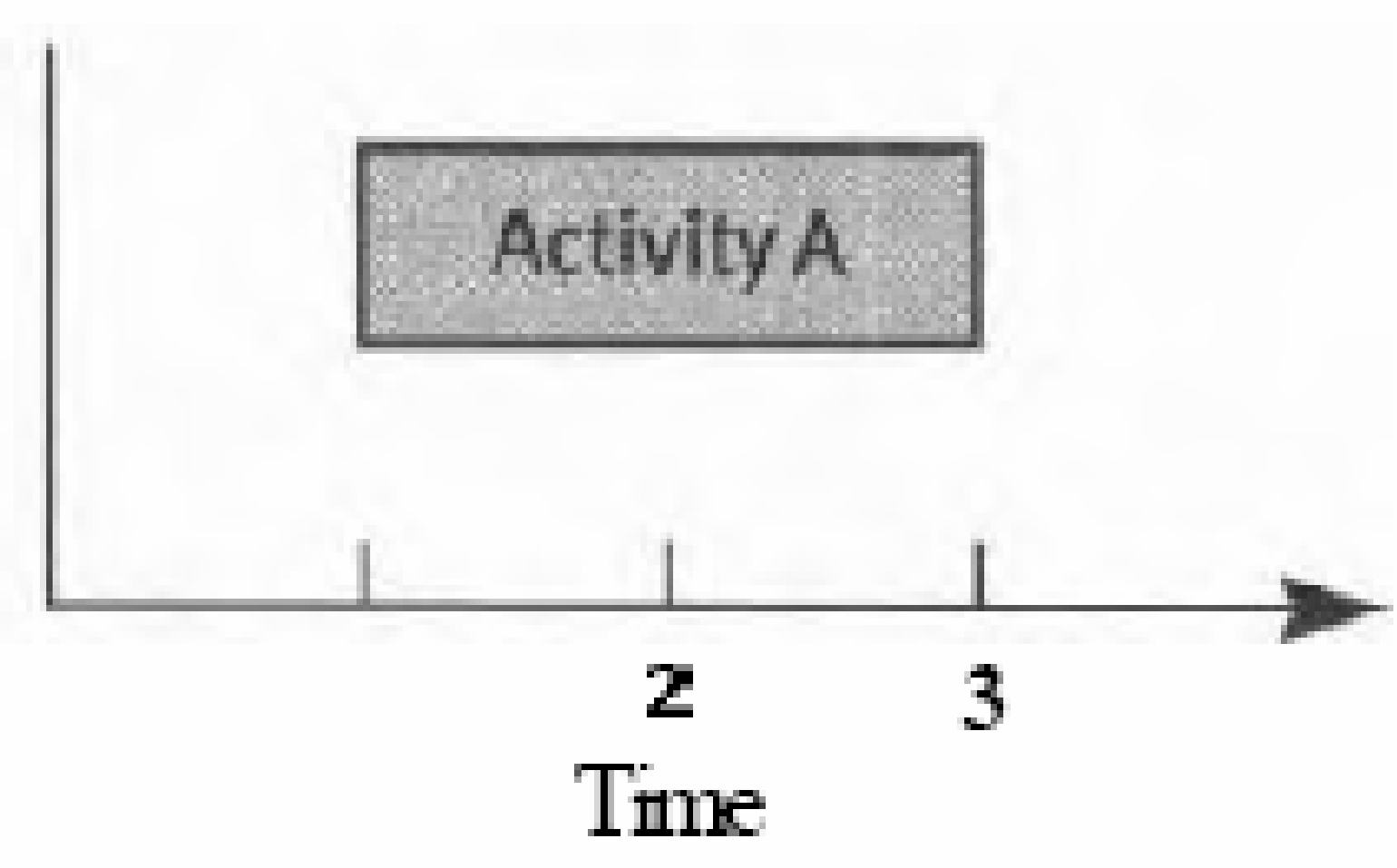
Process


Approval process
Refinement
Sub-projects
Numerical analysis
'Gut feeling'
Experience
Project owner/customer
Input
from
Output to
Revision

Process

- The use of various graphical techniques
  - allow the construction of a comprehensive but comprehensible picture of the project activities;
  - communicate this with others.

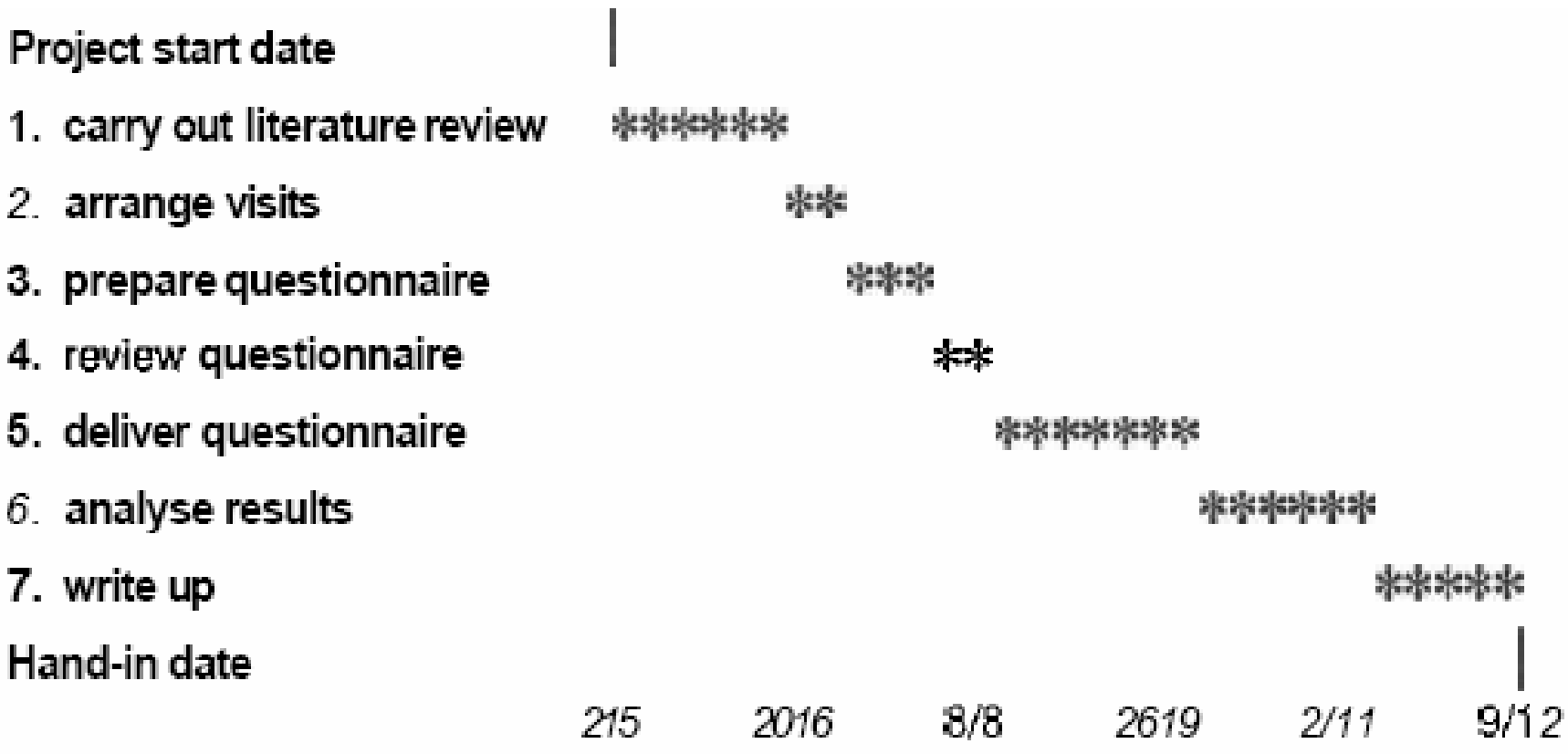
Gantt Charts



Gantt Charts

- Planning Steps
  - identify the constituent activities;
  - determine their sequence;
  - estimate the time and resources required;
  - present the plan.

