



LECTURE THREE

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PROGRAMME: BSC. COMPUTER SCIENCE

LEVEL: 300

SOFTWARE PROJECT MANAGEMENT

Software Project Management

The job pattern of an IT company engaged in software development can be seen split in two parts:

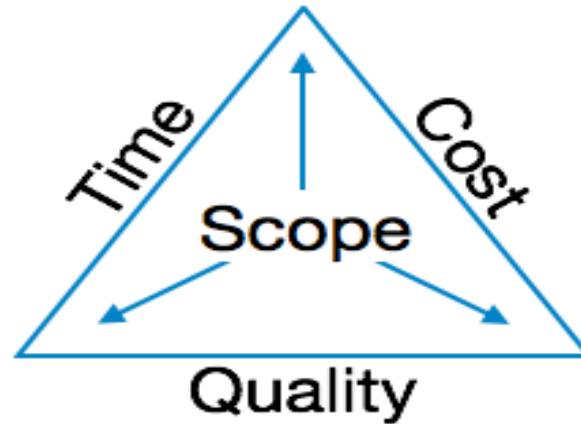
- Software Creation
- Software Project Management

A **project** is well-defined task, which is a collection of several operations done in order to achieve a goal (for example, software development and delivery). A Project can be characterized as:

- Every project has a unique and distinct goal.
- Project is not routine activity or day-to-day operations.
- Project comes with a start time and end time.
- Project ends when its goal is achieved hence it is a temporary phase in the lifetime of an organization.
- Project needs adequate resources in terms of time, manpower, finance, material and knowledge-bank.

Software Project Management

Software Project



The image above shows triple constraints for software projects. It is an essential part of software organization to deliver quality product, keeping the cost within client's budget constrain and deliver the project as per scheduled. There are several factors, both internal and external, which may impact this triple constrain triangle. Any of three factor can severely impact the other two. Therefore, software project management is essential to incorporate user requirements along with budget and time constraints.

Software Project Management

Software Project Manager

° A **software project manager** is a person who undertakes the responsibility of executing the software project. Software project manager is thoroughly aware of all the phases of SDLC that the software would go through.

Project manager may never directly involve in producing the end product but he controls and manages the activities involved in production.

A **project manager** closely monitors the development process, prepares and executes various plans, arranges necessary and adequate resources, maintains communication among all team members in order to address issues of cost, budget, resources, time, quality and customer satisfaction.



Responsibilities of a Project Manager

- Act as project leader
- Liaison with stakeholders
- Managing human resources
- Setting up reporting hierarchy etc.

Managing Project

- Defining and setting up project scope
- Managing project management activities
- Monitoring progress and performance
- Risk analysis at every phase
- Take necessary step to avoid or come out of problems
- Act as project spokesperson

Software Management Activities

- Software project management comprises of a number of activities, which contains planning of project, deciding scope of software product, estimation of cost in various terms, scheduling of tasks and events, and resource management. Project management activities may include:

Project Planning

Scope Management

Project Estimation

Software Management Activities

Project Planning

- Software project planning is task, which is performed before the production of software actually starts. It is there for the software production but involves no concrete activity that has any direction connection with software production; rather it is a set of multiple processes, which facilitates software production. Project planning may include the following:

Scope Management

It defines the scope of project; this includes all the activities, process need to be done in order to make a deliverable software product. Scope management is essential because it creates boundaries of the project by clearly defining what would be done in the project and what would not be done. This makes project to contain limited and quantifiable tasks, which can easily be documented and in turn avoids cost and time overrun.

Software Management Activities

Scope Management

- ° During Project Scope management, it is necessary to -
 - Define the scope
 - Decide its verification and control
 - Divide the project into various smaller parts for ease of management.
 - Verify the scope
 - Control the scope by incorporating changes to the scope

Software Management Activities

Project Estimation

° For an effective management accurate estimation of various measures is a must. With correct estimation managers can manage and control the project more efficiently and effectively.

Project estimation may involve the following:

- Software size estimation
- Effort estimation
- Time estimation
- Cost estimation
- Empirical Estimation Technique

Software Management Activities

Project Estimation Techniques

- We discussed various parameters involving project estimation such as size, effort, time and cost.

Project manager can estimate the listed factors using two broadly recognized techniques –

Decomposition Technique

This technique assumes the software as a product of various compositions.

There are two main models -

Line of Code Estimation is done on behalf of number of line of codes in the software product.

Function Points Estimation is done on behalf of number of function points in the software product.

Software Management Activities

Empirical Estimation Technique

- This technique uses empirically derived formulae to make estimation. These formulae are based on LOC or FPs.

Putnam Model

This model is made by Lawrence H. Putnam, which is based on Norden's frequency distribution (Rayleigh curve). Putnam model maps time and efforts required with software size.

COCOMO

COCOMO stands for COConstructive COst MOdel, developed by Barry W. Boehm. It divides the software product into three categories of software: organic, semi-detached and embedded.

Project Scheduling

Project Scheduling in a project refers to roadmap of all activities to be done with specified order and within time slot allotted to each activity. Project managers tend to define various tasks, and project milestones and then arrange them keeping various factors in mind. They look for tasks lie in critical path in the schedule, which are necessary to complete in specific manner (because of task interdependency) and strictly within the time allocated. Arrangement of tasks which lies out of critical path are less likely to impact over all schedule of the project.

