

INFORMATION SYSTEM

What is information?

In general items of knowledge, news, and messages etc. information is an essential component for each and every human activity in the world. Providing information in a well organized manner is the aim of information system.

What is a system?

Set of connected things or parts, organized body of materials or immaterial things. A system can be defined as any integrated assemblage of components or subsystem designed to achieve an objective. “The whole is greater than the sum of its parts”.

What is Information System?

Information System is an organization of people, materials and machines that serves to facilitate the transfer of information from one person to another. Any group of interrelated components or parts which function together to achieve a goal.

Thus, we can describe it by specifying its parts, the way in which they are related and the goal to be achieved.

compound or complex of functionally and /or attributively related components”.

A system is combination of interacting parts that operate together to achieve some objective or purpose. A system is not a randomly assembled set of elements, but consists of a common purpose, goal or objectives and ideas and their interrelationships which are ordered to a common goal or purpose.

What is systems Analysis?

System Analysis is so popular today, both as a general problem solving technique and, as a method for developing information systems. System analysis can be used for both quantitative methods, as well as for qualitative factors like Judgement, Creativeness, Commonsense and experiences.

System Analysis

System Analysis is concerned with systematically analyzing a total system in its context, and in identifying and describing the interrelatedness of all component parts or operations of overall system.

According to Fisher: An operational definition that provides an insight into elements of the conceptual strategy characterizes System Analysis as," inquiry to assist decision makes in choosing preferred future counts of action by (a) systematically examining and re-examining the relevant objectives and the alternative policies and strategies for achieving them, and (b) comparing quantitatively where possible the economic cost, effectiveness (benefits) and risks of the alternatives.

Need for System Analysis

Number of difficulties were encountered by libraries and information centres due to:

1. Increased quantity and sophistication of the demand of the users, interdisciplinary research, specialization etc.
2. Lack of funds.
3. Increase in inter-institutional cooperation.
4. Shortage of professionals etc.

These necessitated the re-examination of libraries and information centres. This called for a technique which combined the good points of organisation and management (O&M), operations research (OR) and the result was the technique of system analysis.

Factors for consideration in a system analysis

1. Defining the study problems.
2. Definition of the library's overall goals.
3. Scope of the study areas and activities to be covered priorities if any, for example: Manual or machine, number of personnel etc.
4. Methods and techniques for collecting data and information.
5. Work and time schedule-man days, skills required, responsibility of each persons, target data sets.
6. Announcement of the study plan to staff and user.
7. Staff training programs, if required.

Steps in a System Study

1. Problem definition in a system context.
2. Statement of objectives... overall system objectives, outcomes desired and performance indicators.
3. Specification of resources and constraints on possible courses of action.
4. Formation of alternative courses of action with merits and demerits.

5. Data collection and kept analysis on promising alternatives.
6. Selection of the most promising alternatives.
7. Implementation of the most promising alternatives.
8. Performance monitoring, measurement and evaluation.
9. Modification of implementation as needed.
10. Performance monitoring, measurement and re-evaluation.

There are three interdependent phases:

1. Analysis Phase: It includes four surveys (i) Survey of requirements (ii) Survey of current operating conditions (iii) Survey of outputs (iv) Survey of inputs.
2. Evaluation Phase: Detailed examination of current procedure with respect to their adequacy to implement the mission of the system.

3. Design phase: Related to validation of the existing system by modification of or by substitution of a newly designed system to satisfy the demands being placed it on the system.
4. Implementation.
5. Follow up action.

Project Management Technique

Management in general is an organised way of achieving a goal planning, a branch of management is the “process of getting an organisation from where it is to where it wants to be in a given period of time by setting it on a predetermined course of action. It is deciding what to do, how to do it, when to do it, and who is to do it.

Fact finding and formulating the realistic goal and attainable objective is the primary component of the planning process. Project Management is..."a particular way of thinking about achieving goals and offers a practical set of tools".

Hence, project management is “the planning, organising, directing and controlling of organisations resources for a complete specific goals and objectives. Further, project management utilizes the systems approach to management by having functional (linear) personnel (the vertical hierarchy), assigned to specific project (the horizontal hierarchy).