Gantt Charts



Gantt Charts

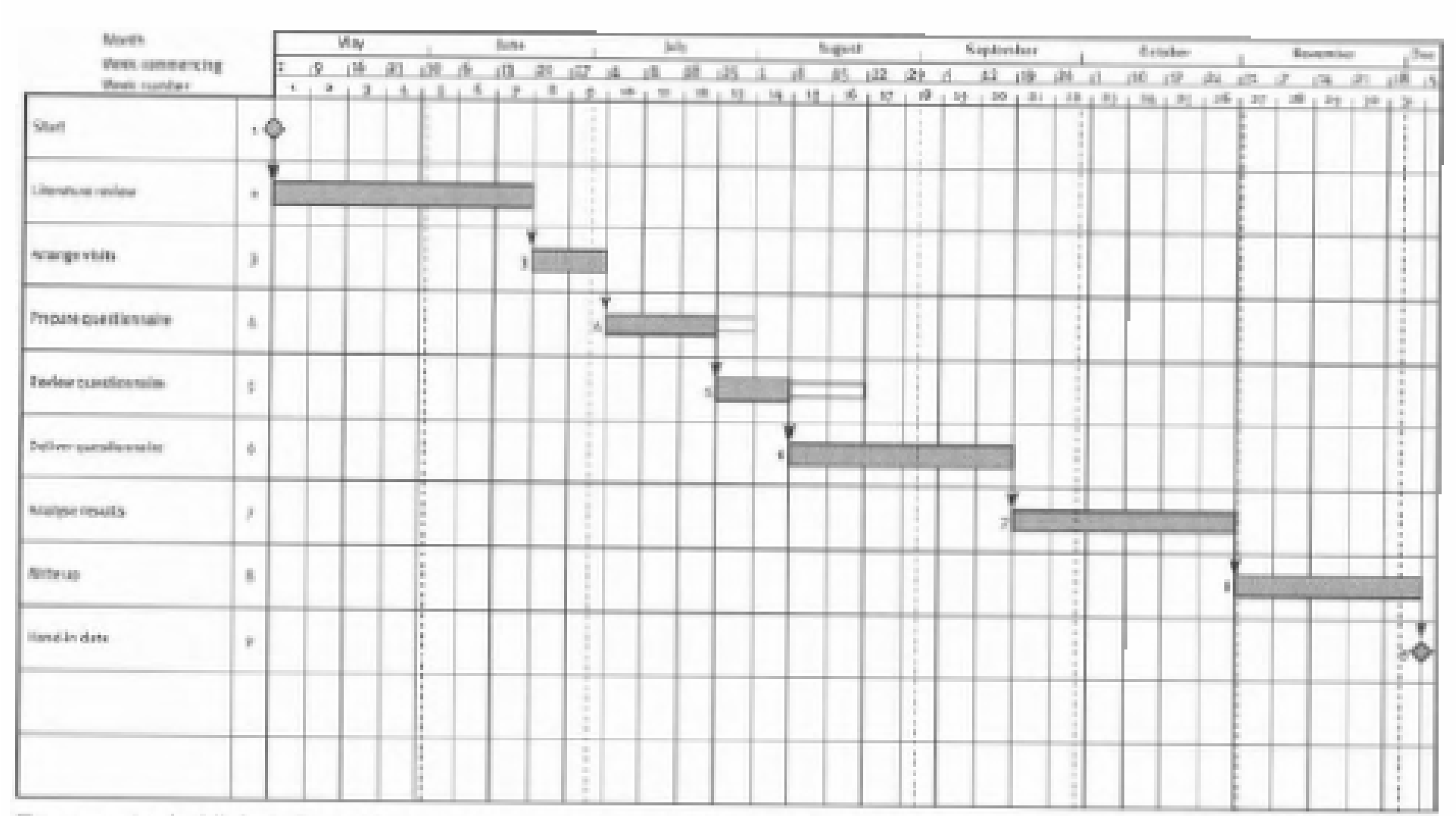


Figure 5.4 Logical links indicated by arrows

Gantt Charts

- Suitable for
  - the number of activities and resources is low;
  - the environment is fairly static;
  - the time periods are relatively long - days and weeks rather than hours.

Gantt Charts

- Good Points
  - simple to draw and read
  - good for static environments
  - useful for providing overview of project activities
  - very widely used
  - the basis of the graphical interface for most PC software

Gantt Charts

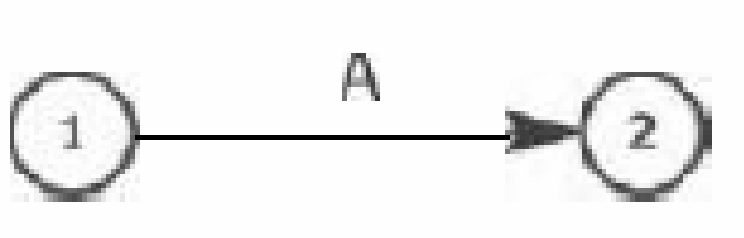
- Weak Points
  - difficult to update manually where there are many changes – charts can quickly become obsolete and therefore discredited
  - does not equate time with cost
  - does not help in optimising resource allocation

Estimating

- Estimation is an activity which continues during the project life-cycle.

Name	*Nature*	Role	*Accuracy*
Rough/finger-in-the-airhallpark	Much uncertainty as to what is involved	Early check on feasibility of brief	Very low
As-buts	As was carried out previously, but with the following amendments – some quantitative data exists	With an appropriate contingency factor – can be used for proposals	Moderate
Detailed estimates	Some initial work is carried out to determine what the likely problems are going to be	Proposals	Moderate
. . . to finish	Much of the project is completed and additional funding is needed to complete the tasks	Additional funds request	High

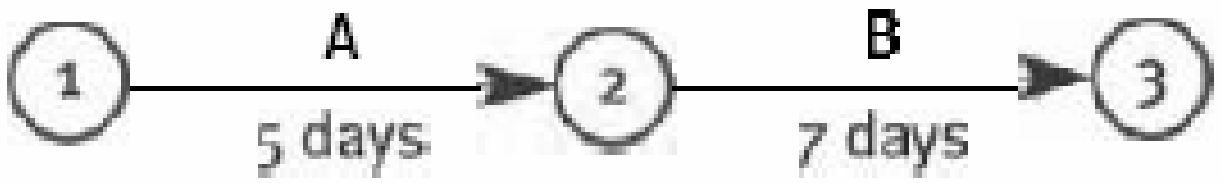
Activity-on-Arrow Diagram



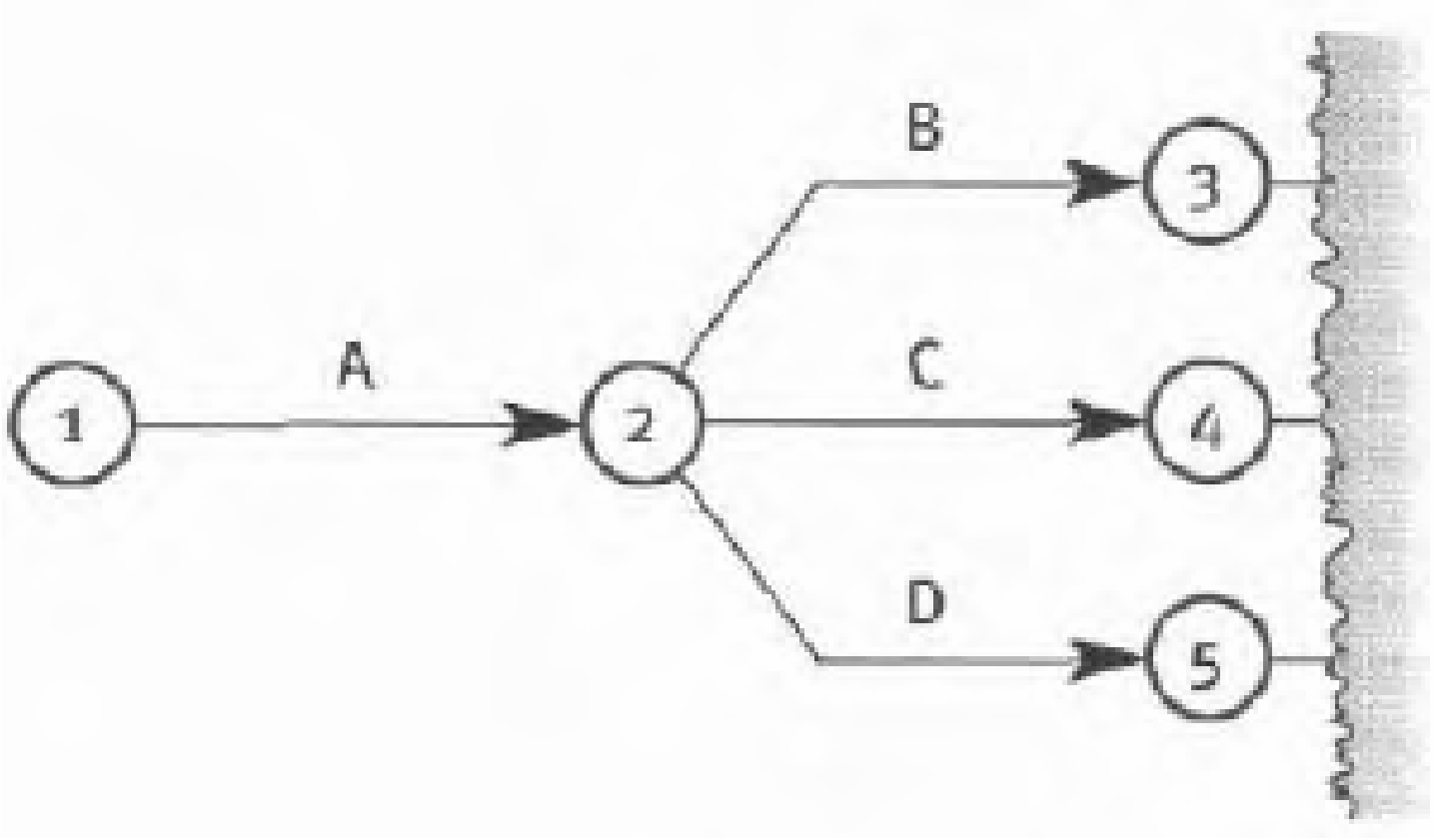
- Rules
  - the arrow runs from left to right indicating time running from left to right;
  - the arrow starts and ends at an event (for the present this can simply be defined as a 'point in time');
  - the events and activities should be given unique identifiers or labels;

