Parul® University

Software Engineering

(303105253)

Software Project Management

❖ Software Project Management (SPM) is a proper way of planning and leading software projects.

❖ It is a part of project management in which software projects are planned, implemented, monitored, and controlled.

Need for Project management

❖ Software development is a new stream in business and there is very little experience in building software products

❖ Most of the software products are made to fit clients' requirements.

❖ The most important is that basic technology changes and advances so frequently and rapidly that the experience of one product may not be applied to the other one

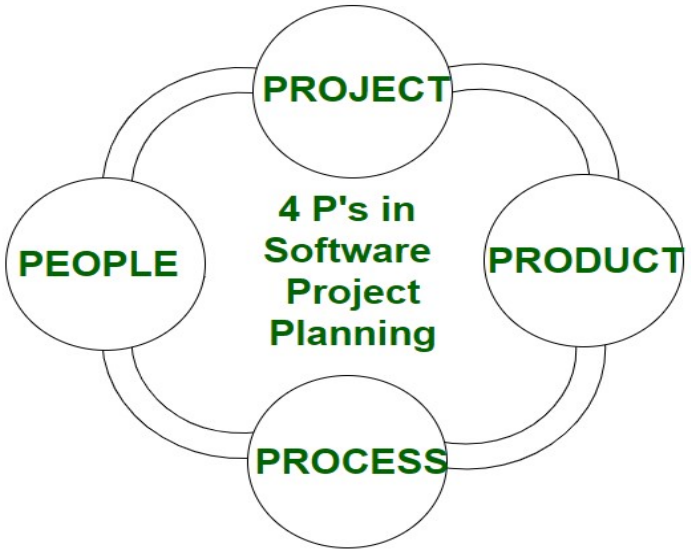
Image source : Google

Management Spectrum

❖ For properly building a product, there's a very important concept that we all should know in software project planning while developing a product

❖ There are 4 critical components in software project planning which are known as the **4P's** namely:

- Product
- Process
- People
- Project



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People

❖ The most important component of a product and its successful implementation is human resources.

❖ In building a proper product, a well-managed team with clear-cut roles defined for each person/team will lead to the success of the product .

❖ We need to have a good team in order to save our time, cost, and effort.

❖ Some assigned roles in software project planning are project manager, team leaders, stakeholders, analysts, and other IT professionals.

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Product

- As the name inferred, this is the deliverable or the result of the project
- The project manager should clearly define the product scope to ensure a successful result, control the team members, as well technical hurdles that he or she may encounter during the building of a product.
- The product can consist of both tangible or intangible such as shifting the company to a new place or getting a new software in a company.

Image source : Google

Process

❖ In every planning, a clearly defined process is the key to the success of any product.

❖ It regulates how the team will go about its development in the respective time period.

❖ The Process has several steps involved like, documentation phase, implementation phase, deployment phase, and interaction phase.

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Project

- It can also be considered as a blueprint of process.
- In this phase, the project manager plays a critical role.
- They are responsible to guide the team members to achieve the project's target and objectives, helping & assisting them with issues, checking on cost and budget, and making sure that the project stays on track with the given deadlines.

Image source : Google

W5HH Principle

❖ **Barry Boehm** gave a philosophy that prepares easy and manageable designs or outlines for software projects.

❖ He also gave a technique to discuss objectives, management, duties, and technical approach of the project and its necessary resources.

❖ Then he named it the **W5HH principle** when few questions resulted in project properties, definition, and resultant plan to make the project successful.

Image source : Google

W5HH questions

- **Why the system is going to be developed?**

  The purpose of software work. Here Barry questions that whether the project's purpose will justify the cost, time spent on it by people?

- **What is activities are needed to be done in this?**

  In this Barry questions what task is needed to be done for a project currently.

- **When is this done?**

  Project Scheduling is done by the team after recognizing when project tasks will be started and when they enter into the final stage to reach the goal.

Image source : Google

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- **Who are the reasons for these activities in this project?**

Every member who is part of the software team is responsible for this. And their roles are defined.

- **Where are these authoritatively located?**

Not only do software practitioners have roles in this but also users, customers, stakeholders also have roles and responsibilities organizationally.

- **How is the job technically and managerially finished?**

All technical strategies, management rules of the project are defined after knowing the scope of the project which is being built.

Image source : Google

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❖ **How much part of each resource is required?**

This is known by software developers after the estimation of each resource as per the needs of customers/users.

Image source : Google

Planning a Software Project

❖ Once a project is found to be possible computer code, project managers undertake project design.

❖ Project designing is undertaken and completed even before any development activity starts.