- Project management involves various steps. At each step/ phase different techniques are used to perform the activity during that particular phase. This can be presented in (figure no. 1&2)

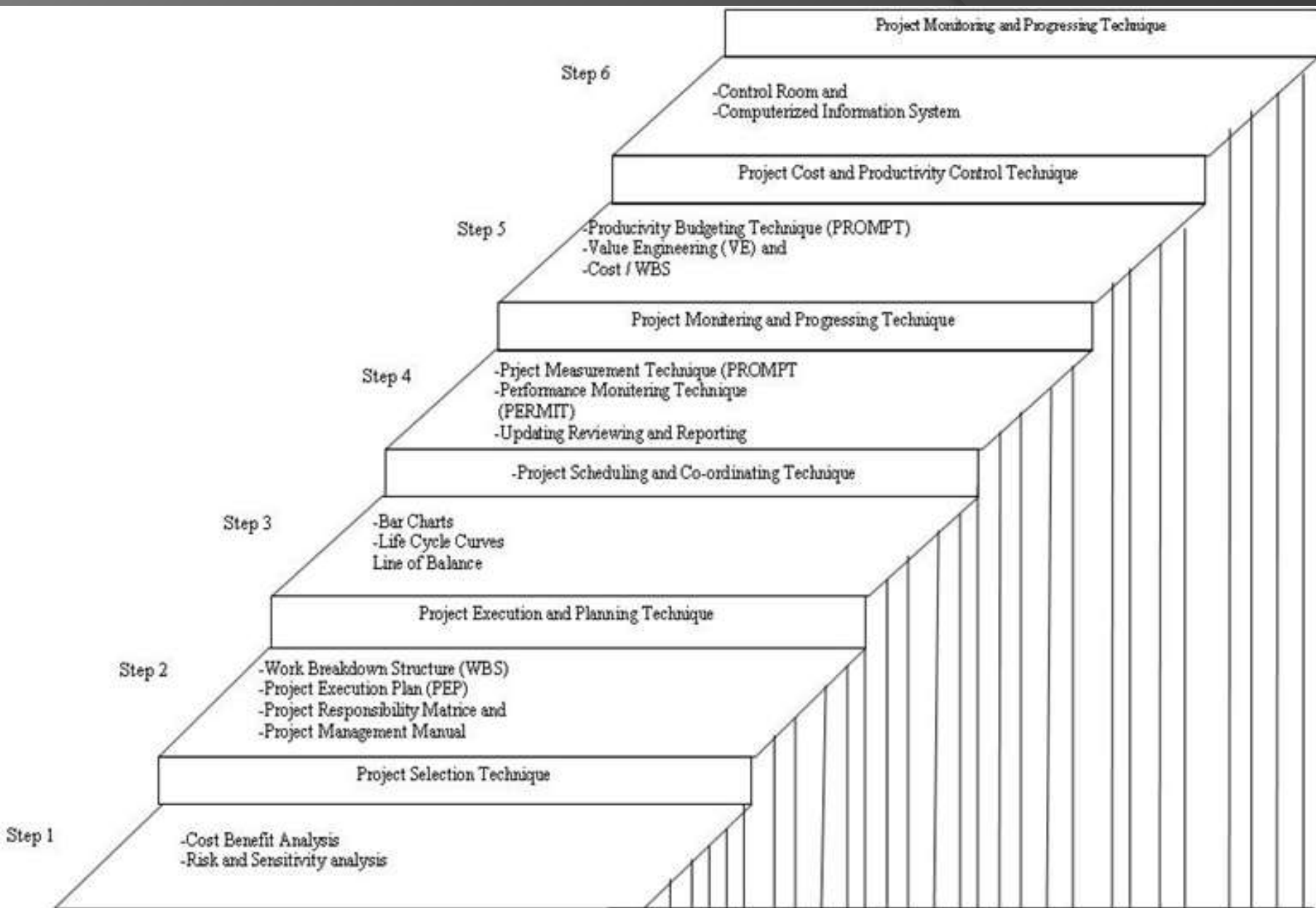
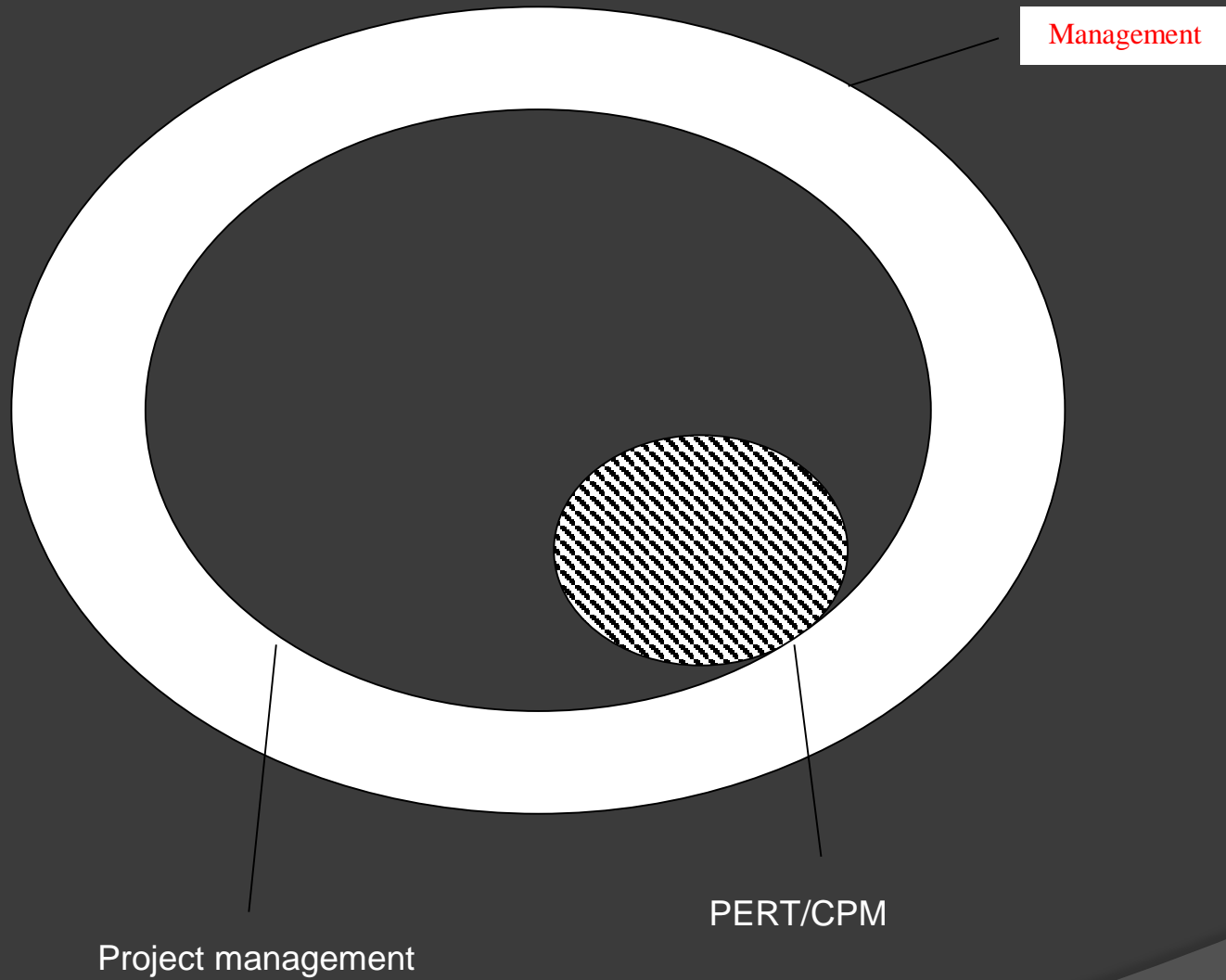