Activity-on-Arrow Diagram

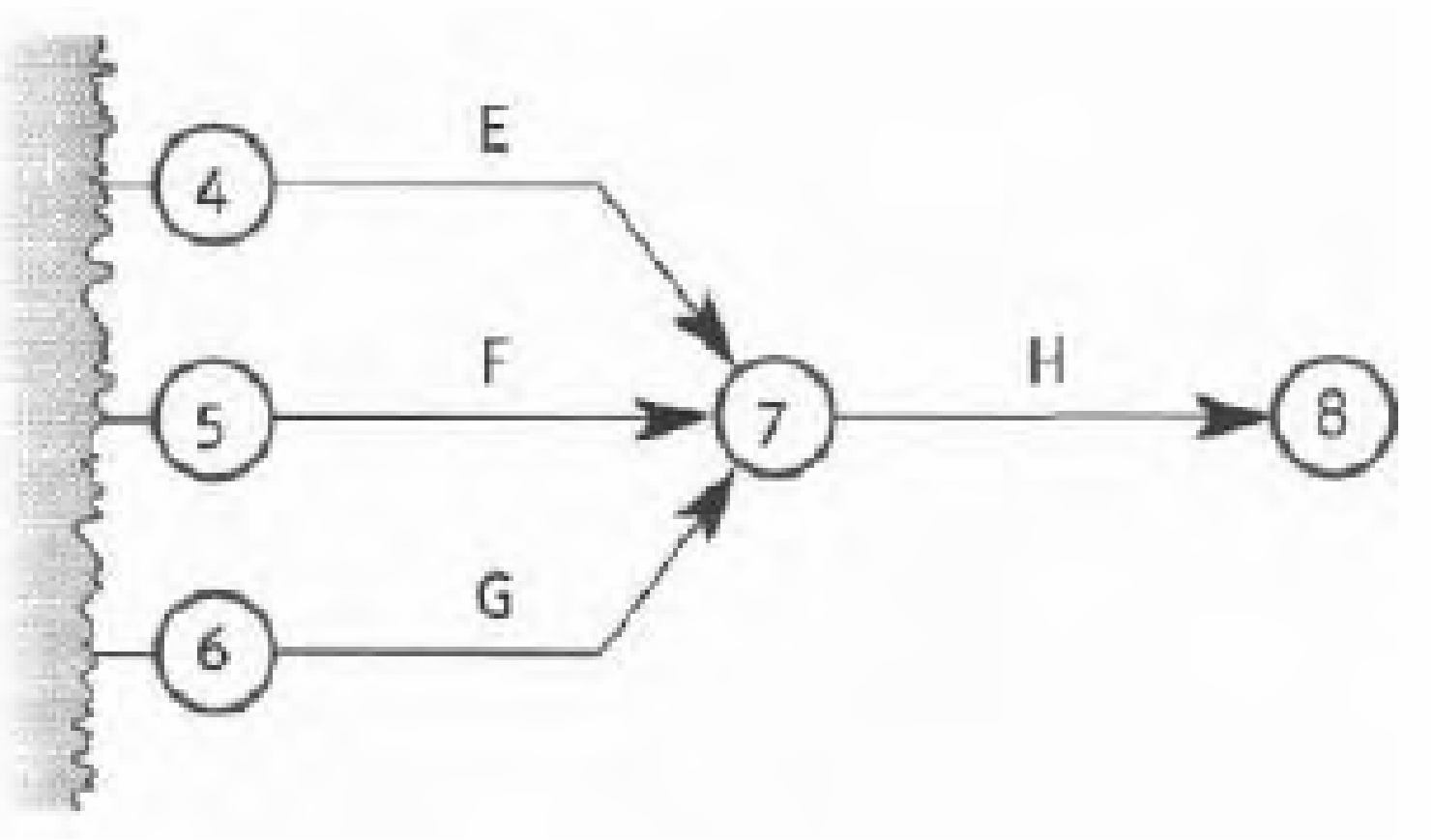
- Identification
  - identify constituent activities;
  - determine their sequence;
  - estimate the times for each;



