Using PERT to Plan and Schedule Your Documentation Projects

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Program Evaluation and Review Technique(PERT) is a proven project management tool that can be applied to documentation projects. PERT is used to identify: (a) the interrelationships between the various milestones of a project, and (b) the critical path of activities, the path where more resources should be concentrated to complete the project on schedule. A PERT network is a graphical representation of the plan and schedule of the project. The technique is effective in non-repetitive documentation projects where project managers have an accurate assessment of their resources.

PERT IN DOCUMENTATION PROJECTS

As a documentation project manager, you could monitor a project more efficiently if you were able to identify the interrelationships between the various milestones in a project. No matter how simple or complex your documentation project appears to be, you would benefit from a tool that could chart the milestones of a project and represent the interrelationships between these milestones. PERT does just that and, in doing so, helps to you plan and schedule your projects by identifying the areas that need the greatest concentration of your resources.

ORIGIN OF PERT

The U.S. Navy Special Projects Office, in collaboration with Lockheed and the management consulting firm of Booz, Allen & Hamilton, developed PERT for the Polaris Program in January 1958. The Navy was faced with the problem of coordinating some 3000 contractors, subcontractors, and suppliers. Using PERT, the Navy was able to make the Polaris program operational two years ahead of its original schedule.(1) Since then, a wide range of governmental and private agencies have used PERT as a project management tool.

PERT combines aspects of GANTT charts with inferential analyses derived from the network approach used in electrical engineering, fluid dynamics and related scientific disciplines.(2)

USING PERT IN YOUR DOCUMENTATION PROJECTS

PERT works by identifying the interrelationships between the various milestones of a project. Every individual responsible for a phase of the project presents an estimate of the time required to complete that phase.(3) A phase may consist of more than one milestone. All the phases and their corresponding time estimates are charted on a PERT network which is a graphical representation of the plan and schedule of the project.

A PERT network is composed of two elements: (a) event, and (b) activity. An event is a specific task accomplished at a recognizable point in time.(4) An activity is the work that is required to accomplish an event. For example, in a documentation project, the creation of a user profile, could bean event. There are three possible activities that accomplish the event, creation of a user profile: interviewing the users; recording their work habits; and gathering information about the turnover rates among users.

Events take no time in themselves and are the beginning and the end points of various activities. In other words, an event represents a specific milestone in the project whereas an activity represents the actual work done and the time needed to reach a specific milestone.

Table 1 lists some events and related activities involved in the creation of an information plan of a user document. The information plan shows you how to manage your documentation project and provides the preliminary estimates of schedule and budget required to complete the project.(5)

Table 1: Selection of events and activities in the Information planning stage of a documentation project.

Event	Activity
User File	Ž Interview users on percieved need for documentation Ž Record work habbits Ž Assess turnover rates.
Task Analysis	Ž Develop task inventory. Ž Conduct surveys and interviews. Ž Study prototypes.
User/Task Matrix	• Establish relationships between user group and tasks.
Task Description	Ž Identify specific tasks that the user documentation will address. Ž Discuss task with subject matter experts.
Information Plan	Ž Discuss design implication of the manual. • Discuss documentation strategies. Ž Identify constraints and problems. Ž Integrate user/task information.

Fig. 1 is a simple PERT network which depicts the relationships between the events and the activities featured in Table 1. The events are represented by circles and the activities by arrows joining the circles. The physical time required by the various activities is represented in calendar weeks. To ease understanding of this network, each circle has been labeled with a description of the event. In a more complex network, involving many circles and arrows, the descriptions are deleted and numbers only are used.

In a PERT network, the time required for an activity is denoted in calendar weeks. Use the following equation to calculate calendar weeks:

$$\text{Calendar Week} = \frac{\text{No. of working days required}}{\text{No. of working days per week}}$$

The expected time for any activity (T) is calculated (an algebraic calculation, using the weighted average method) in calendar weeks by the following equation.(6)

$$T = \frac{a + 4b + c}{6}$$

where, a = most optimistic time; b =most likely time; c = most pessimistic time

For example, if a = 2 weeks, b = 3 weeks, c = 4 weeks, then:

$$T = \frac{2 + (4)3 + 4}{6} = \frac{18}{6} = 3 \text{ weeks}$$

Using assumed values for a, b and c for the activities in Fig. 1, we shall plot the values of T against the corresponding activities in the project. Each element of time in the network represents the time required to complete the event that appears to the right of the arrow. The event to the right of an arrow is also known as the ending event. For example, the time required in the path 1-2 (two weeks) represents the time required to accomplish the ending event, 2 (creating the user profile).

