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The E- project manager

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ABSTRACT: *Software Engineering is an approach to build with a systematic & scientific way instead of ad hoc basis. Through tools, techniques & procedures laid by Software Engineering are powerful & very useful in long term but at times they are quite tedious & developers may ignore those things. And the worst thing is that people who develop the software for all does not have optimum & versatile software for their own purpose.*
Keywords – *Project estimation, Activity planning, System design, Critical path method, Program evaluation and review technique, Function point analysis.*

I. INTRODUCTION

In our project, we are attempting to give computerized solution for few elements of Software Engineering. Modules Covered: Two main area of Software Estimation & Activity Planning will be covered in this project and that areas are as follows:
a) Software Estimation
b) Activity Planning with Optimization
A project means a group of activities that need to be done in order to accomplish a set objectives in a specific time and with available resources

1. Project management:

Project Management technique is used by Project manager to ensure successful completion of project. Project management involves the planning, monitoring, and control of the people, process, and events that occurs as software evolves from a preliminary concept to an operational implementation.

2. Why is project management required?

Building computer software is a complex undertaking, particularly if it involves many people working over a relatively long time. That's why software projects need to be managed.

II. WHAT DOES E-PROJECT MANAGER DO?

1. Software Estimation:

The most tedious & most error prone part is estimation of time & money for any software development. Powerful methods CPM (Critical Path Method), FPA (Function Point Analysis), PERT (Programmed Evaluation & Review Techniques) is provided in Software Engineering for the same but due to lot of tedious calculation very few project managers are using i.e. will develop a tool which will take Function parameters as input & will calculate Function Point which will further calculate time required & cost involved in developing software.

2. Feasibility study for proposed system:

Feasibility is carried out whenever there is a complex problem is arrives. When we want to develop any computerized system, it is necessary to examine whether the developed computerized system is feasible or not i.e. feasibility study is undertaken to determine the possibly or probability of either improving the existing system or developing a completely new system [1]. Accomplishing following studies can do this…

2.1 Operational feasibility
2.2 Technical feasibility
2.3 Economical feasibility

2.1 Operational Feasibility:

Will the system be used if it is implemented? Will there be resistance from user? This is necessary because equipment does not cry but people do cry in existing system a worker should have job security. It also considers the current work practices and procedures support a new system

"E- Project Manager" software provides a computerized software engineering tools that handled by only the person who have knowledge about software engineering [2]. Because this software provides tools for software project planning and estimation while you want to build any software.

2.2 Technical Feasibility:

It can work for the project with the present equipment, procedures, existing software technology and alternatives needed in present system. It will require a close examination of a processing system it ask question related to:

a) Sufficiency of available technology
b) Sufficiency of hardware
c) Availability of computer

2.3 Economical Feasibility:

It considers how can we establish the cost-effectiveness of the proposed system i.e. if the benefits do not outweigh the costs then it is not worth going ahead .The development of project is completed at a low cost. The Cost involves in software packages required for our project only.

III. System design

This article describes the overall system design of "E-Project Manager Software" that means how "E-Project Manager" work is and also describes modules covered within our project.
In short, "E-Project Manager Software" is one of the computerized software engineering tool that provides the planning of whatever action (when any software is to be built) necessary to ensure that project activities are completed on time, within budget.

3.1 Activity Planning with Optimization:

Project Planning is also tedious job & Software Engineering gives a tool of Network Diagram for calculating optimum time requirement by using CPM (Critical Path Management). We will give computerized solution which will give ready planning sheet.

3.2 Why is activity planning needed?

To build complex system, many software engineering tasks occur in parallel and the result of the work performed during one task may have a profound effect on work conducted in another task. These dependencies are very difficult to understand without a schedule. It's also virtually impossible to assess progress on a moderate or large software project without a detailed scheduled. So, activity planning of project is needed and for this, Critical Path Method (CPM) is one of the project scheduling method is used [3].