Activity-on-Arrow Diagram

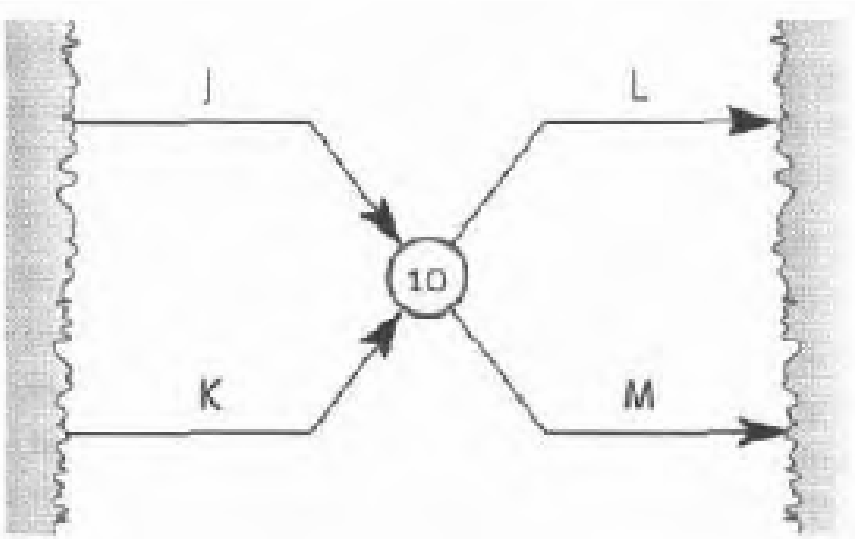


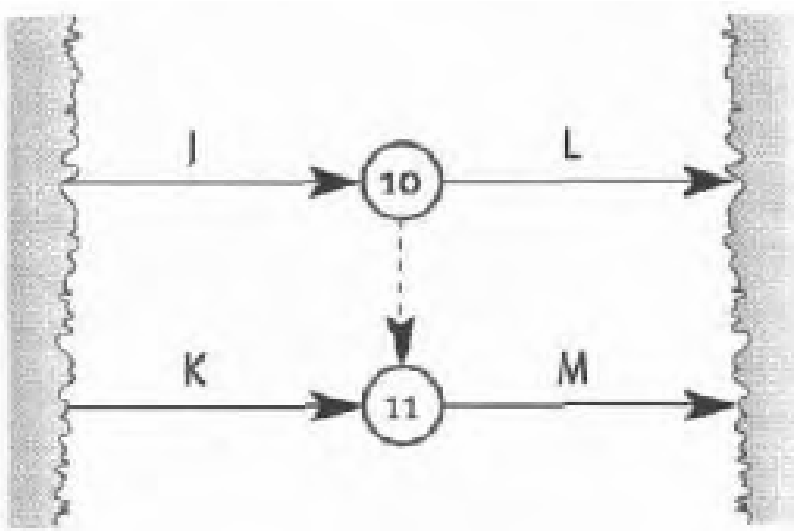
Activity-on-Arrow Diagram



Activity-on-Arrow Diagram

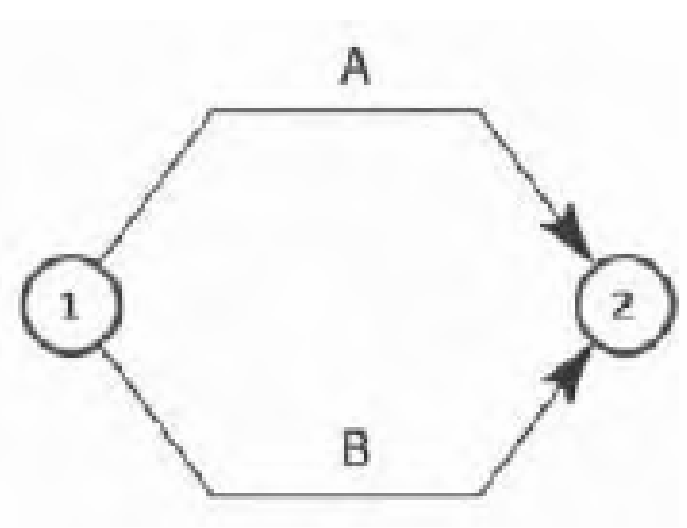
- Dummy Activities

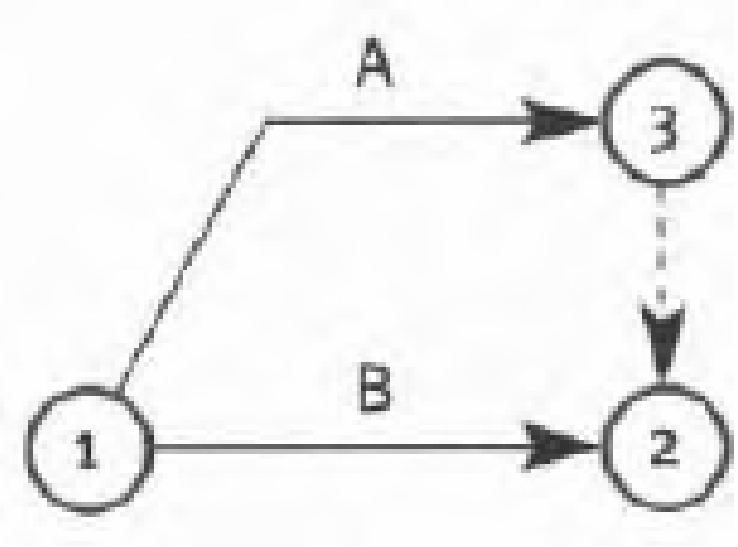




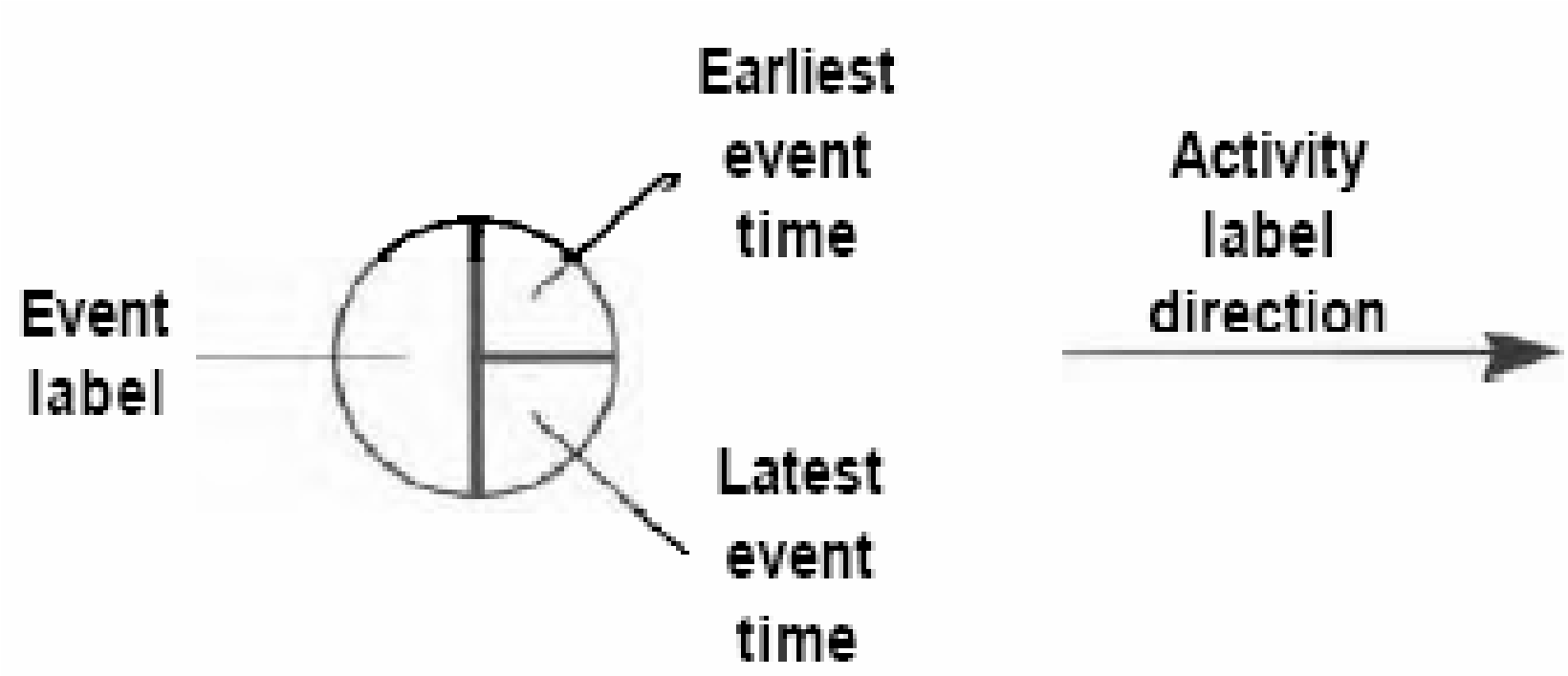
Activity-on-Arrow Diagram

- Dummy Activities





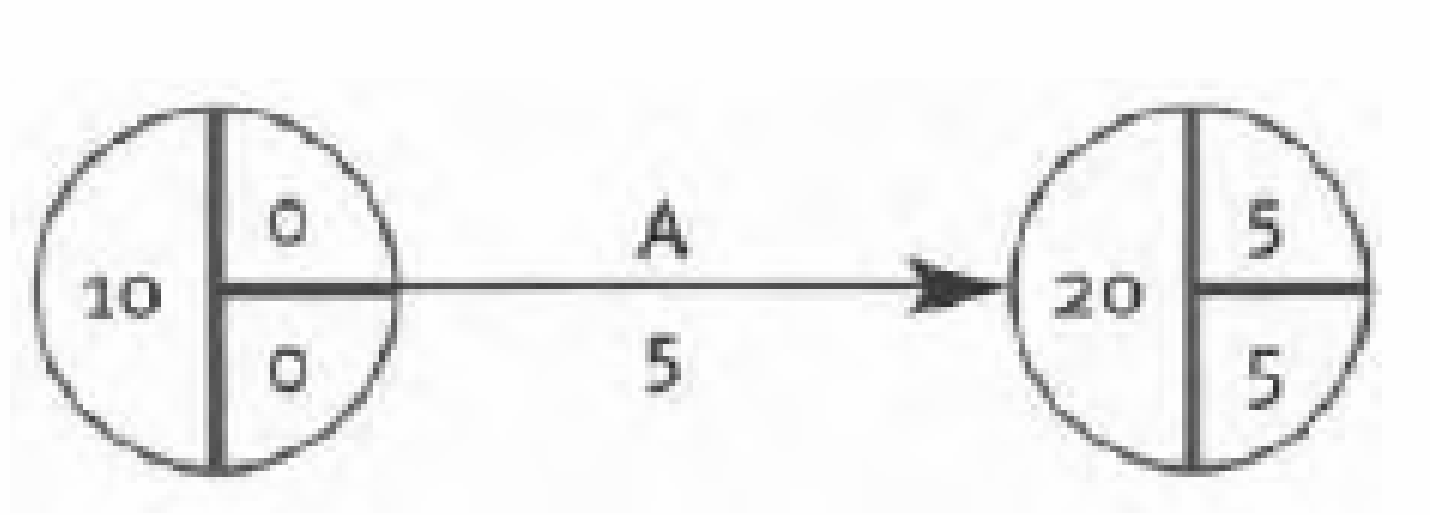
Critical Path Analysis (CPA)



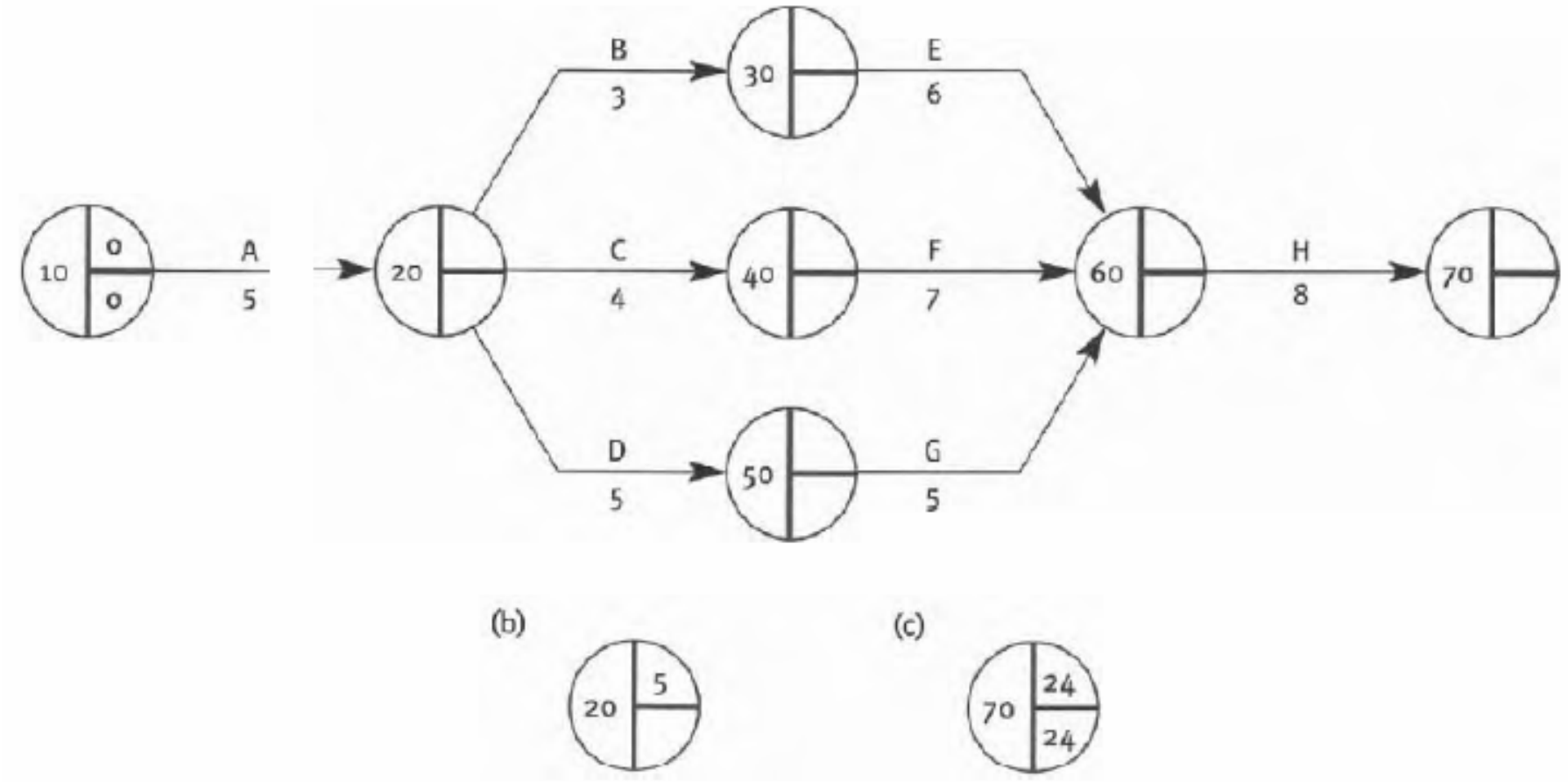
Critical Path Analysis (CPA)

- earliest event time (EET) -determined by the activities preceding the event and is the earliest time at which any subsequent activities can start;
- latest event time (LET) - is the same or later than the EET and is the latest time at which all the previous activities need to have been completed to prevent the whole network being held up.