Figure 1

The present topic deals with automating the University/College libraries for networking as a project. In this project, the first two steps (Project selection and Project Execution and Planning) and the last three (Project Monitoring and Progressing, Project Communication and clean up techniques) these are beyond the control of the investigator(s). Therefore, Project scheduling and co-ordinating phase is brought in focus. In that PERT and CPM techniques are used for achieving the objectives of this study.



Venn Diagram indicating Scope of the Study

Scheduling the Project Efforts

Once the overall project time estimates have been established and schedules prepared, individual resources must be allocated to meet this schedule. The nature of systems work and programming efforts requires careful scheduling in order to be utilized effectively.

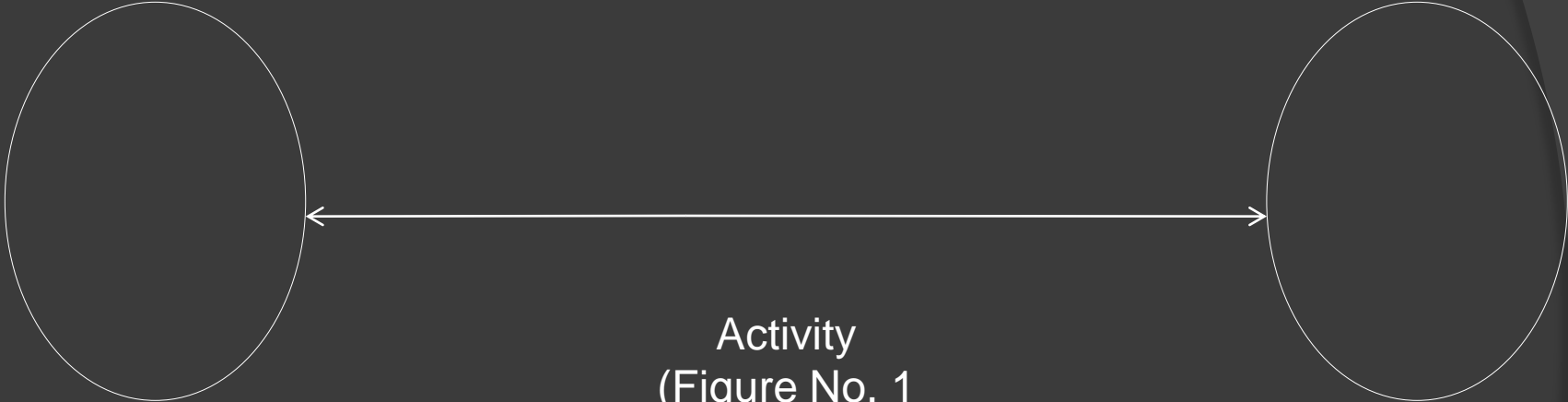
A number of special charting and network techniques based on timing estimates, have been devised that can assist information systems management in scheduling and controlling a system development project.

- The Gantt Chart can be used for scheduling less complicated projects. Projects having high level of complexity and or sever scheduling requirements can benefits from the use of network systems such as PERT or CPM. It is estimated today that more than 200 variations of networks systems are available and utilized for the planning and control of project efforts.

- Library/Information System networking is a major projects comprising of several events, the actual execution has a set of activities-such a set of activities can be referred as a programme. This programme Evaluation and Review Technique (PERT) looks critically at each of these activities and determined the ideal sequencing of them. This technique of sequencing and co-ordination is a component of operations research.

In a sense, PERT/CPM is systematic method of determining the sequence of activities. The end result of PERT/CPM is a PERT diagram which guides precise execution of the activities such that, time and resources are Spent Judiciously. This is achieved in the following steps.

In a PERT diagram an event which marks either beginning or end of our activity is represented by a circle and an activity is represented by an arrow.



```
graph LR; E1((Event 1)) <--> E2((Event 2)); A[Activity (Figure No. 1)]
```

Activity
(Figure No. 1)

Event
1

Event 2

Activity A takes the project from event 1 to event 2. Each activity requires amount of time and resources. However, there are certain activities which do not consume these, because the activity in question is merely assumed but it does not actually take place. Consider event 1, 2, 3 which are results of activities a, b and c respectively (fig. 2).

The activity e succeeds a, c and b. it also follows or succeeds an activity, a dummy activity d. This activity d is merely assumed for the sake of drawing a PERT diagram and it conveys that the activity b, which is not directly linked to e, precedes it.

