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PROJECT MANAGEMENT SKILLS

In the previous lesson you have learnt about new trends in computing. In this lesson you will learn about what is project, and how to manage projects. This includes planning, scheduling and executing the project. A project is a temporary task, designed to produce a unique product, service or result. Here, temporary does not mean a short duration but a definite beginning and end. The end of the project could be deduced if project objectives are met or if it becomes clear that the objectives cannot be met and need of project no longer exists.

OBJECTIVES

After reading this lesson, you will be able to:
- define a project;
- enlist the knowledge areas of project management;
- explain project communication management;
- describe software configuration management.

27.1 PROJECT

Projects are a means of organizing activities that cannot be addressed within the organization's normal operational limits. These are, therefore, often utilized as a means of achieving an organization's strategic plan. The presence of repetitive elements does not change fundamental uniqueness of the project. Projects are progressively elaborated, i.e., developed in steps and continued by increments.

Projects are typically authorized as a result of one or more of the following strategic considerations:

- An organizational need (e.g., to increase revenues)

- A technological advance

- A market demand

- A legal requirement

- A customer request

Now let us see the examples of a project.

- Developing a new product or service

- Effecting a change in structure, staffing, or style of an organization

- Designing a new vehicle

- Developing or acquiring a new or modified information system

- Constructing a building or facility

- Building a water system for a community

- Implementing a new business procedure or process

Project management is the application of skills, knowledge, techniques, and tools used to meet project requirements. These are accomplished through the application and integration of the Project Management processes. Usually, projects are constrained by 'Triple Constraint' (Scope, Time & Cost). If any one of the three factors change, at least one other factor is likely to be affected. The "triple constraint" is used to help evaluate competing demands, quality, risk and customer satisfaction.

Project management cannot begin without the presence of a project manager. A project manager is a person who is assigned the responsibility of executing the complete project. A project manager is expected to be thoroughly aware of all the phases that the project would go through.

Project Management Skills

A project manager is expected to closely monitor the development process, prepare and execute various plans, arrange necessary and adequate resources, maintain communication among all team members in order to solve the issues related to cost, budget, resources, time, quality and customer satisfaction of the project.

Few key responsibilities that a project manager owns are:

Managing People

● Association with stakeholders

● Reporting hierarchy

● Act as a project leader

● Managing human resources

Managing Project

● Project scope - defining and setting up

● Monitoring and controlling progress and performance

● Risk analysis at every phase

● Proactively taking necessary steps to avoid problems or to come out of problems

● Act as project spokesperson

Project Management - Knowledge Areas

● Project Planning

● Scope Management

● Project Estimation

● Scheduling of tasks and events

● Resource management

Project Planning

This is performed before the production of software starts. It is essential for the successful software production but involves no concrete activity that has any direct connection with software production. It is a set of multiple processes, which facilitate software production.

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Scope Management

This process defines the scope of the project - includes all the activities, the processes that need to be carried out to make a deliverable software product. Scope management is essential because it defines boundaries of the project by clearly stating what would be done and what would not be done, in the project. This ensures that project contains limited and quantifiable tasks, which can easily be documented and in turn avoids cost and time overrun.

Scope management includes:

- defining the scope
- dividing the project into various smaller parts for ease of management.
- verifying the scope
- controlling the scope

Project Estimation

For an effective project management, accurate estimation of various measures is must. Correct estimation helps managers manage and control the project more efficiently and effectively. This includes:

- **Software size estimation**

  Software size is usually estimated in one of the following measures:

  - LOC (Line of Code) - Lines of code depend upon coding practices
  - Number of function points (FP) in the software - vary according to the user or software requirement.

- **Effort estimation**

  Efforts estimation is done in terms of man-hours required to produce the software and then the people needed for it. For effort estimation software size should be known. This can either be derived by organization's historical data, or managers' experience. Software size can be converted to efforts by using some standard formula.