3 E-Project Manager Software modules

1. Activity Planning with Optimization using Critical Path Method (CPM).
2. Program Evaluation & Review Techniques (PERT).
3. Software Estimation using Function Point Analysis (FPA).

1. Critical Path Method (CPM):

A complex project must be well planned, especially if a number of people are involved. It is the task of management to undertake the planning and to ensure that the various tasks required in the project are completed in time. Operational researchers developed a method of scheduling complex projects shortly after the Second World War. It is sometimes called network analysis, but is more usually known as critical path analysis (CPA) [4]. Its virtue is that it can be used in a wide variety of projects, and was, for example, employed in such diverse projects as the Apollo moon shot, the development of Concorde, the Polaris missile project and the privatization of the electricity and water boards. Essentially, CPA can be used for any multi-task complex project to ensure that the complete scheme is completed in the minimum time. Although its real potential is for helping to schedule complex projects, we will illustrate the use of CPA by applying it to rather simpler problems. You will often be able to solve these problems without using CPA, but it is an understanding of the concepts involved in CPA which is being developed here.

The Critical Path Method (CPM) is one of several related techniques for doing project planning. CPM is for projects that are made up of a number of individual "activities." If some of the activities require other activities to finish before they can start, then the project becomes a complex web of activities.

CPM models the activities & events of a project as a network. Activities are depicted as nodes on the network & events that signify the beginning or ending of activities are depicted as arcs or lines between the nodes. The following is an example of a CPM network diagram:

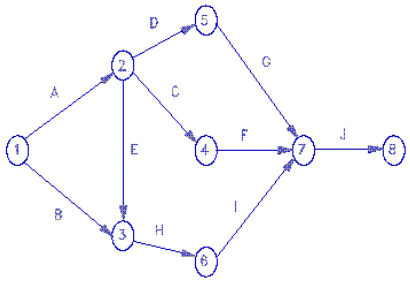

Fig.1: CPM Network Diagram

1.1 Steps in CPM Project Planning:

1.1.1 Specify the individual activities.
1.2.2 Determine the sequence of those activities.
1.2.3 Draw a network diagram.
1.2.4 Estimate the completion time for each activity.
1.2.5 Identify the critical path (longest path through the network)
1.2.6 Update the CPM diagram as the project progresses.

1.1.1 Specify the Individual Activities:

From the work breakdown structure, a listing can be made of all activities in the project. This listing can be used as the basis for adding sequence & duration information in later steps.

1..1.2 Determine the Sequence of the Activities:

Some activities are dependent on the completion of others. A listing of the immediate predecessors of each activity is useful for constructing the CPM network diagram.

1.1.3 Draw the Network Diagram:

Once the activities and their sequencing have been defined, the CPM diagram can be drawn. CPM originally was developed as Activity on Node (AON) network, but some project planners prefer to specify the activities on the arcs.

1.1.4 Estimate Activity Completion Time:

The time required to complete each activity can be estimated using past experience. CPM is a deterministic model that does not take into account variation in the completion time, so only one number is used for an activity's time estimate.

1.1.5 Identify the Critical Path:

The critical path is the longest-duration path through the network. The significance of the critical path is that the activities the lie on it cannot be delayed without delaying the project. Because of its impact on the entire project, critical path analysis is an important aspect of project planning.
The critical path can be identified by determining the following four parameters for each activity:

ES - Earliest Start time: The earliest time at which the activity can start given that its precedent activities must be completed first.
EF - Earliest Finish time: This is equal to the earliest start time for the activity plus the time required to complete the activity i.e. Earliest Start - Duration.

LF - Latest Finish time: The latest time at which the activity can be completed without delaying the project.

LS - Latest Start time: It is equal to the latest finish time minus the time required to complete the activity i.e. Latest Finish - Duration.

The slack time for an activity is the time between its earliest & latest start time, or between its earliest & latest finish time. Slack is the amount of time that an activity can be delayed past its earliest finish without delaying the project [5]. The critical path is the path through the project network in which none of the activities have slack, that is, the path for which ES = LS and EF = LS for all activities in the path. A delay in the critical path delays the project.