Critical Path Analysis (CPA)



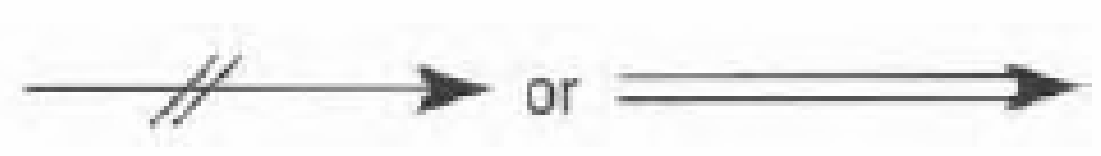
Critical Path Analysis (CPA)



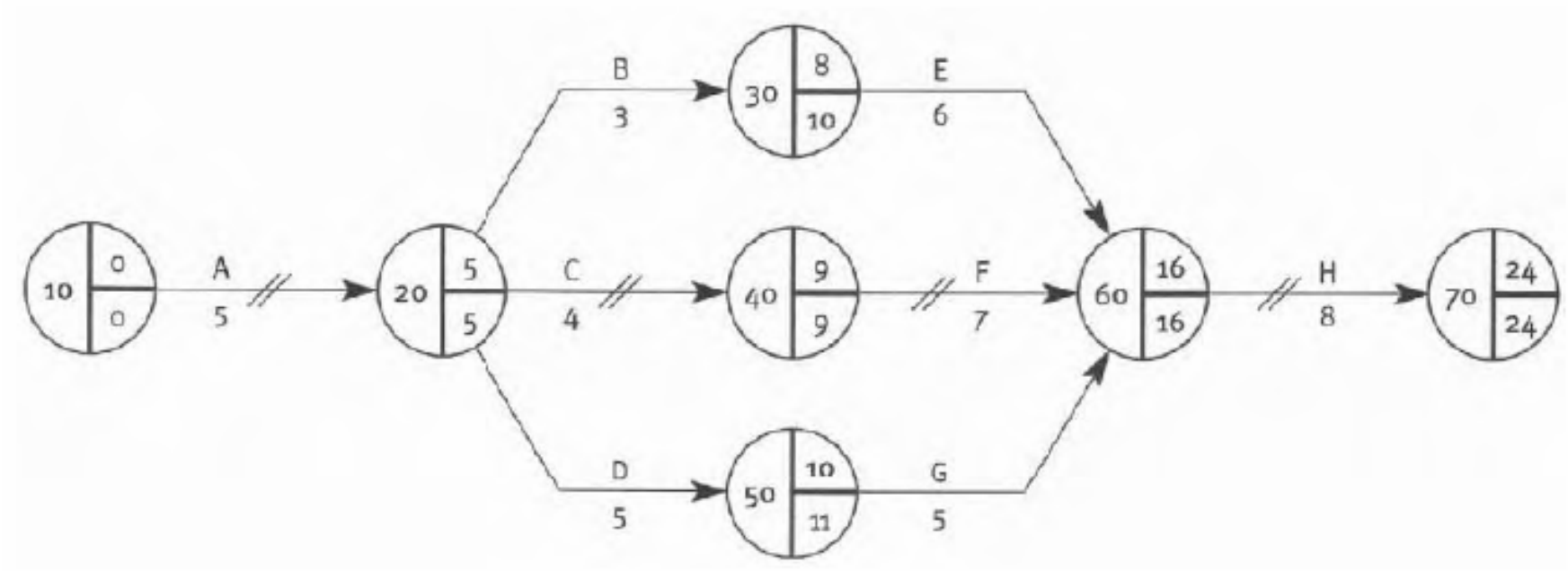
Critical Path Analysis (CPA)

- Forward pass to determine the EET
- Reverse pass to determine the LET

- Critical Path



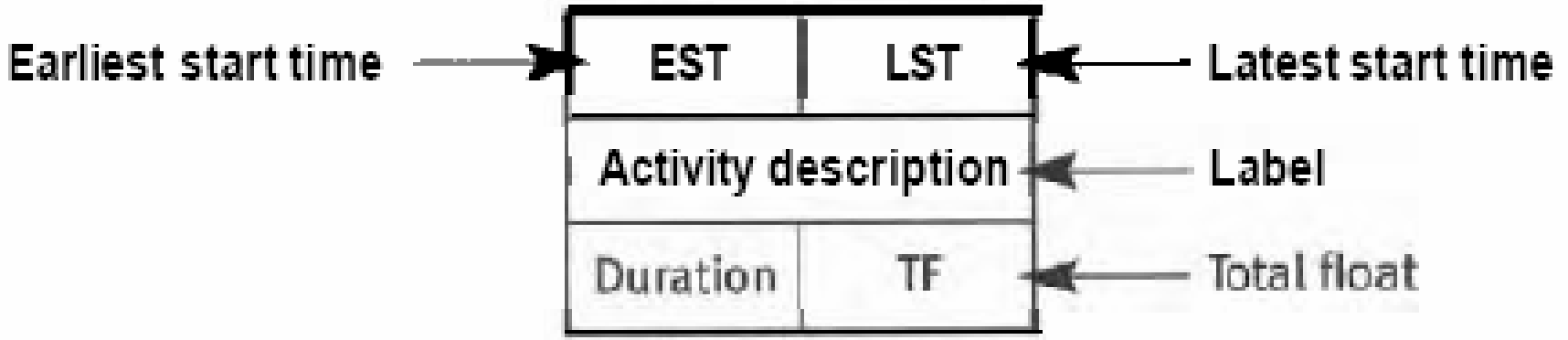
Critical Path Analysis (CPA)



Critical Path Analysis (CPA)

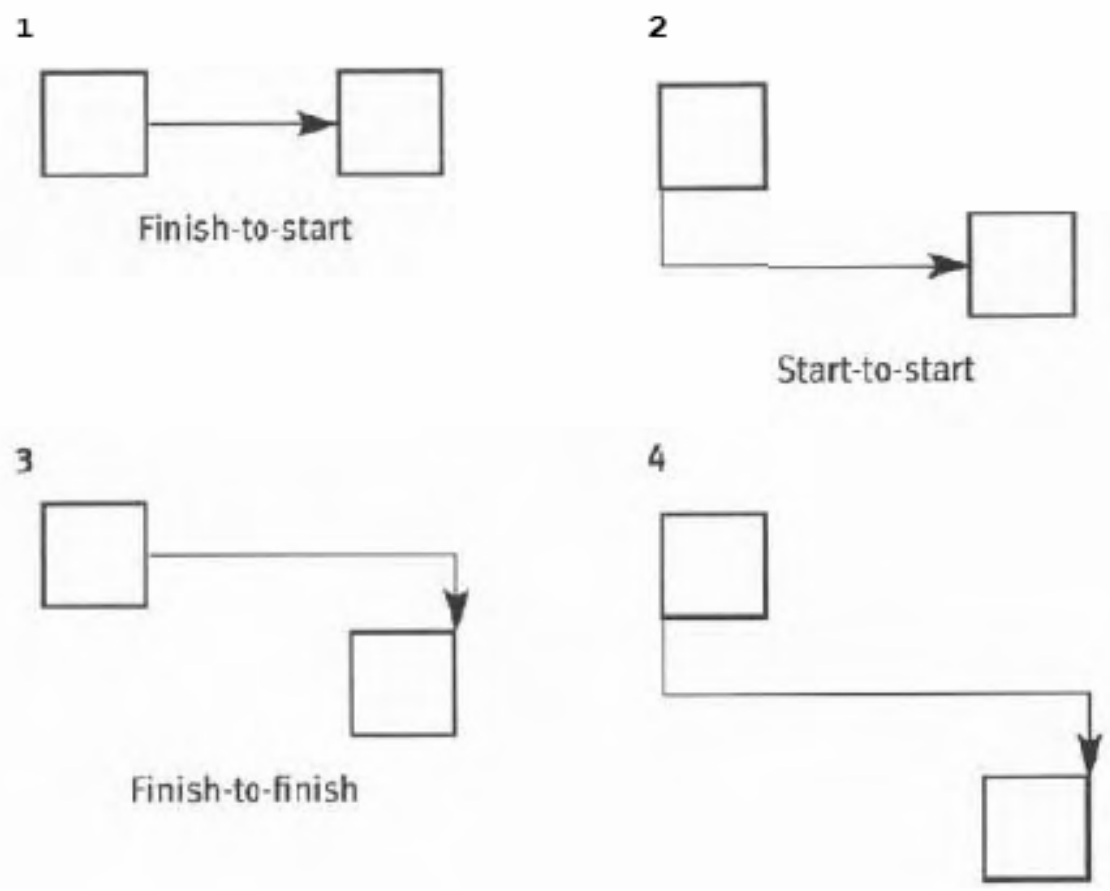
- Float or slack = LET – EET
  - start late;
  - take longer than expected;
  - there could be a gap between E finishing and H starting;