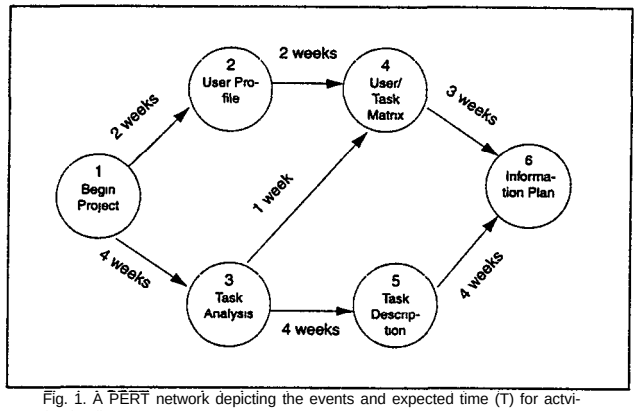

Fig. 1. A PERT network depicting the events and expected time (T) for actvities leading to an event.

To help us determine the influence of the individual events on the overall schedule of the project, we shall use the following concepts of a PERT network:

- Earliest Expected Date
- Latest Allowable Date
- Slack

Earliest Expected Date (TE)

The earliest expected date (TE) is the earliest possible date that a particular event can be accomplished.(7) In Fig. 1, there are three possible paths through the network:

- 1-2-4-6
- 1-3-5-6
- 1-3-4-6

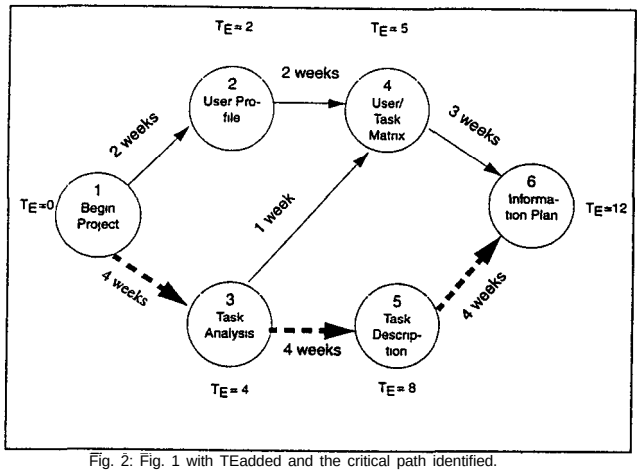

Fig. 2: Fig. 1 with TEadded and the critical path identified.

Path 1-2-4-6 takes seven weeks, path 1-3-4-6 takes eight weeks and path 1-3-5-6 takes 12 weeks. Since all the events have to occur before the project is considered complete, you will have to wait five additional weeks after completing path 1-2-4-6 and four additional weeks after completing path 1-3-4-6. So the earliest expected date for the network—and the project—is 12 weeks.

The path 1-3-5-6, represented by dashed arrows, is also called the critical path. To achieve any reduction in overall project duration, you must reduce the activities or the time taken to perform the activities along this path. Therefore, to reduce the T_E of the entire project, you must reduce the T_E of activities along the critical path.

Latest Allowable Date (T_L)

The latest allowable date(T_L) is the latest possible date for an event to take place and still not interfere with the scheduled date of the entire network.(8) In Fig. 2, using path 1-3-4, you would expect to complete event 4 five weeks after initiation of the project. After completing event 4, you will need three more weeks to complete that component of the information plan which you eventually expect to complete in a sum total of 12 weeks.

A closer look reveals that the total project schedule of 12 weeks is the result of the time taken by the critical path, 1-3-5-6. Thus, you could complete event 4 in later than five weeks and still not interfere with the schedule of the entire project. Therefore, event 4 could be completed in nine weeks latest and you would still be within the project's scheduled completion time of 12 weeks.

The significance of T_L is that it gives you the latest possible time (see Fig. 3) within which you can achieve an event and still be within the scheduled project completion time.

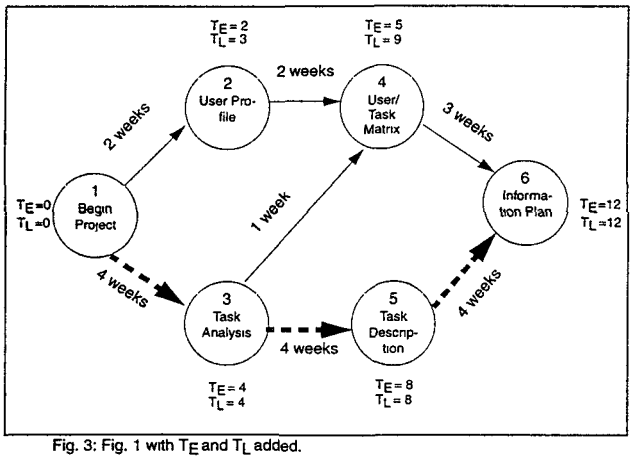

Fig. 3: Fig. 1 with T_E and T_L added.