❖ Project designing consists of subsequent essential activities: Estimating the subsequent attributes of the project:

Project designing consists of subsequent essential activities:

- Project Size
- Project cost
- Project Duration
- Effort

Image source : Google

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The effectiveness of the following design activities relies on the accuracy of those estimations.

- Planning force and alternative resources.
- Workers organization and staffing plans.
- Risk identification, analysis, and abatement designing
- Miscellaneous arrangements like quality assurance plans, configuration, management arrangements, etc

Image source : Google

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Precedence ordering among project planning activities:

- The different project-connected estimates done by a project manager have already been mentioned
- The below diagram shows the order in which vital project coming up with activities is also undertaken.
- It may be simply discovered that size estimation is the 1st activity.
- Miscellaneous arrangements like quality assurance plans, configuration, management arrangements, etc

Image source : Google

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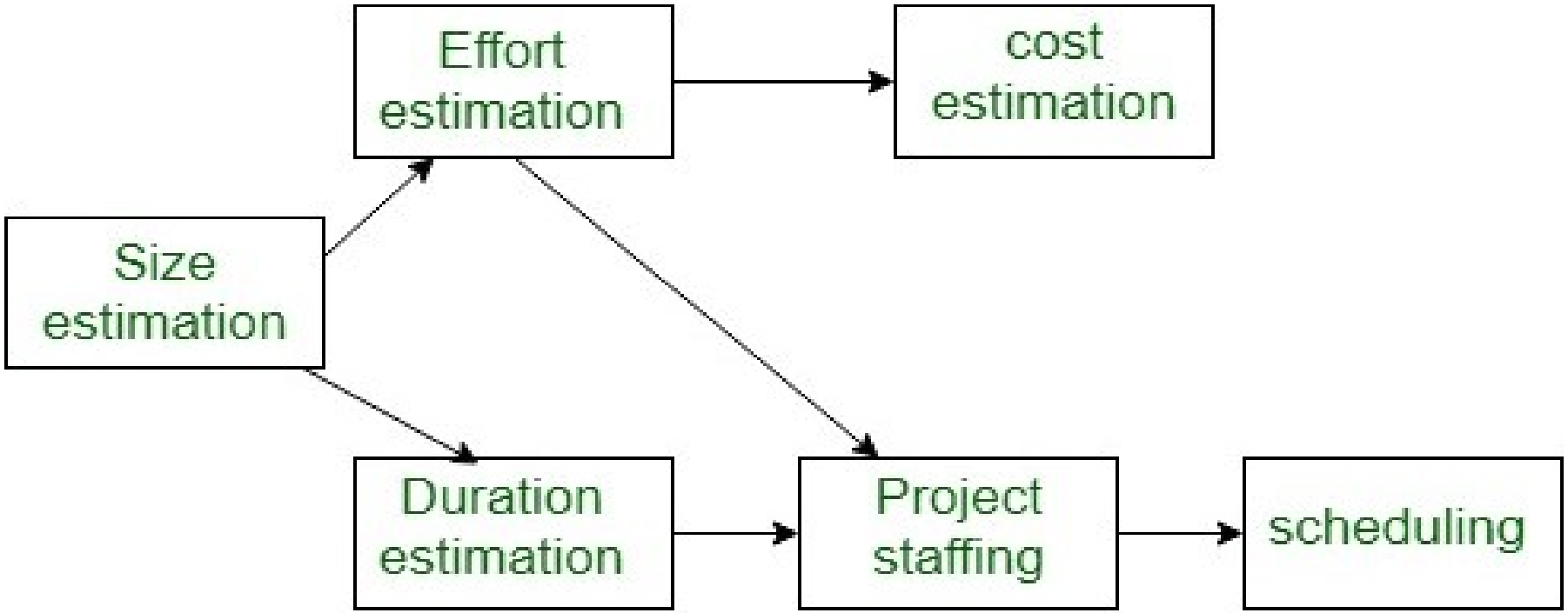

Precedence ordering among planning activities

Image source : Google

Feasibility and scope

❖ **Feasibility Study** in Software Engineering is a study to evaluate feasibility of proposed project or system.

❖ Feasibility study is one of stage among important four stages of Software Project Management Process.

❖ Feasibility study is carried out based on many purposes to analyze whether software product will be right in terms of development, implementation, contribution of project to the organization etc

Image source : Google

Type of Feasibility study

Technical Feasibility: Technical Feasibility current resources both hardware software along with required technology are analyzed/assessed to develop project.

Operational Feasibility: Operational Feasibility degree of providing service to requirements is analyzed along with how much easy product will be to operate and maintenance after deployment.