- **Time estimation**

  Once size and efforts estimation is complete, the time required to produce the software can be estimated. Efforts required are further divided into sub categories as per the requirement specifications and interdependency of various components of software. Software tasks are broken down into smaller tasks, activities. The task scheduling is done on the day-to-day basis or in calendar months.

Total time invested in completing the project is the sum of the time required to complete all tasks in hours or days.

● **Cost estimation**

Considered to be the trickiest of all, cost estimation depends on more elements than any of the previous ones. It is required to consider the following points:

- Hardware
- Additional software or tools, licenses etc.
- Skilled personnel with task-specific skills
- Size of software
- Software quality
- Travel involved
- Communication
- Training and support

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Project Scheduling

In a project, project scheduling refers to a roadmap of all activities to be done in a specified order and within the time slot allotted to each activity. Project managers usually define various tasks and project milestones and then arrange them keeping various factors in mind. They look for tasks that lie in the critical (most important) path in the schedule, which are necessary to be completed within the time allocated. Arrangements of tasks that lie out of critical path are less likely to impact the overall schedule of the project.

For project scheduling, it is necessary to

- break down the project tasks into smaller, manageable form.
- estimate time frame required for each task.
- correlate various tasks.
- divide time into work-units.
- assign an adequate number of work-units for each task.
- calculate total time required for the project from start to finish.

Resource management

All elements that are used to develop a software product are considered as a resource for that project. This resource includes human resource, productive tools, and software licenses.

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

Resource management includes -

- Defining proper team structure for the project by creating a project team and allocating responsibilities to each team member.

- Determining the resources required at a given stage/activity and ensuring their availability.

- Managing resources by creating resource request as and when they are necessary and de-allocating them when they are no longer required.

27.1.1 Project Risk Management

Project risk management includes all activities corresponding to identification, analysis and readying for predictable and non-predictable risks in the project. A risk may include the following:

- Fluctuating skill maturity - Experienced staff leaving the project and new employee coming in.

- Change in organizational leadership.

- Requirement change / misinterpreting requirement.

- Under-estimation of required time and resources.

- Technological changes, environmental changes, business competition.

Risk Management Process

Following activities are part of risk management process:

- **Identification -** Making a note of all possible risks, which may occur in the project.

- **Categorize -** Categorizing known risks into high, medium and low-risk intensity depending on their level of impact on the project.

- **Manage -** Predicting the probability of occurrence of risks at various phases. Making plans to avoid the occurrence of risks and attempting to minimize their side-effects.

- **Monitor -** Closely monitoring the potential risks and identifying early symptoms. Also monitoring the effect of steps taken to mitigate or avoid risks.

27.1.2 Project Execution – Monitoring and Control

In this phase, the tasks described in project plan are executed as per the defined schedule. Execution needs monitoring - to test whether everything is going according to the plan or not. Monitoring is - to check the probability of risk and to take steps to resolve the risk or report the status of various tasks.

These include -

- **Activity Monitoring -** All activities scheduled within some task are monitored on regular basis. When all activities in a particular task are completed, then the task is considered as completed.

- **Status Reports -** The reports contain the status of activities and tasks completed/in-progress/not started within a given time frame.

- **Milestones Checklist -** Every project is divided into a number of phases where major tasks are performed (milestones) based on the phases of Software Development Life Cycle. This milestone checklist is prepared and is revised / updated every few weeks. The status of each milestone is reported and reviewed.

27.2 PROJECT COMMUNICATION MANAGEMENT

Effective communication is essential for 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 software / hardware suppliers. Communication can be oral or written. Communication management process usually has following steps:

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

- **Sharing** - After determining various aspects of planning, the manager is expected to focus on sharing correct information with the correct person on correct time so that everyone involved in the project is up-to-date with project progress and its status.

- **Feedback** - Project managers use various measures like status and performance reports to get feedback. This mechanism ensures that input from various stakeholders come to the project manager.

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- **Closure** - At the completion of each major milestone, end of a phase of SDLC or end of the project itself, the closure is formally announced to update every stakeholder by sending email or by distributing a copy of the document or by any other means of effective communication. After closure, the team moves to next phase or project.