Similarly, to accelerate the project it is necessary to reduce the total time required for the activities in the critical path.

1.1.6 Update CPM Diagram:

As the project progresses, the actual task completion time will be known and the network diagram can be updated to include this information. A new critical path may emerge, and structural changes may be made in the network if project requirements change.

2. Program Evaluation and Review Technique (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. Shish AikatProgram Evaluation and Review Technique (PERT) is a USING PERT IN YOUR DOCUMENTATION proven project management tool that can be applied to PROJECTS documentation projects. PERT is used to identify: (a) the interrelationships between the various milestones of a PERT works by identifying the interrelationships project, and (b) the critical path of activities, the path between the various milestones of a project. Every individual where more resources should be concentrated to complete responsible for a phase of the project presents the project on schedule. A PERT network is a graphical estimate of the time required to complete that phase. (3) Representation of the plan and schedule of the project. The A phase may consist of more than one milestone. All the technique is effective in non-repetitive documentation phases and their corresponding time estimates are projects where project managers have an accurate assess- charted on a PERT network which is a graphical represent of their resources. Sensation 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 be an 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.

PERT is a manager's tool for defining and coordinating moves for completing a project's objectives on time. Its use is not restricted to the business world [6]. It can be applied to any endeavor which requires planned, controlled, and integrated work patterns. More often than not, diversified activities contribute to the difficulty in completing a project on schedule. Many uncertainties are associated with these activities. PERT is a technique that statistically presents knowledge about these uncertainties. To show this more clearly, let's view the preparation of this manual, as the project under consideration. Obviously, many different activities, such as writing, reviewing, editing, and printing, will contribute to preparing a PERT management manual. Many uncertainties are associated with these activities. In our discussion, we will use PERT to generate statistical information about the uncertainties. This information will then be used to establish better managerial control over the project. Program evaluation and review technique (PERT) charts depict task, duration, and dependency information [7]. Each chart starts with an initiation node from which the first task, or tasks, originates. If multiple tasks begin at the same time, they are all started from the node or branch, or fork out from the starting point. Each task is represented by a line which states its name or other identifier, its duration, the number of people assigned to it, and in some cases the initials of the personnel assigned. The other end of the task line is terminated by another node which identifies the start of another task, or the beginning of any slack time, that is,

waiting time between tasks. Each task is connected to its successor tasks in this manner forming a network of nodes and connecting lines. The chart is complete when all final tasks come together at the completion node. When slack time exists between the end of one task and the start of another, the usual method is to draw a broken or dotted line between the end of the first task and the start of the next dependent task.
A PERT chart may have multiple parallel or interconnecting networks of tasks. If the scheduled project has milestones, checkpoints, or review points (all of which are highly recommended in any project schedule), the PERT chart will note that all tasks up to that point terminate at the review node. It should be noted at this point that the project review, approvals, user reviews, and so forth all take time. This time should never be underestimated when drawing up the project plan. It is not unusual for a review to take 1 or 2 weeks. Obtaining management and user approvals may take even longer.

When drawing up the plan, be sure to include tasks for documentation writing, documentation editing, project report writing and editing, and report reproduction. These tasks are usually time-consuming, so don't underestimate how long it will take to complete them.

PERT charts are usually drawn on ruled paper with the horizontal axis indicating time period divisions in days, weeks, months, and so on. Although it is possible to draw a PERT chart for an entire project, the usual practice is to break the plans into smaller, more meaningful parts [8]. This is very helpful if the chart has to be redrawn for any reason, such as skipped or incorrectly estimated tasks. Many PERT charts terminate at the major review points, such as at the end of the analysis. Many organizations include funding reviews in the projects life cycle. Where this is the case, each chart terminates in the funding review node. Funding reviews can affect a project in that they may either increase funding, in which case more people have to make available, or they may decrease funding, in which case fewer people may be available. Obviously more or less people will affect the length of time it takes to complete the project. PERT is a variation on Critical Path Analysis that takes a slightly more skeptical view of time estimates made for each project stage. To use it, estimate the shortest possible time each activity will take, the most likely length of time, and the longest time that might be taken if the activity takes longer than expected. Use the formula below to calculate the time to use for each project stage:

1.1 Optimistic Time -- the minimum time period in which the activity can be Accomplished, i.e., the time it would take to complete it if Everything proceeded better than expected. (Labeled a.)