Activity-on-Node Diagrams

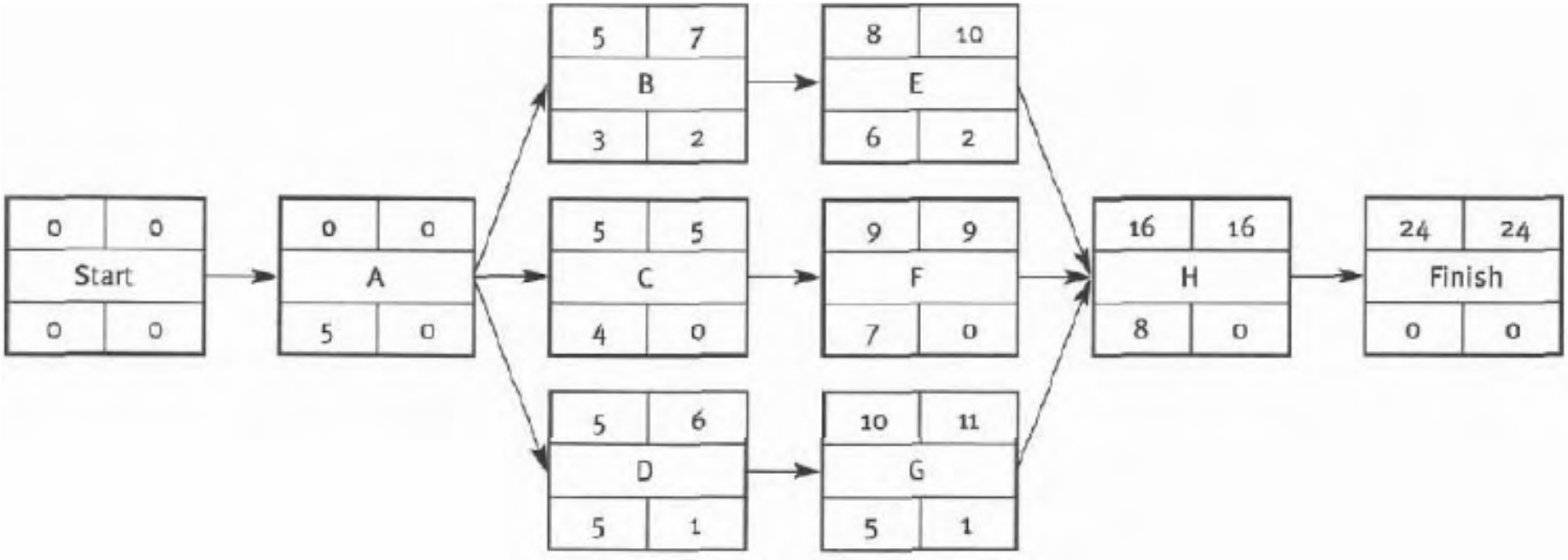


Activity-on-Node Diagrams

- Ways to Link A-o-N Activities



Activity-on-Node Diagrams



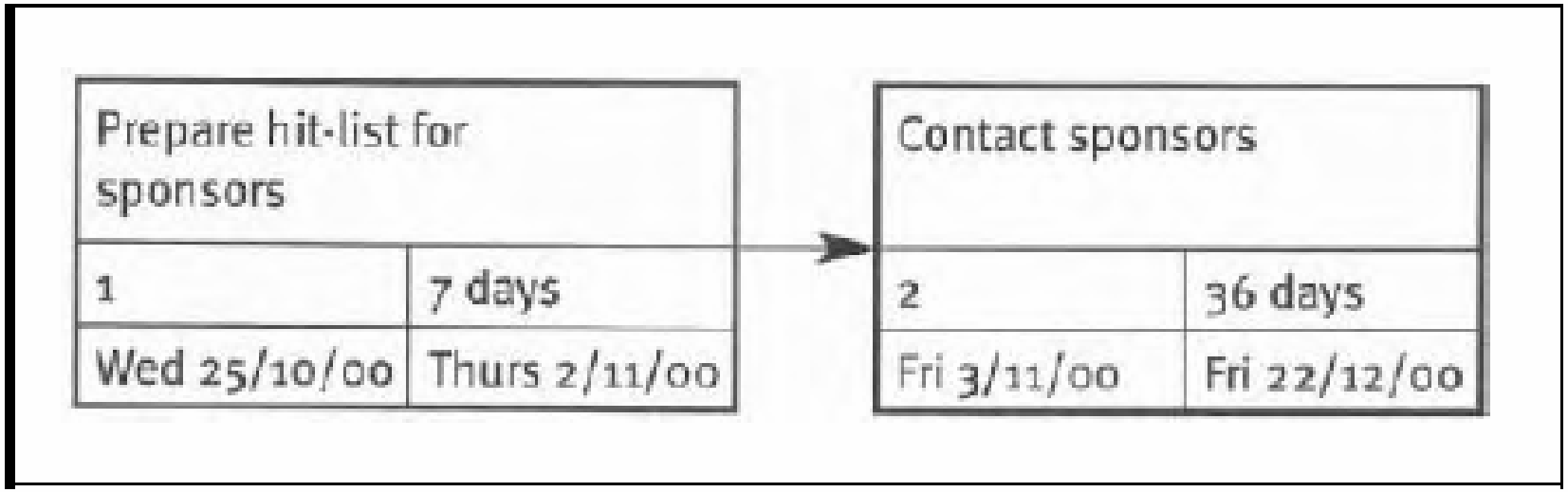
Activity-on-Node Diagrams

- The forward pass determines the ESTs
- The reverse pass starts from the end of the network and assigns the LSTs

- Float = LST - EST

Activity-on-Node Diagrams

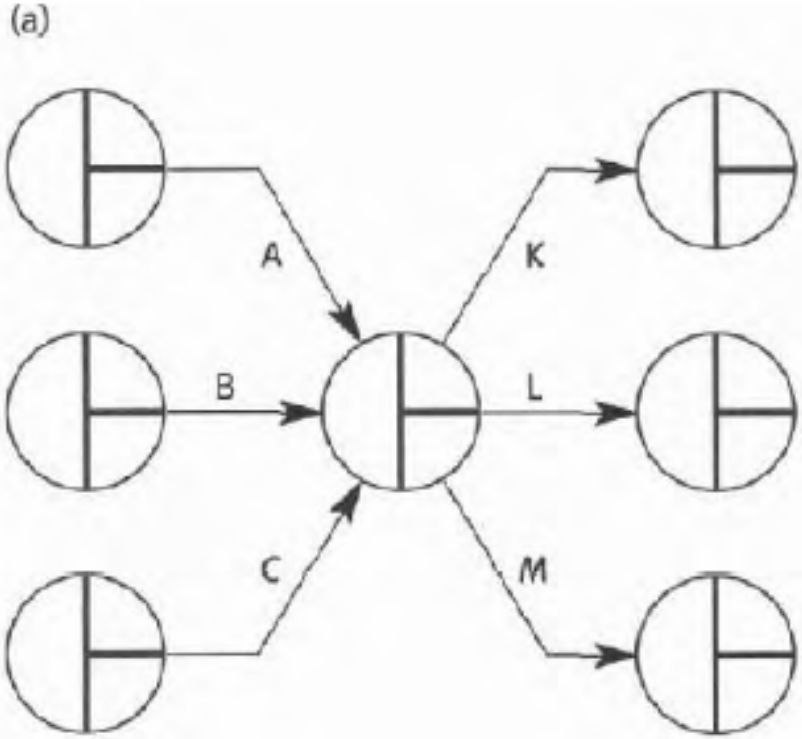
- Microsoft Project Output



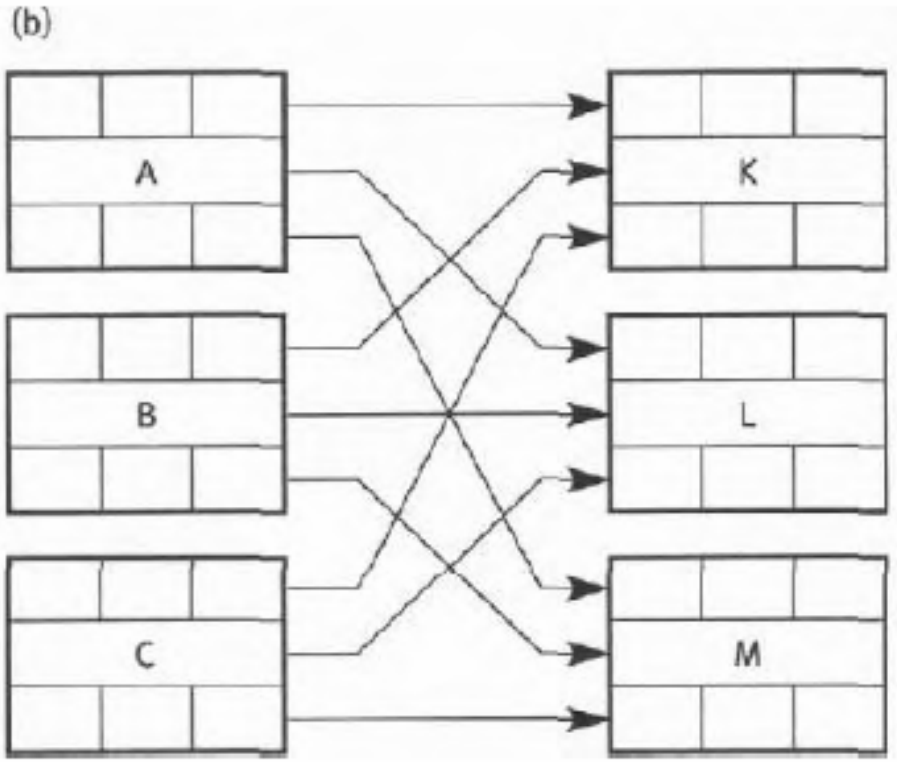
A-o-A v.s. A-o-N

A-o-A	*A-o-N*
• easier to prepare and modify • non-experts have a better chance of understanding the network • milestone events are easily marked • where there are multiple precedence relationships (see Fig. 5.22), this is much more clearly illustrated	• easier to show complex relationships, **e.g.** start-to-finish precedence with time lag (complex with A-o-A) • no dummy activities – keeps the number of activities the same as in the verbal statement (except when showing milestones) • all the information about the activities is contained within the box – easier to ensure the right numbers are associated with the right activity