❖ **Economic Feasibility** Economic Feasibility study cost and benefit of the project is analyzed.

Image source : Google

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Legal Feasibility: Legal Feasibility study project is analyzed in legality point of view. This includes analyzing barriers of legal implementation of project, data protection acts or social media laws, project certificate, license, copyright etc.

Schedule Feasibility: Schedule Feasibility Study mainly timelines/deadlines is analyzed for proposed project which includes how much time teams will take to complete final project which has a great impact on the organization as purpose of project may fail if it can't be completed on time.

❖ **Market Feasibility :** Market feasibility refers to evaluating the market's willingness and ability to accept the suggested software system.

Image source : Google

Effort Estimation

There are a number of effort estimation techniques used in software development, each with its own advantages and disadvantages

Top-down estimation: This method involves estimating the total effort required for the project, and then breaking it down into smaller tasks. This can be a quick and easy way to get an initial estimate, but it can be less accurate than other methods.

Bottom-up estimation: This method involves estimating the effort required for each individual task, and then adding those estimates together. This can be more accurate than top-down estimation, but it can also be more time-consuming.

Image source : Google

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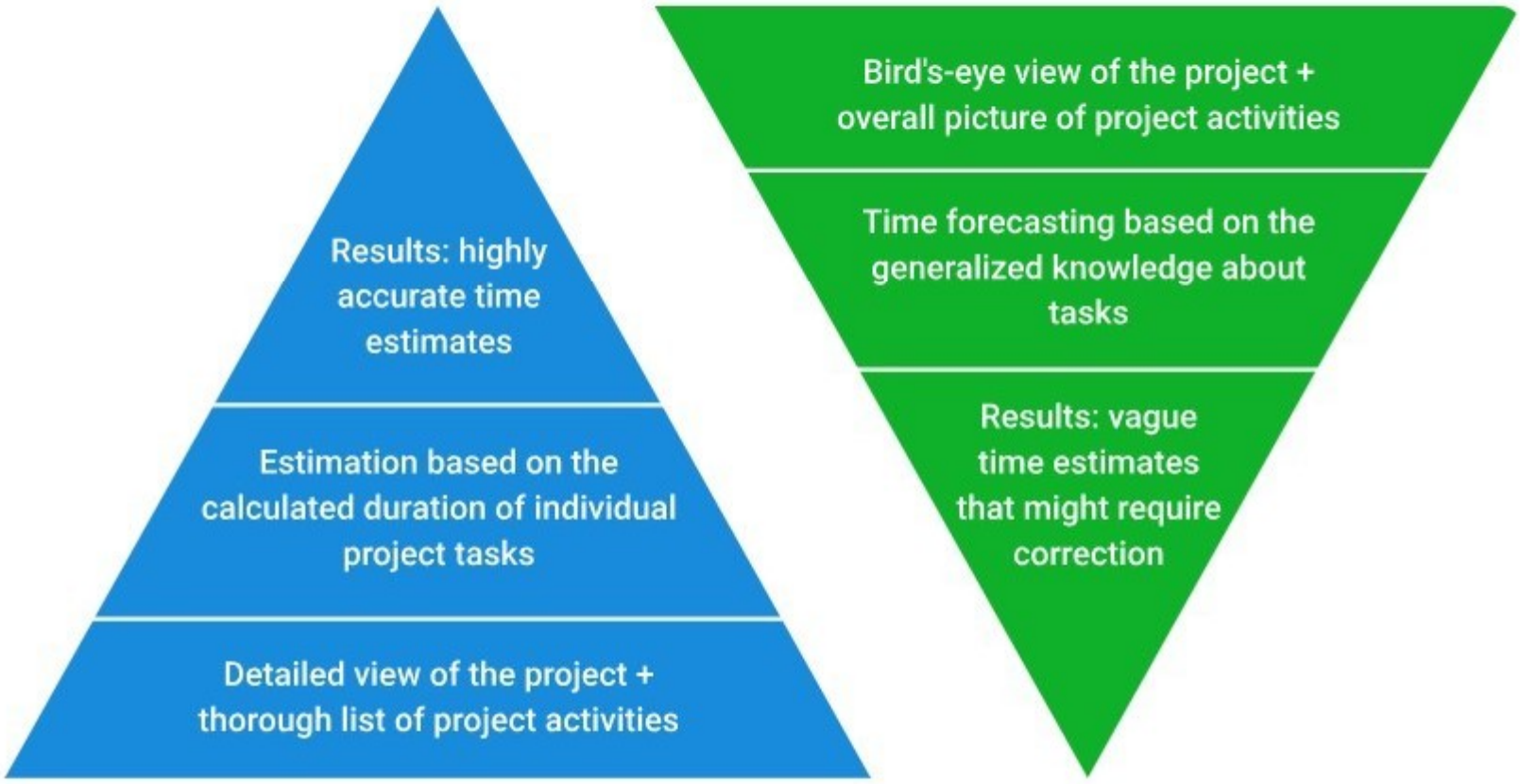
Results: highly accurate time estimates
Estimation based on the calculated duration of individual project tasks
Detailed view of the project + thorough list of project activities
Bird's-eye view of the project + overall picture of project activities
Time forecasting based on the generalized knowledge about tasks
Results: vague time estimates that might require correction
BOTTOM-UP ESTIMATION
TOP-DOWN ESTIMATION