Slack (S)

Slack(S) is the difference between the latest allowable date and the earliest expected date. The significance of slack is that it shows you where:

- You can let the expected date slip (S>0) .
- You must complete an event on time (S= 0) .

In Fig. 4, the slack time is tallied against the latest allowable date and the earliest expected date. The slack time for event 4 is four weeks. In other words you could complete event 4 four weeks after the earliest expected date and still be within the project schedule. On the other hand, event 5 has to be completed within the expected date, eight weeks, and you must concentrate all your resources to achieve this deadline or else your overall project schedule will slip.

Slack helps you pinpoint events along the critical path in a network where you need to concentrate your greatest resources.

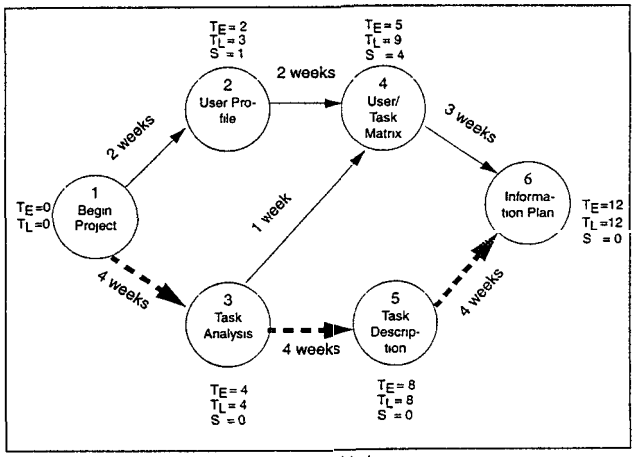

Fig.4: Fig.1 with T_E, T_L and slack time added.

Attributes of PERT

Here are some benefits of using PERT to plan and schedule your documentation projects:

PERT as an Analytical Tool. Perhaps the most attractive feature of PERT is that it identifies the interrelationships between events and activities. Besides identifying the critical path and the schedule, the network reflects all changes in schedule due to slips in activities and locates the non-critical activities that may have resources available for critical activities.(9)

Detail of a PERT Network. There is no physical limit to the number of events and activities that you can depict in a network. The complexity of a network is often influenced by the magnitude and diversity of a project. For example, the production of a software user manual of approximately 150 pages may involve as many as 20 events and twice that many activities.

Improved Progress Reporting. Using PERT, you can report on the present as well as the likely impact of the present on future events. This aids the process of anticipatory management, a technique of predicting circumstances

before they actually occur.(10) Moreover, you can use PERT to look at activities and events with reference to the total project. As events occur, it is immediately possible to evaluate their impact on the critical path. Most other progress reporting techniques are historical by nature and lack the dynamic nature of PERT.

Reporting by Management Level. You can tailor PERT networks with respect to the management level that you are reporting to. Depending on your intended audience, you can alter the extent of detail in a PERT network.

Communication. The networks and its graphical representations clearly identify who is responsible for what in the project and help facilitate the communication process. When you use PERT, it will demonstrate to your potential client that you know what you are doing and that you have carefully thought through the entire project.(11)

Inadequacies of PERT

Like most popular planning and scheduling tools, PERT has its drawbacks. Here are some inadequacies that you may discover while using PERT

Inability to Secure Realistic Time Estimates. PERT cannot help you find a realistic time estimate when it involves a project with which your department has little or no experience. A network built on inaccurate time estimates may jeopardize the planning process. In other words, to gain the advantage of a PERT network, you need to have realistic time estimates in the first place.

No Restrictions on Network Detail. Since PERT is relatively simple to apply, there is a tendency to over-analyze the detail of a PERT network to a point where it becomes unnecessary. PERT is a management tool but is no more efficient than the individuals who identify all the events and activities and design the network. PERT cannot simplify a network that already has been complicated by over-detailing.

Training and Application. To use PERT effectively in your documentation projects, you will need to train on and practice using PERT.

Assumption That Resources Can Be Made Available as and When Needed. There is an assumption in PERT that the required resources can always be made available by diverting a resource from a non-critical path to a critical path.(12) This is not always the case. For instance, you might determine from the network that indexing tasks are not as critical as writing all the procedures for the document. Although theoretically possible in PERT, you may find that in reality, you cannot reorient indexing resources to fulfil procedure writing requirements.

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