1.2 Most Likely Time -- the best estimate of the time period in which the activity Can be accomplished, i.e., the estimate submitted if one (Only) had been requested. (Labeled m.)

1.3 Pessimistic Time -- the maximum time period it would take to accomplish the Activity, i.e., the time required if everything went wrong, Excluding major catastrophes. (Labeled b.)

Optimistic time (a) + 4 x Most Likely time (m) + Pessimistic time (b)

This helps to bias time estimates away from the unrealistically short time-scales normally assumed.
Key points:
Critical Path Analysis is an effective and powerful method of assessing:

- What tasks must be carried out.
- Where parallel activity can be performed.
- The shortest time in which you can complete a project.
- Resources needed to execute a project.
- The sequence of activities, scheduling and timings involved.
- Task priorities.
- The most efficient way of shortening time on urgent projects.

An effective Critical Path Analysis can make the difference between success and failure on complex projects. It can be very useful for assessing the importance of problems faced during the implementation of the plan. PERT is a variant of Critical Path Analysis that takes a more skeptical view of the time needed to complete each project stage.

3 Function Point Analysis (FPA)

It is a reliable method for measuring the functional size of software. The functional size reflects the amount of functionality i.e. relevant to and recognized by user. The unit of measurement is "Function Point". So, FPA expresses the functional size of software in a number of functional points. One of the initial design criteria for function points was to provide a mechanism that both software developers and users could utilize to define functional requirements [12, 13, 14]. It was determined that the best way to gain an understanding of the users' needs was to approach their problem from the perspective of how they view the results an automated system produces.

Therefore, one of the primary goals of Function Point Analysis is to evaluate a system's capabilities from a user's point of view. To a chieve this goal, the analysis is based upon the various ways users interact with computerized systems.

From a user's perspective a system assists them in doing their job by providing five (5) basic functions. Two of these address the data requirements of an end user and are referred to as Data Functions. The remaining three addresses the user's need to access data and are referred to as Transactional Functions.

3.1 Why is software estimation needed?

Software estimation is a form of problem solving that resolves the problems such as determination of developing cost, effort, resources, and time in which software-based system to be completed. It would seem reasonable to develop an estimate before you start creating the software. In our project, Function Point Analysis (FPA) is used for estimating software.

The Five Components of Function Points

1) Data Functions
2) Internal Logical Files
3) External Interface Fill
4) Transactional Functions
5) External Inputs
6) External Outputs
7) External Inquiries

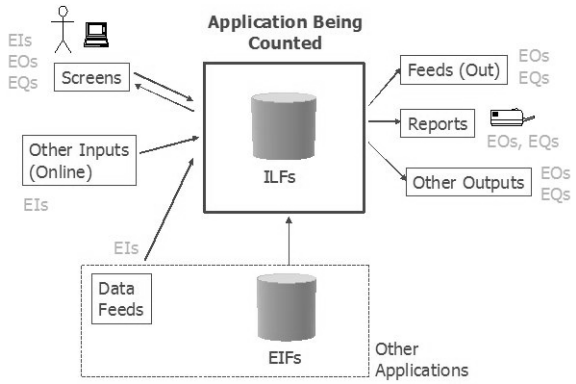

Fig.2: The view of a software application from the eyes of a Function Point practitioner.

In addition to the five functional components described above there are two adjustment factors that need to be considered in Function Point Analysis.

3.2 Unadjusted Function Point (UFP):

It is the first adjustment factor considers the Functional Complexity for each unique function. Functional Complexity is determined based on the combination of data groupings and data elements of a particular function. The number of data elements and unique groupings are counted and compared to a complexity matrix that will rate the function as low, average or high complexity. Each of the five functional components (ILF, EIF, EI, EO and EQ) has its own unique complexity matrix. UFP is calculated by addition of total weights of ILF, EIF, EI, EO and EQ.