Cont..

Expert Judgment:

Description: Involves experienced individuals providing their judgment based on their knowledge and experience.

Application: Useful when historical data is scarce or when dealing with new technologies or unique projects.

Analogous Estimation:

Description: Uses historical data from similar projects as a basis for estimating the effort of the current project.

Application: Effective when the current project has similarities in scope and complexity with past projects.

Image source : Google

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Parametric Estimation:

Description: Uses mathematical models based on historical data and project parameters (e.g., lines of code, function points, or other metrics).

Application: Provides a more quantitative approach and is useful when detailed project data is available.

Delphi Technique:

Description: Involves obtaining estimates from a panel of experts anonymously and iteratively until a consensus is reached.

Application: Useful when there are diverse opinions and it's important to converge on a single estimate.

Image source : Google

Staffing and Scheduling

Employee Scheduling is the act of creating a future schedule so that each employee knows the dates and times that they will be working

Staffing is the process in which you react in real time to differences between the plan (schedule) and the actual need.

Image source : Google

Quality planning

The role of **quality planning** is to design a process that will be able to meet established goals under operating conditions.

Quality planning is a methodology which can be used when a situation exhibits one or more of the following characteristics:

- A service has never existed before.
- Customer requirements are not known
- The existing service/process performance is not capable of meeting customer requirements
- The service/process is ad hoc; extremely variable; never been well defined or worked on before as a whole
- The environment is unstable, characterized by major market, technology or organizational change
- Performance data does not exist or it would require excessive time/expense to collect data

Image source : Google

Risk Management : What is Risk ?

❖ Risk is any potential event that can impact your project, positively or negatively.

❖ Risk management is the process of identifying and dealing with these events before or as they happen.

❖ Risk can come in many different forms—employee sickness, inclement weather, unexpected costs, and transportation delays among them.

Risks commonly affect the following aspects of a project:

- ❑ **Budget**
- ❑ **Schedule**
- ❑ **Scope**

Image source : Google

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Risks can also have the following characteristics:

- **External risk**
- **Internal risk**
- **Positive risk (opportunity)**

Image source : Google

Risk Management

The risk management process, or lifecycle, is a structured way of tackling risks that can happen in your project.

The risk management process or lifecycle, generally follows the following steps:

1. Identification

❖ The first step to getting a grasp on potential risks is to know what they are

❖ you will identify risks that might affect your project by making a list (or spreadsheet) of risks that might arise.

❖ You will also want to have stakeholders, team members, and subject matter experts generate ideas with you

Image source : Google

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2 . Assessment

❖ In this stage, you will assign priority to risks by using the probability and impact of each risk to determine their risk levels.

❖ This means assigning each risk a high, medium, or low priority based on the factors you have determined.

❖ Evaluating your risks gives your team the chance to see where to focus their energy in mitigating risk.

Image source : Google

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3. Control

❖ The process of identifying, addressing, and eliminating potential problems before they have a negative impact on the project.

❖ Risk control measures are actions taken to eliminate, prevent or reduce the occurrence of a hazard that you have identified.

1. Redesigning the job.
2. Replacing the materials, machinery or process.
3. Organizing your work to reduce exposure to the materials, machinery or process.
4. Identifying and implementing practical measures needed to work safely.
5. providing personal protective equipment and making sure workers wear it.