For scheduling a project, it is necessary to -

- Break down the project tasks into smaller, manageable form
- Find out various tasks and correlate them
- Estimate time frame required for each task
- Divide time into work-units
- Assign adequate number of work-units for each task
- Calculate total time required for the project from start to finish

Resource management

All elements used to develop a software product may be assumed as resource for that project. This may include human resource, productive tools and software libraries.

The resources are available in limited quantity and stay in the organization as a pool of assets. The shortage of resources hampers the development of project and it can lag behind the schedule. Allocating extra resources increases development cost in the end. It is therefore necessary to estimate and allocate adequate resources for the project.

Resource management includes -

- Defining proper organization project by creating a project team and allocating responsibilities to each team member
- Determining resources required at a particular stage and their availability
- Manage Resources by generating resource request when they are required and de-allocating them when they are no more needed.

Project Risk Management

Risk management involves all activities pertaining to identification, analyzing and making provision for predictable and non-predictable risks in the project. Risk may include the following:

- Experienced staff leaving the project and new staff coming in.
- Change in organizational management.
- Requirement change or misinterpreting requirement.
- Under-estimation of required time and resources.
- Technological changes, environmental changes, business competition.

Risk Management Process

There are following activities involved in risk management process:

- **Identification** - Make note of all possible risks, which may occur in the project.
- **Categorize** - Categorize known risks into high, medium and low risk intensity as per their possible impact on the project.
- **Manage** - Analyze the probability of occurrence of risks at various phases. Make plan to avoid or face risks. Attempt to minimize their side-effects.
- **Monitor** - Closely monitor the potential risks and their early symptoms. Also monitor the effects of steps taken to mitigate or avoid them.

Project Execution & Monitoring

In this phase, the tasks described in project plans are executed according to their schedules. Execution needs monitoring in order to check whether everything is going according to the plan. Monitoring is observing to check the probability of risk and taking measures to address the risk or report the status of various tasks.

These measures include -

Activity Monitoring - All activities scheduled within some task can be monitored on day-to-day basis. When all activities in a task are completed, it is considered as complete.

Status Reports - The reports contain status of activities and tasks completed within a given time frame, generally a week. Status can be marked as finished, pending or work-in-progress etc.

Milestones Checklist - Every project is divided into multiple phases where major tasks are performed (milestones) based on the phases of SDLC. This milestone checklist is prepared once every few weeks and reports the status of milestones.

Project Communication Management

Effective communication plays a vital role in the success of a project. It bridges gaps between client and the organization, among the team members as well as other stakeholders in the project such as hardware suppliers. Communication can be oral or written. Communication management process may have the following steps:

Planning - This step includes the identification of all the stakeholders in the project and the mode of communication among them. It also considers if any additional communication facilities are required.

Project Communication Management

Sharing - After determining various aspects of planning, manager focuses on sharing correct information with the correct person on correct time. This keeps every one involved the project up to date with project progress and its status.

Feedback - Project managers use various measures and feedback mechanism and create status and performance reports. This mechanism ensures that input from various stakeholders is coming to the project manager as their feedback.

Closure - At the end of each major event, end of a phase of SDLC or end of the project itself, administrative closure is formally announced to update every stakeholder by sending email, by distributing a hardcopy of document or by other mean of effective communication.

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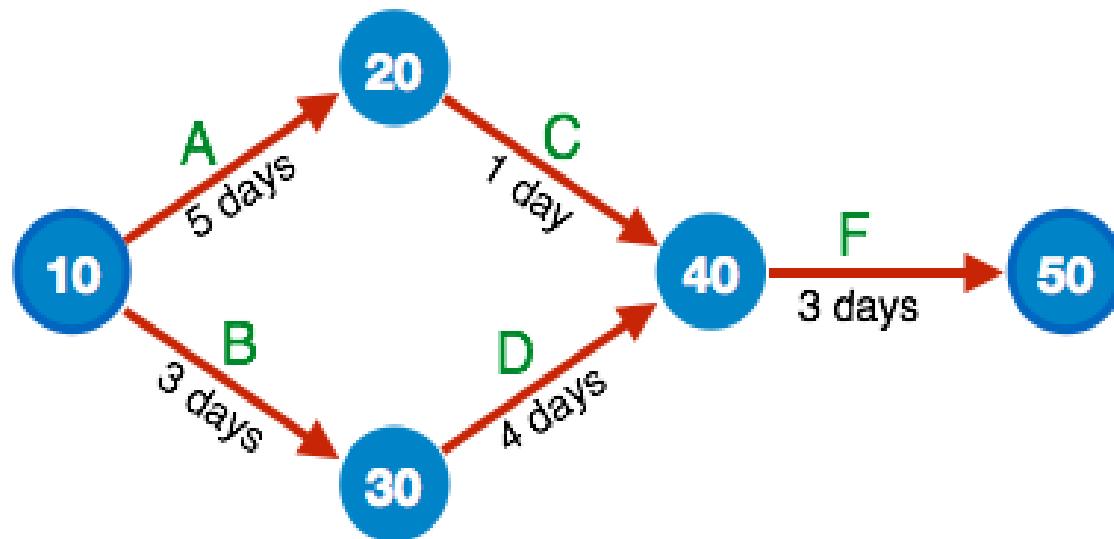
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Project Management Tools

PERT Chart

PERT (Program Evaluation & Review Technique) chart is a tool that depicts project as network diagram. It is capable of graphically representing main events of project in both parallel and consecutive way. Events, which occur one after another, show dependency of the later event over the previous one.



Events are shown as numbered nodes. They are connected by labeled arrows depicting sequence of tasks in the project.