3.3 Value Adjustment Factor (VAU):

This factor considers the system's technical and operational characteristics and it is based on 14 general system characteristics (GSC's) that rate the general functionality of the application being counted. Each characteristic has associated descriptions that help determine the degrees of influence of the characteristics. The table below is intended to provide an overview of each GSC:

Adjusted Function Point (AFP)

The final Function Point Count is obtained by multiplying the VAF times the Unadjusted Function Point (UAF).

FP = UAF * VAF

Formula for calculating fp/day as follows:

FP per Day = FPs / Man-hour

Three magic formulas

1) Project Duration:

The formula states that the duration of a project is equal to 2.5 times the cube root of the work months, or:

Project Duration = 2.5 * (Cube Root of Work Months)

Where Work Months is defined as

Work Months = (Project Work Effort (Hours)) / (Hours per Month)

2) Optimum Staffing Size:

Optimum Staffing Size = Square Root of Work Months

3) Minimum Duration:

The last magic formula states that the minimum duration of a software project is:

Project Duration = 0.75 * (Cube Root of Work Months)

IV. IMPLEMENTATION

Implementation is the process of converting a new or revised system design into an operational one. Conversion is one aspect implementation.

Four types of implementation are as follows:

1) Implementation of computer system to replace manual system.

2) Problem encountered are converting files, user training, creating accurate files, and verifies printouts for integrity.

3) Implementation of new computer system to replace an existing one.

4) Implementation of modified application to replace an existing one, using the same computer.

In this project, first type of implantation is used.

Conversion means changing from one system to another. The objectives are to put the tested system into operation while holding risks and irritation.

V. CONCLUSION

As to build the software is tedious job, so our "E-Project Manager Software" provides computerized tools i.e. Activity Planning and Software Estimation while planning the software project.

Our software shows the activities that are critical and difficult to maintain the schedule and activities which will perform parallel to another activity. It also gives critical path for project completion, slack time of

project and time to be spent for each activity. It calculates size of software in term of function points. Function point can be anticipated that the overall rate of progress in software productivity and software quality will improve. Understanding software size is the key to understanding both productivity and quality. It calculates minimum project duration, work months, optimum staffing size and total cost of project.

In short"E-Project Manager Software" provides the tools which give the efficient way for how you complete your project within available time and resources and your budget, so it reduces cost of project. And because of planning, it will avoid the errors in your project and ensure success of your software project.

VI. FUTURE SCOPE

1. Reduces your variable:

In the business day, there are too many variables to deal with you shouldn't have to wasting precious mental energy on recordkeeping. Project management software lets you focus on your day-to-day operations. Other advantages of a complete project management software; it helps maintain your entire operations system.

2. Enhance your Winning Edge:

It will avoid failure in your project & so it will ensure the success of the project.

3. It allows to prioritize activities for the effective management of project completion, and to shorten the planned critical path of a project by pruning critical path activities, by "fast tracking" (i.e., performing more activities in parallel), and/or by "crashing the critical path" (i.e., shortening the durations of critical path activities by adding resources).

3.1 Helps to speed up your project
3.2 Provides tool to complete your project within available time, so reduces cost.
3.3 Helps to understand complexity of your project.

VII. USER'S MANUAL

The E-Project Manager Software is written in Visual basic 6.0 and to the system following steps are required:

1. Start the computer.
2. Obtain the windows application.
3. Run the application program.

After running the application program, first you will get the main form which will give you two options i.e. 1.

1. CPM.

By clicking on CPM, you will get menu-driven form of CPM which gives submenus for adding and moving node, creating edges, entering and updating expected time and job titles, calculating CPM, etc. . . .In addition to this, it also provides command buttons also for same submenus.

In this way u can see all menu and its submenus …..Finally by clicking on exit menu, u can exit from the application.

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