A-o-A v.s. A-o-N



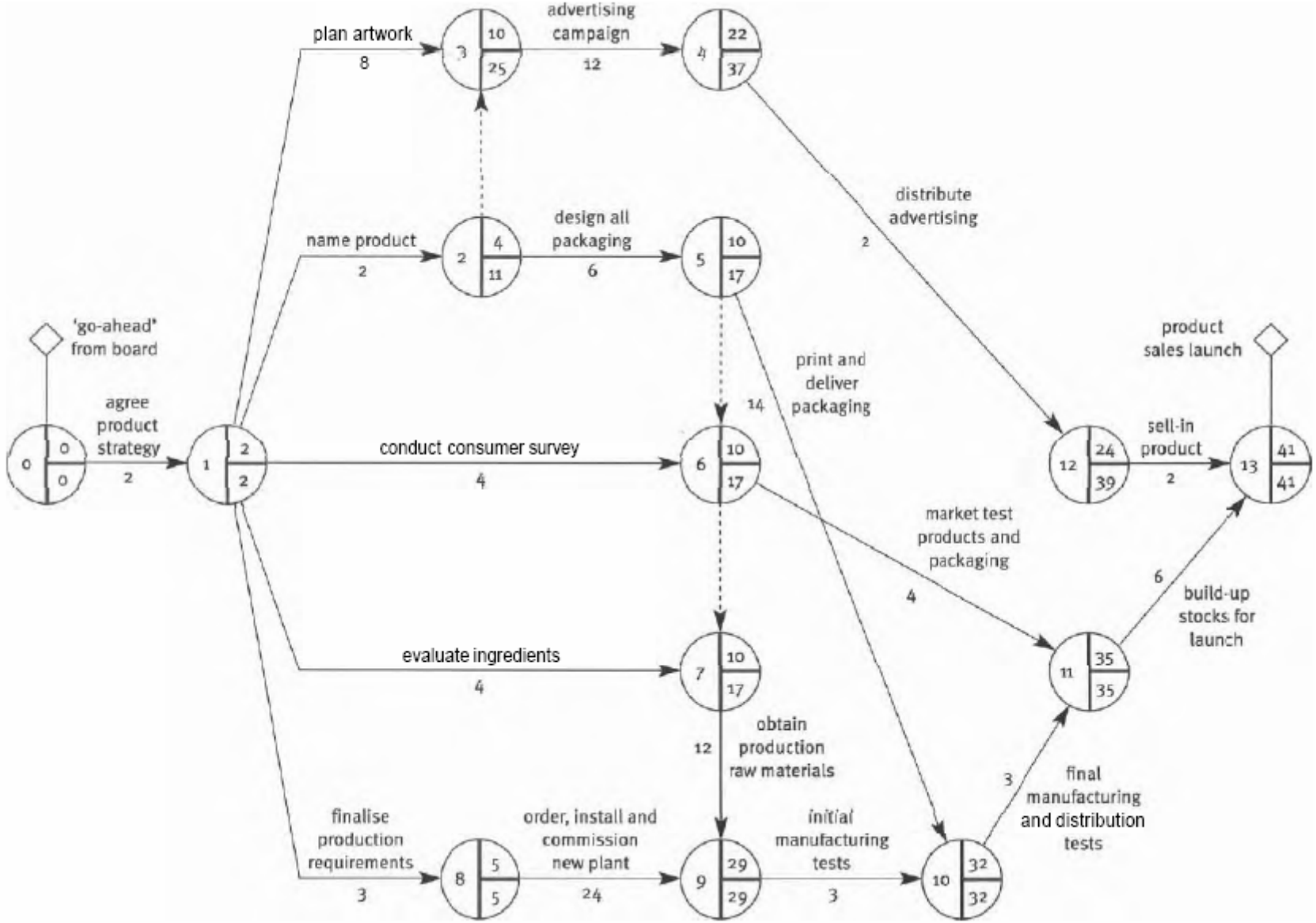
Note: A, B and C represent incoming activities; K, L and M represent outgoing activities.



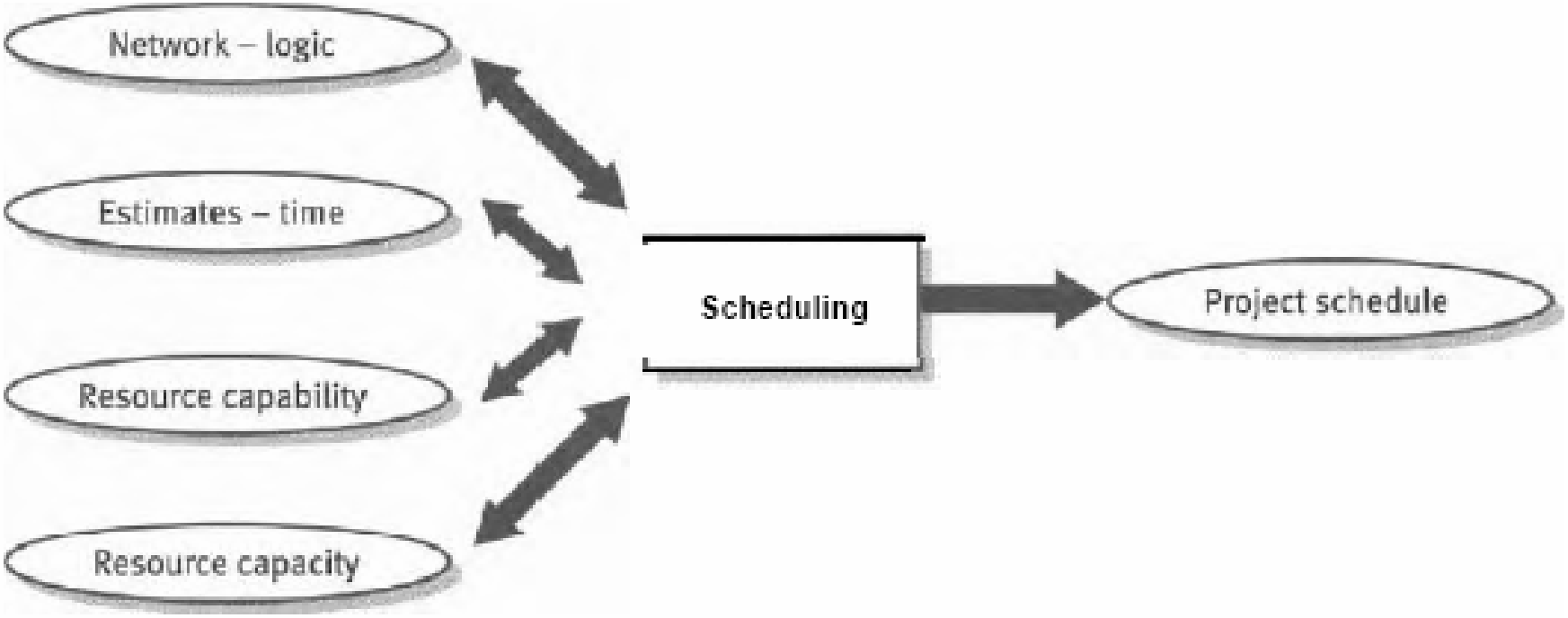
Note 1: A, B, C, K, L and M represent activity descriptions.

Note 2: Under certain circumstances and in particular with zero duration finish-to-start dependencies, this diagram can be simplified by the introduction of a dummy activity.

Example: New Product Development

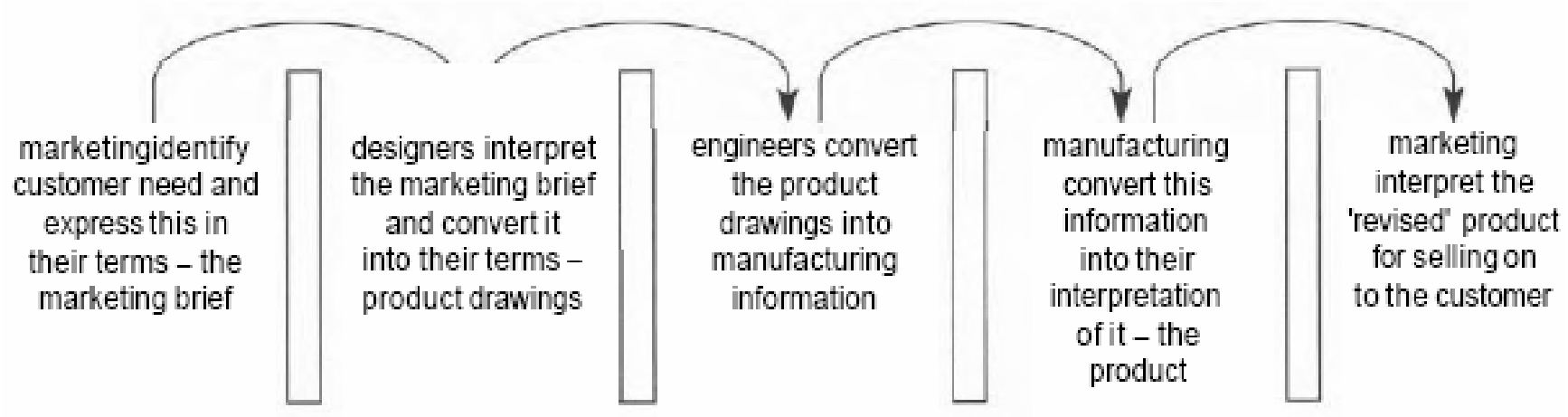


Schedule


Network – logic
Estimates – time
Resource capability
Resource capacity
Scheduling
Project schedule

