1 NETWORK AND CRITICAL PATH ANALYSIS (CPA)

One of the component parts of network analysis is critical path analysis or CPA.

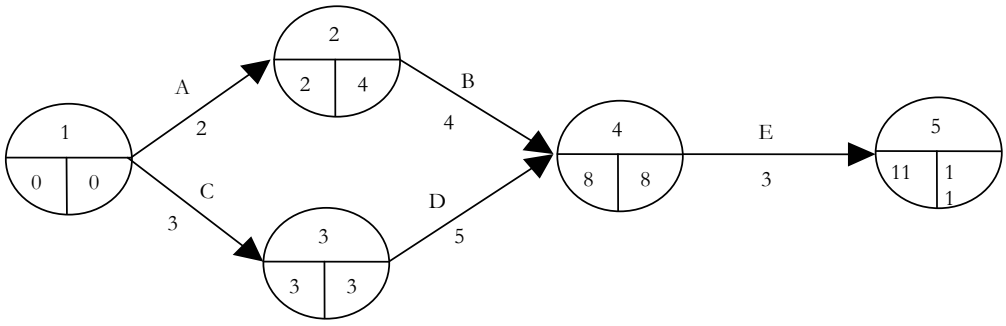
This means breaking down a project into its constituent activities, presenting the activities in diagrammatic form, and identifying the critical path.

The following steps are used in CPA.

- Analyse the project.
- Draw the network.
- Estimate the time and costs of each activity.
- Locate the critical path.
- Schedule the project.
- Monitor and control the progress of the project.
- Revise the plan.

Drawing the network diagram

A simple network diagram looks like this:



Rules to follow when drawing network diagrams

1 The network diagram is written and read from left to right.

2 A network should have a beginning and an end.

3 Networks are not drawn to scale.

4 The event symbol (a circle) shows the beginning or end of an activity, and each event symbol is numbered for reference purposes. The event symbol represents a point in time.

5 The left hand side of the event symbol details the earliest start time (EST), which is the earliest time at which an activity can begin. The right hand side of the event symbol details the latest start time (LST), which is the latest time an activity can commence without the project exceeding its estimated duration.

6 The 'activity' line connecting the event symbols shows the time taken to complete an activity. Each activity line is referenced.

7 All activity lines should have an arrowhead at one end indicating the sequence of activities.

8 Lines that cross should be avoided.

9 Every activity must have a preceding event (the tail), and a following event (the head).

10 No two activities can share the same head and tail events.

11 Loops are not allowed.

12 'Danglers' are not allowed: all of the activities must be connected.