Image source : Google

Likelyhood	Consequences				
	Insignificant *Risk is easily mitigated by normal day to day process*	**Minor** *Delays up to 10% of Schedule Additional cost up to 10% of Budget*	**Moderate** *Delays up to 30% of Schedule Additional cost up to 30% of Budget*	**Major** *Delays up to 50% of Schedule Additional cost up to 50% of Budget*	**Catastrophic** *Project abandoned*
Certain *>90% chance*	High	High	Extreme	Extreme	Extreme
Likely *50% - 90% chance*	Moderate	High	High	Extreme	Extreme
Moderate *10% - 50% chance*	Low	Moderate	High	Extreme	Extreme
Unlikely *3% - 10% chance*	Low	Low	Moderate	High	Extreme
Rare *<3% chance*	Low	Low	Moderate	High	High

Project Monitoring Plan

❖ A critical component of project management is monitoring, which entails keeping tabs on a project's development, performance, and activities throughout its entire lifecycle.

❖ It assures that the maintain a high level on course and accomplishes its objectives within the characteristics of the predefined scope, timeline, and budget.

❖ **Project monitoring in project management** enables project managers and stakeholders to identify and address any deviations or risks promptly, thereby enhancing project success.

Image source : Google

Importance of Project Monitoring

Early Detection of Issues : Regular monitoring allows project managers to identify potential issues and risks before they escalate, enabling timely interventions and preventing costly delays.

Improved Decision-Making: Another **importance of project monitoring** is providing real-time insights into project performance, allowing project managers to make data-driven decisions to optimize resources, mitigate risks, and allocate budgets effectively.

Enhanced Accountability: Monitoring helps establish accountability among team members by tracking individual and collective progress. It fosters a culture of responsibility, ensuring that everyone remains focused on their assigned tasks.

Image source : Google

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Effective Resource Allocation: By monitoring project activities, managers can identify resource gaps and reallocate them accordingly, ensuring that resources are utilized optimally and productivity is maximized.

Stakeholder Engagement: Monitoring enables project stakeholders to stay informed about the project's progress, fostering transparency, and building trust. Regular updates and reports enhance collaboration and alignment among team members and stakeholders.

Image source : Google

Project Monitoring Types

Progress Monitoring: This type of monitoring focuses on tracking the project's progress against the planned schedule, milestones, and deliverables. It ensures that the project stays on track and enables timely adjustments if deviations occur.

Quality Monitoring: Quality monitoring involves assessing and measuring the quality of project deliverables against predefined standards and benchmarks. It ensures that the project meets the required quality criteria and facilitates timely corrective actions if deviations are detected.

Risk Monitoring: Risk monitoring involves identifying, assessing, and monitoring project risks throughout the project lifecycle. It helps in proactive risk management by identifying potential risks and developing mitigation strategies to minimize their impact on project outcomes.

Image source : Google

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Cost Monitoring: Cost monitoring involves tracking and controlling project expenses against the allocated budget. It helps in preventing cost overruns, ensuring financial stability, and optimizing resource utilization.

Performance Monitoring: Performance monitoring focuses on evaluating the performance of project team members, suppliers, and contractors. It involves tracking individual and collective performance metrics to ensure alignment with project goals and objectives.

Image source : Google

Process of project monitoring

Define Monitoring Objectives: Clearly define the objectives and key performance indicators (KPIs) that will be monitored throughout the project. These objectives should align with the project's goals and deliverables.

Obtain Information: relevant data as well as information about status of the work. activities, performance, Regular status updates, team gatherings, data collection devices, and project management software can all help with this.

Examine and assess: and Investigate the data collected to measure the success of a project the and spot any variations from the stated aims. Determine what effect these deviations had on the project's overall success and what needed to be done better.

Image source : Google

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Take Disciplinary Actions: In order to provide an overview and assessment, immediately address any issues, risks that have been found. Project plans must be modified as necessary, and resources given back.

Monitor Continuously: Continuously monitor the project's progress, performance, and risks to ensure that it remains on track and aligned with the defined objectives.

Image source : Google

Steps to Create a Project Monitoring Plan

1. Define Monitoring Scope
2. Identify the important Monitoring Metrics
3. Select Monitoring Tools
4. Establish Reporting Mechanisms
5. Allocate Responsibilities
6. Monitor and Review

Image source : Google

Project scheduling

- Project scheduling is a responsible activity of project manager.
- Project scheduling is a mechanism that is used to communicate and know about that task are needed and has to be performed in project.
- Project manager separate total work task in project into different activities
- Project manager estimate time and resources require to complete activities and organize them into coherent sequence.
- Effective project scheduling leads to success of a project reduce cost and increase customer satisfaction

Image source : Google

Scheduling process

- Identify all the functions / modules required t complete the project
- Breakdown large functions into small activities.
- Determine the dependency among various activities.
- Allocate resources to activities.
- Assign people to conduct various activities.
- plan the beginning and ending dates for different activities.
- Create activity network Bar or Gantt Chart.

Image source : Google