27.3 CONFIGURATION MANAGEMENT

Software Configuration management is a process of tracking and controlling the changes made to the software in terms of the requirements, design, functions, and development of the product. IEEE (Institute of Electrical and Electronics Engineers) defines it as "the process of identifying and defining the items in the system, controlling the change of these items throughout their life cycle, recording and reporting the status of items and change requests, and verifying the completeness and correctness of items". Generally, once the requirements are finalized there is less chance of further requirement changes from the user. If they occur, the changes are accepted only with prior approval of higher management, as this could result in cost and time overrun.

27.3.1 Baseline

Baselining is an effective way to define the completeness of a phase. A phase is considered to be baselined only when all activities pertaining to it are finished and well documented. If it was not the final phase, its output would be used in next immediate phase. Configuration management takes care of occurrence of any change (process, requirement, technological, strategical etc.) after a phase is baselined. Regularly, Configuration manager checks the changes done in software.

27.3.2 Change Control

Change control is a function of configuration management, which ensures that all changes made to software system are consistent and made as per defined project/organizational rules and regulations.

A change in the configuration of product goes through following steps -

- **Identification** - change request arrives from either internal or external source change request is identified formally and is properly documented.

- **Validation** - Validity of the change request is checked and its handling procedure confirmed.

- **Analysis** – The impact of the change request is analysed in terms of required additional efforts, cost and schedule. Overall impact of the prospective change on system is thoroughly analysed and documented.

- **Control** - It is mandatory to take approval of high authorities before the change is incorporated into the system especially if the required additional change either impacts too many entities in the system or it is unavoidable. The decision is taken based on the fact that whether incorporating such changes will be worth or not. If it is not, change request is formally refused to be accepted.

- **Execution**–Once approved, the ongoing phase takes appropriate actions to execute the change, does a thorough revision to previous phases, if necessary. When executing a change request, the compatibility check of modified part with the other existing modules plays an important role.

- **Close request** - Change is verified for correct implementation and its integration with the rest of the system. The newly incorporated change in the software is well documented and then the request is formally closed.

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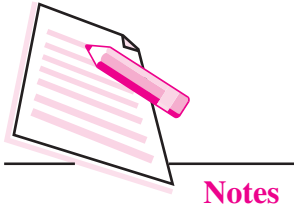## 27.4 PROJECT MANAGEMENT TOOLS

The risk and uncertainty associated with a project rise with the size of the project, even when the project is developed according to set methodologies. There are many tools available that aid to effective project management. A few are described below:

27.4.1 Gantt Chart

Gantt chart was first proposed by Henry Gantt (1917). It represents project schedule with respect to time periods. It is a horizontal bar chart with bars representing activities and time scheduled for the project activities.

There are proprietary softwares (MS-Project etc.) that help the professional project managers in effectively and successfully managing a software project.

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INTEXT QUESTIONS 27.1

1. Who is ultimately responsible for the quality of project?

   a) Employee

   b) Project manager

   c) Team member

   d) Quality manager

2. Project management process groups are

   a) Planning, Controlling, Organizing

   b) Initiating, Planning, Organizing

   c) Controlling, Initiating, Monitoring

   d) Planning, Directing, Organizing, Staffing, controlling

3. State whether the following statements are true or false:

   a. Healthcare industry also requires good project management skill people.

   b. A good project manager is a good leader only.

   c. "What is to be done" is a part of planning.

   d. Project management is the process of organizing a work to achieve a specific goal.

TERMINAL EXERCISE

1. What are the skills required for being successful project manager?

2. Difference between project objective and project scope.

3. What are the different process areas in project management?

4. Describe configuration management.

5. Explain project communication management.

6. Write a short note on resource management.

ANSWERS TO INTEXT QUESTIONS

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1. b. Project manager

2. b. Initiating, planning, organizing.

3. a. True

    b. False

    c. True

    d. True