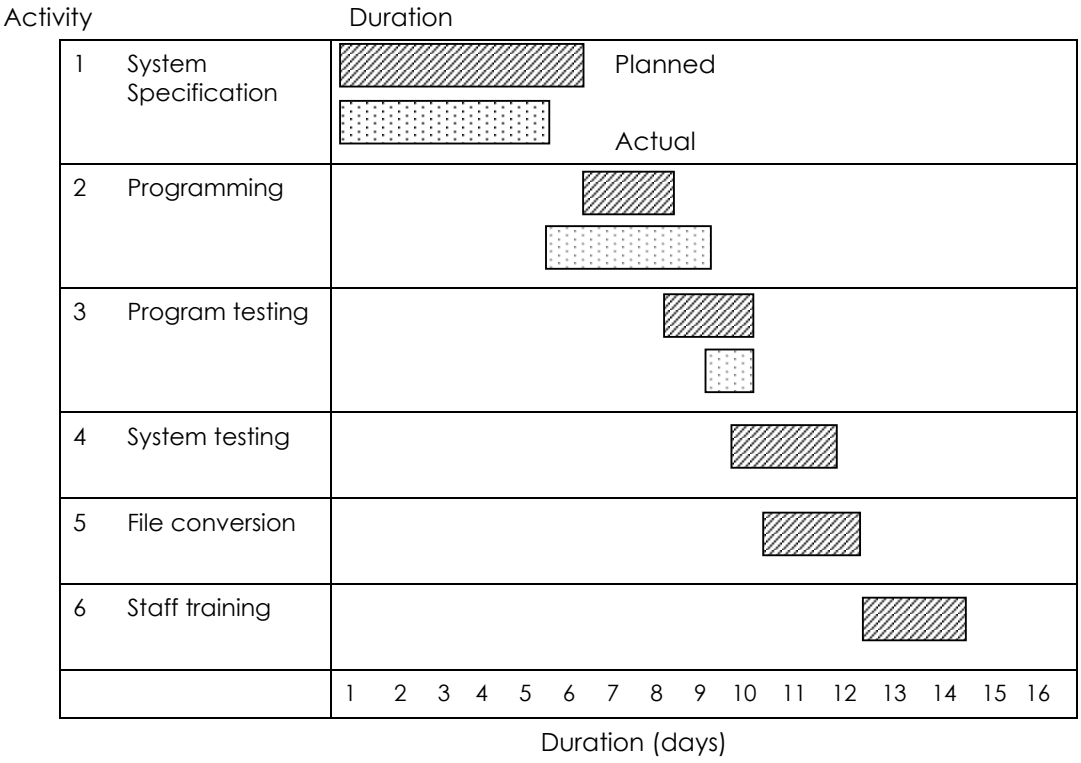
The critical path

The critical path through the network is the chain of activities whose times determine the overall maximum duration of the project. Activities on the critical path are known as critical activities; any increase in the duration of a critical activity will result in an increase in the planned maximum duration of the project.

2 GANTT CHARTS

Gantt charts are another form of graphical presentation used as part of network analysis. They are a form of horizontal bar chart where the length of each bar represents the duration of each activity.

Two bars are used for each activity: one represents the planned duration and the other represents the actual duration.



Advantages of project management tools

Project management tools such as critical path analysis and Gantt charts have the following advantages:

- Easier visualisation of relationships.
- More effective planning.
- Better focus on problem areas.
- Improved resource allocation.
- Studying alternative options.
- Management by exception.
- Improved project monitoring.

3 SOFTWARE SUPPORT FOR PROJECT MANAGEMENT

Use of project management software

Project management tools are available in the form of computer software packages. Project management software may be used to assist with planning the project, estimating the resource and cost requirements, monitoring and reporting the progress of the project.

Features and functions of project management software

Planning

- Allows the input of all tasks, start, end, dependencies, resources.
- Produces network diagrams and Gantt charts automatically.
- Allows different scenarios to be modelled.
- Allows items, tasks, to be changed and produce updated plans.

Estimating

- Various methods will generally be available for estimating costs or allowing linear regression based on previous data from old projects or even completed parts of the current one.
- Resource data can be applied to produce cost data.
- Modelling techniques can be used to change plans and therefore also cost estimates.

Monitoring

- Progress to plan can be shown in a clear diagrammatic form.
- Actual costs can be monitored against budget.

Reporting

- Reports can be produced by resource, task groupings, manager both as progress charts and costs.
- PM tools will often incorporate a report generator facility for development of specific reporting types.

Project management packages

Examples of available packages include the following:

- AMIS Schedule Publisher
- Texim Project
- Win Project (MS Project)

When choosing project management software there are a number of important points to address:

- Determine the requirements of the organisation, including its current and future needs.
- Document the requirements, distinguishing functions that are essential, those that are important, and those that are merely desirable.
- Review the available packages to identify three or four products which meet the essential functions and fall within budget.
- Attend a demonstration of the packages or use on a trial basis if possible.
- Select the package and develop a 'roll out' strategy (including installation, training, etc).

4 RISK AND RISK REDUCTION

Threats to a successful project

Software Development Projects, if large, can carry significant risks.

The three main risks to projects are:

- They do not complete on-time
- Major cost over-runs occur
- They do not meet the original specified objectives

In addition to these risks other significant problems can occur:

- The technical performance of the system is inadequate
- There is a lack of user acceptance of the system
- Shifting priorities due to lengthy timescales may reduce the project's importance or change requirements.

Risk management

This consists of the following steps:

- Identification of the risks
- Estimates of the effects and costs of things going wrong
- Estimation of the probabilities of the events occurring
- Ranking of the important and more likely threats
- Decision as to the way in which the risks are to be handled.

Risk assessment

The level of risk can be calculated by:

- Using a checklist of potential risks;
- Setting a weighting to all risks;
- Scaling the identified risks;
- Multiplying weights by scale to produce a score.

The scores can then be compared against pre-set limits.

Risk analysis helps to identify areas which require special consideration and additional planning as well as greater management attention.

Risk reduction

Concentration on the following areas will help to minimise risk of project failure.

- Project Quality Plan
- Project planning
- Project management
- Standards
- Post project review

5 THREATS TO THE PROJECT

The following is a summary of the types of problems that can threaten the success of a project, together with some methods to minimise these risks.

Threat	Ways of minimising threat
1. Poor planning	1. Use of CPA and Gantt charts
2. Few control mechanisms	2. Implement constant progress review, together with standardised reporting mechanisms
3. Specification changes	3. User requirements should be thoroughly examined at the systems analysis stage, using walkthroughs or prototyping
4. Unrealistic deadlines	4. The network diagram should identify the critical path on which management's attentions should be concentrated
5. Under-resourced budgets	5. Management should ensure that the budget (in terms of finance and manpower) is correctly balanced to ensure that the project can be successfully completed
6. Poor management	6. Training of project managers in management skills as well as technical skills