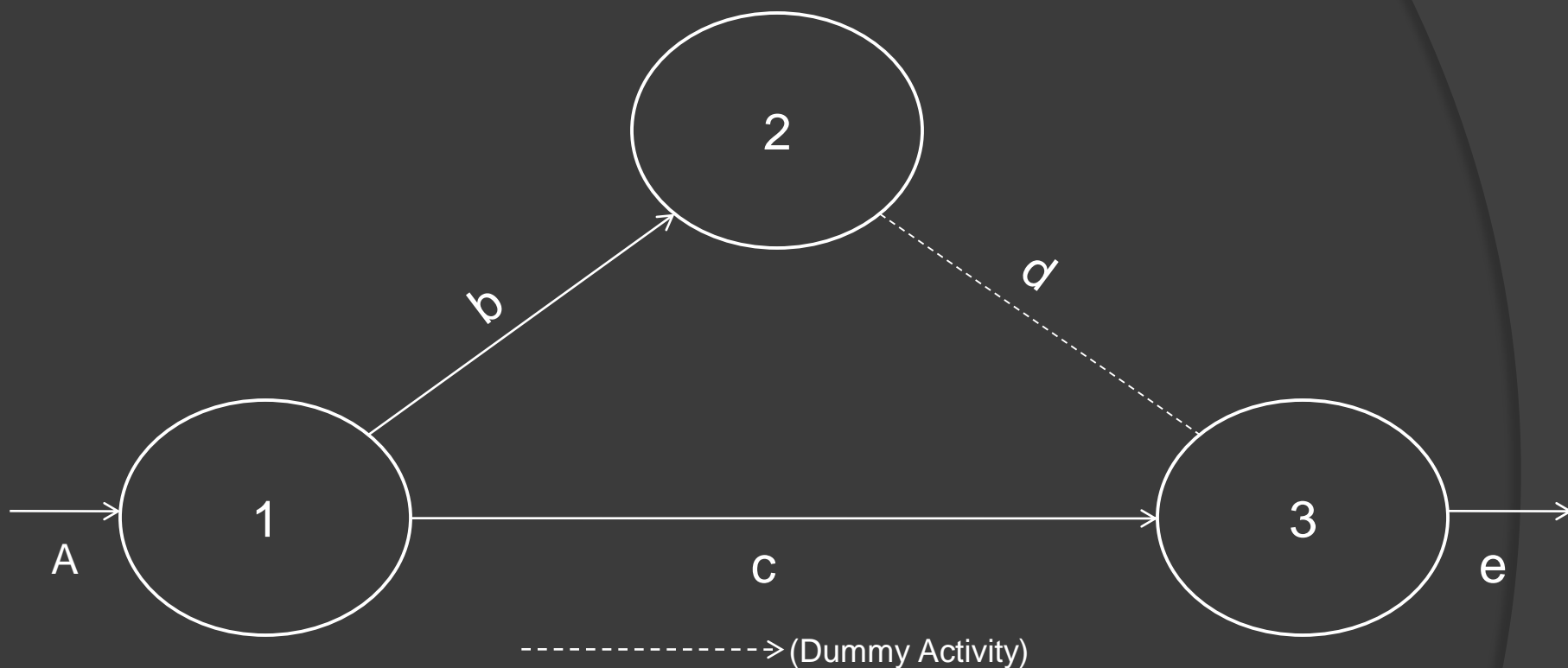
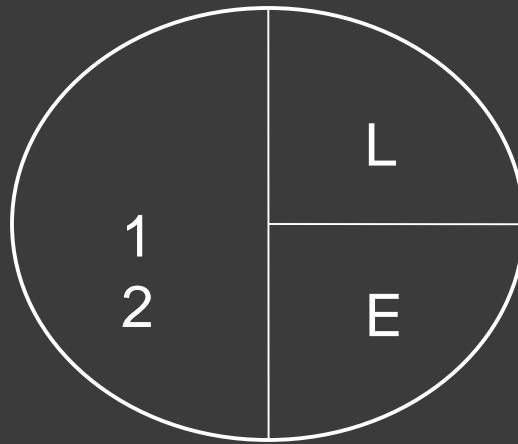


Figure 4



- An arbitrary number at the left hand half represents the event number.
-
- Right hand top segment is meant for Earliest Event (EET) denoted by E. EET is the earliest time by which the event should be reached.
-
- Right hand bottom portion is for recording Latest Event Time (LET) denoted by L. LET is the latest time by which the event should be reached or the previous activity should be completed.

As a corollary, an event which does not have any preceeding activity is a Start Event. Similarly an event which has no succeeding activity is called the End Event. For these two events $EET=LET$. For the rest of the events these may or may not be equal.

PRET/CPM technique rests on interdependence of events. In this technique events start, end or otherwise-activities succeeding or preceding-are the building blocks.

The actual process has the following steps:

1. Clear perception of goals, including who should perform what activities and when and how using what type or resources.
2. List all the activities.
3. To each of the activities, identify whether it precedes or succeeds any given event. This determines the relationship or interdependence of the activities.

