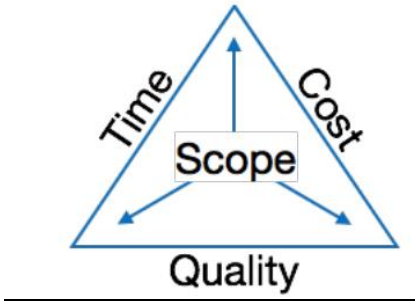
**Software Project Management:**

***Software Project:***

A Software Project is the complete procedure of software development from requirement gathering to testing and maintenance, carried out according to the execution methodologies, in a specified period of time to achieve intended software product.

**Goal:**

Enable a group of engineers to work efficiently towards successful completion of a software project. 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. Software project management is so important to the success of a project.




**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. He 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.

**Software Management Activities:**

Project management activities may include:

**1) 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.

**2) 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.

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

**3) 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**

Software size may be estimated using two metrics, either in terms of KLOC *KiloLineofCode* or by calculating number of function points in the software. Lines of code depend upon coding practices and Function points vary according to the user or software requirement.

Function point metric was proposed by Albrecht in 1983. This metric overcomes many of the shortcomings of the LOC metric. Function point metric has several advantages over LOC metric. One of the important advantages of the function point metric over the LOC metric is that it can easily be computed from the problem specification itself. Conceptually, the function point metric is based on the idea that a software product supporting many features would certainly be of larger size than a product with less number of features.

- **Effort estimation**

The managers estimate efforts in terms of personnel requirement and man-hour required to produce the software. For effort estimation software size should be known. This can either be derived by managers' experience, organization's historical data or software size can be converted into efforts by using some standard formulae.

- **Time estimation**

  Once size and efforts are estimated, the time required to produce the software can be estimated. Efforts required are segregated into sub categories as per the requirement specifications and interdependency of various components of software. Software tasks are divided into smaller tasks, activities or events by Work Breakthrough Structure *WBS*. The tasks are scheduled on day-to-day basis or in calendar months. The sum of time required to complete all tasks in hours or days is the total time invested to complete the project.

- **Cost estimation**

  This might be considered as the most difficult of all because it depends on more elements than any of the previous ones. For estimating project cost, it is required to consider – (1) Size of software, (2) Software quality, (3) Hardware, (4) Additional software or tools, licenses etc., (5) Skilled personnel with task-specific skills, (6) Travel involved Communication, and (7) Training and support.

**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 they 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

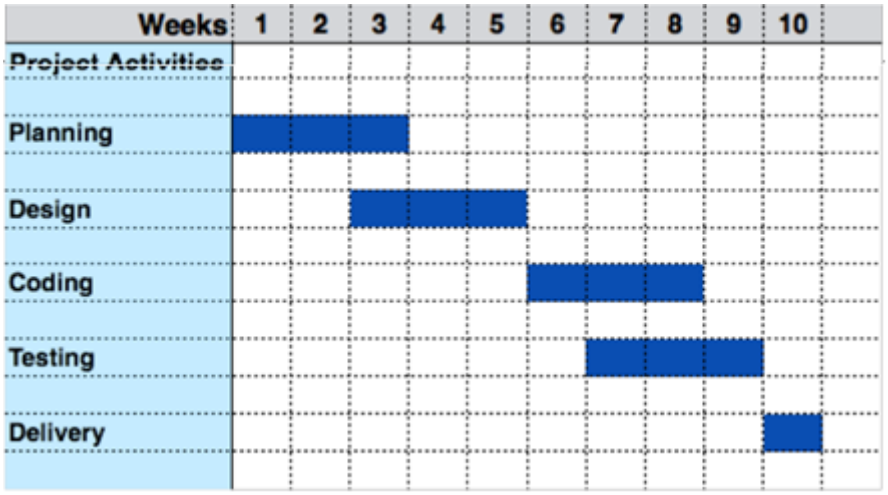
**Project Management Tools**:

The risk and uncertainty rises multi fold with respect to the size of the project, even when the project is developed according to set methodologies. There are tools available, which aid for effective project management.

***Gantt Chart***

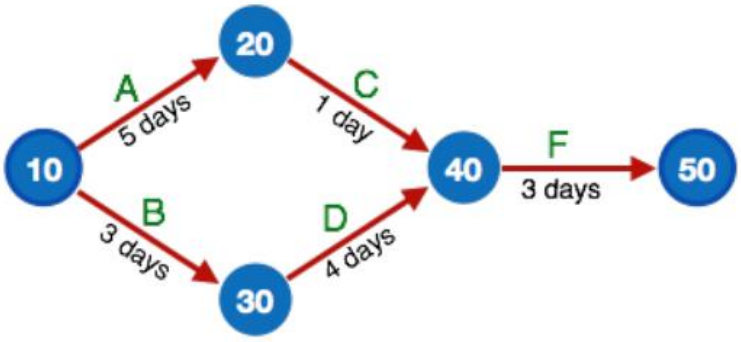
Gantt chart was devised by Henry Gantt 1917. It represents project schedule with respect to time periods. It is a horizontal bar chart with bars representing activities and time scheduled for the project activities.

***Example:***




***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 labelled arrows depicting sequence of tasks in the project.



***Resource Histogram***

This is a graphical tool that contains bar or chart representing number of resources *usually skilled staff* required over time for a project event *or phase*. Resource Histogram is an effective tool for staff planning and coordination.

| Staff | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Day 6 | Day 7 |
|---|---|---|---|---|---|---|---|
| Designer | 4 | 4 | 3 | 3 | 2 | 2 | 1 |
| Developer | 0 | 0 | 1 | 2 | 4 | 4 | 3 |
| Tester | 0 | 0 | 0 | 0 | 2 | 2 | 2 |
| Total | 4 | 4 | 4 | 5 | 8 | 8 | 6 |

**Risk management:**

Risk management is concerned with identifying risks and drawing up plans to minimize their effect on a project.

**Categories of risk:**

- Project risks affect schedule or resources.
- Product risks affect the quality or performance of the software being developed.
- Business risks affect the organisation developing or procuring the software.

**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.