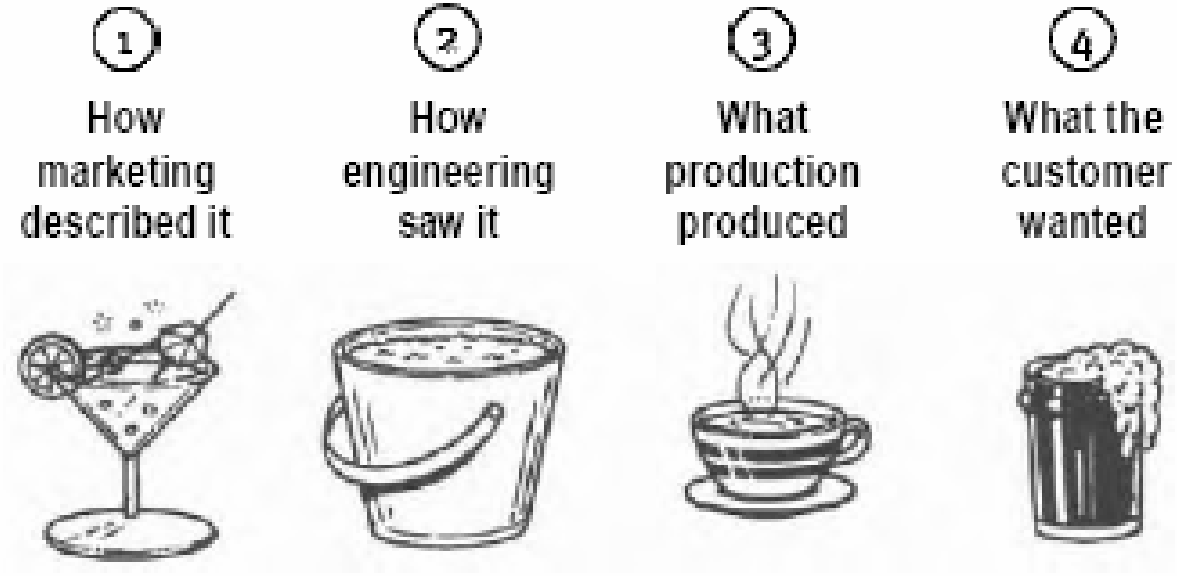
Fast-track Project

- Conventional approach to new product development



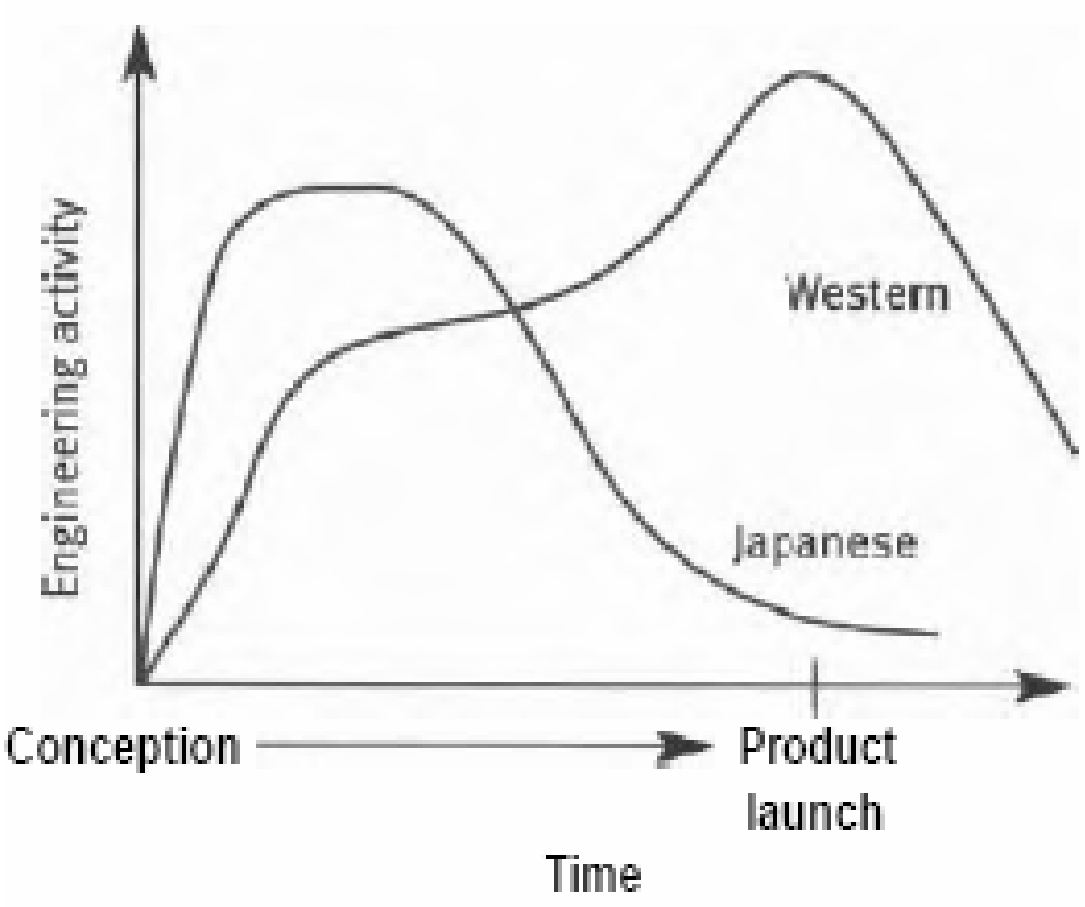
Fast-track Project

- Conventional approach to new product development
  - Effect of 'Chinese-whispers' syndrome



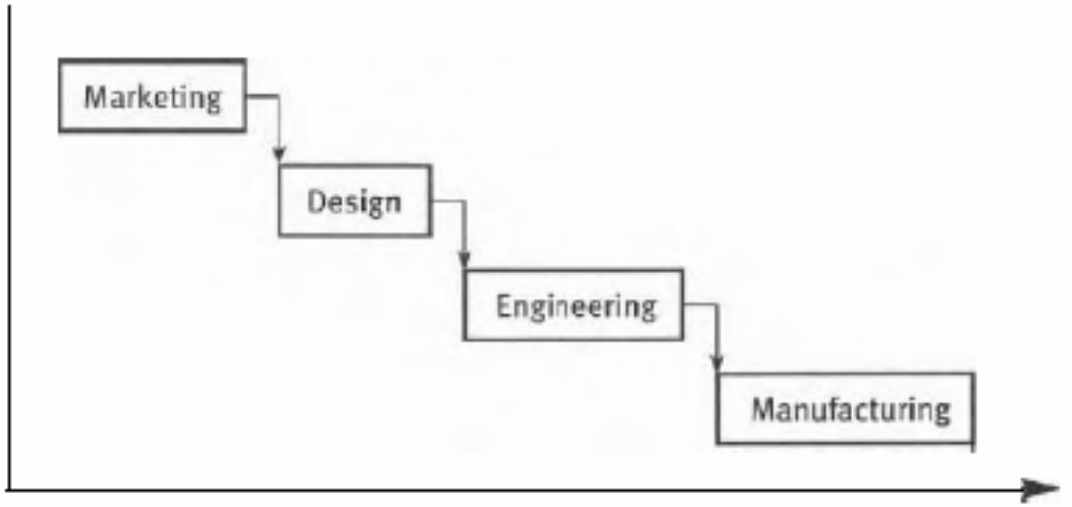
Fast-track Project

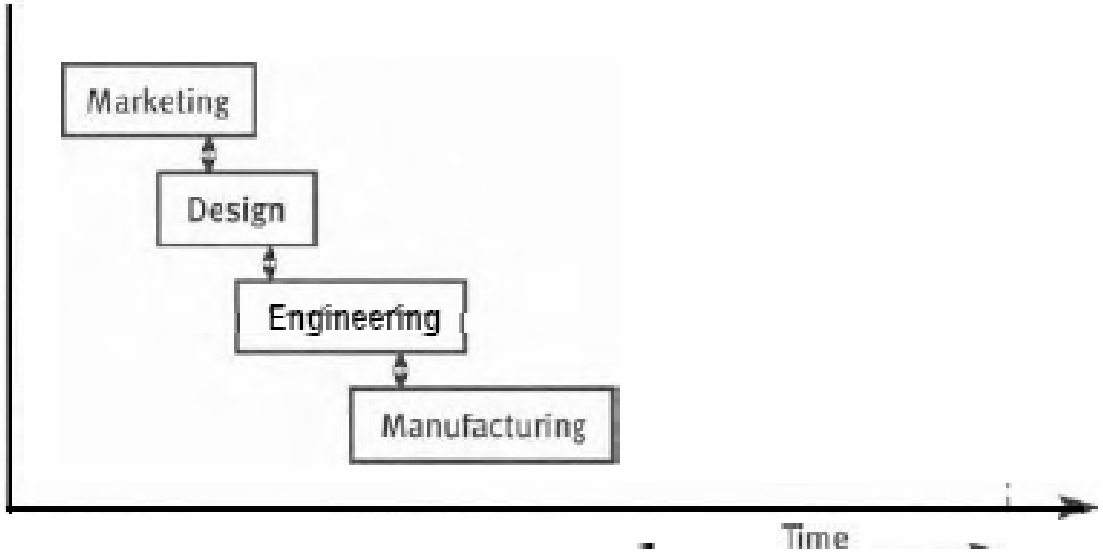
- Engineering activity



Fast-track Project

- Sequential versus concurrent models





Fast-track Project

- Concurrent Engineering
  - Advantages
    - reduced project time
    - reduced project costs
  - Disadvantages
    - increased overheads
    - costs of co-location
    - cultural resistance
    - inappropriate application