- a) Group the activities in order of precedence.
- b) Activities occurring simultaneously are put together.
- c) Processes should be arranged in natural order.
- d) Re-arrange the activities such that unnecessary dummy activities are eliminated and PERT diagram appears concise.

* The word network in general implies linking or coordination of two or more events or activities or computers or organisations. Computer to Computer through telecommunication.

- 5. Estimate time and resources required for each activity.
- 6. Calculate the critical path i.e. the path traced by a continuous chain of activities from the start event to end event such that, the cumulative duration is largest.

This is the process of PERT/CPM. However, there are some distinctions between PERT/CPM. These are:-

- a) PERT method is 'event' based and CPM is 'activity' based. This does not mean that PERT completely ignores 'activities' and CPM 'events'. It is a question of emphasis.
- b) PERT scheduling computations are based upon three time estimates and CPM based on single time estimates.
- c) PERT statistical approach is appropriate for scheduling and controlling project comprising primarily of activities whose actual duration time are subject to considerable amount of random variation.

- ◎ The PERT considers the following three time estimates for each event which are assumed based on the past experiences.
 - Optimistic Time (a) is the minimum reasonable time in which an activity can be completed if everything goes exceptionally well.
 - Pessimistic Time (b) is the maximum reasonable time in which an activity would be completed, if everything goes in advance manner.
 - Most Likely Time (M) is always somewhere between the above two values. It is the most realistic amount of time an activity might consume (In case of CPM).

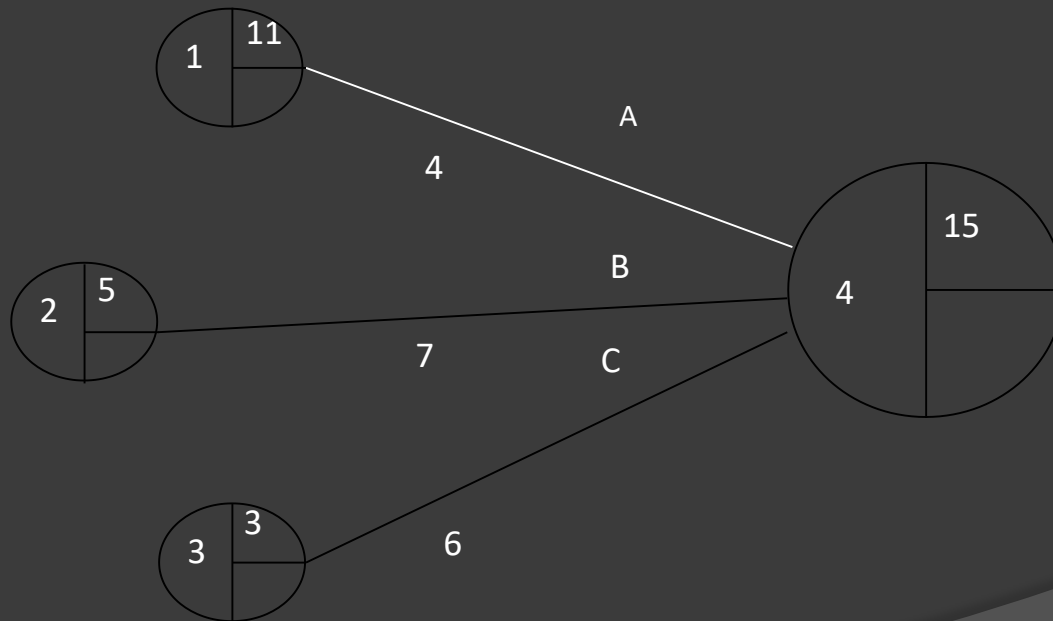
- Based on these three time estimates, in PERT method, the Expected Time Activity ($t_{(e)}$) for each activity is given by the following formula.

- $$t_{(e)} = \frac{a+4m+b}{6}$$

- As indicated earlier, for each event besides its own Expected Activities Time ($t_{(e)}$) there are two other time estimates. These are EET and LET explained already in the earlier section. These two are worked out in the following manner:

- **Earliest Event Time (EET)**

- Consider the following four events. Event 4 succeeds events 1, 2 and 3 which require activities A, B, C taking 4, 7, 6 days respectively.

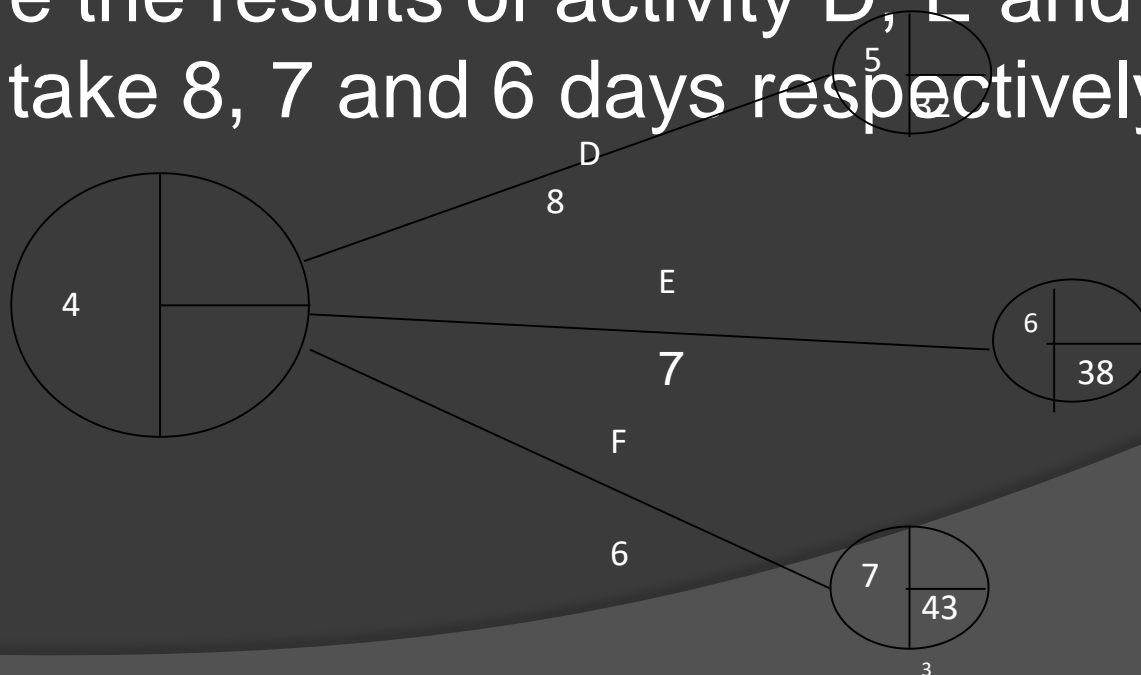


In turn EET for events 1, 2, 3 are 11, 3, 5 days respectively. Therefore EET for event 4 has to be

- ⦿ 15 (11+4) days owing to activities A
- ⦿ 10 (3+7) days Owing to activities B
- ⦿ 11 (5+6) days owing to activity C
- ⦿ Therefore in 15 days, the maximum of these, all the three activities will be completed. Hence, 15 days is the EET for event 4

- **Latest Event Time (LET)**

- Consider four other events, 4, 5, 6 and 7. Event 5, 6 and 7 succeeds event 4, and are the results of activity D, E and F which take 8, 7 and 6 days respectively.



⦿ Thus, the LET for event 4 is,

⦿

- 24 (32-8) days due to activity D.

- 31 (38-7) days due to activity E.

- 37 (43-6) days due to activity F.

⦿ Therefore in 24 days, the latest of three is the latest time by which event 4 has to be completed. In other words, LET is calculated backward, while EET is forward calculation.

PERT has both advantages and disadvantages

◎ **Advantages are:**

1. The successive activities constituting a project can be identified clearly and precisely. There by if undergoes rigorous planning of the tasks and increases the co-ordination among the various activities of the project.
2. As a planning tool it enables one to estimate:
 - a. The time requires to completing the proposed project.
 - b. Optimum allocation of resources for the activities.

3. As a scheduling technique it provides a means for establishing time schedule for activities.
4. As a result of 3 above, it serves as a control device by allowing one to check scheduled time against actual time for the activity duration.
5. Method enables to see immediately the likely effect of delays or other problems in any one area.

- One of the major disadvantages of this method is owing to the uncertainties regarding procurement of resource and performance of people. However, no method can precisely forecast and ensure certainties regarding these two factors.
- Nevertheless, a PERT technique has all the ingredients of planning and controlling the automation project for

