

Software Engineering

Unit 1.

Software Engineering: is an engineering branch related to the evolution of software product using well-defined scientific principles, techniques and procedures. The result of software engineering is an effective and reliable software product.

Software Engineering required

- To manage Large Software.
- For more scalability.
- Cost Management
- To manage the dynamic nature of software.
- For better quality Management.

Importance of Software Engineering

- Reduces Complexity.
- Minimize Software Cost.
- Decrease time.
- Handling Big Project.
- Effectiveness.
- Reliable software. → user can't face any problem.

Program Vs Software

Program:- Program is a combination of source code & object code.

Software:- Software is a set of instructions, data, or programs used to operate computers and execute specific tasks.

Software Crisis

Software Crisis is a set of difficulties or problems encountered while developing software.

① size: Software is becoming more expensive and more complex with the growing complexity and expectation out of software.

For example; the code in the consumer product is doubling every couple of years.

② Quality :- Many software products have poor quality i.e. the software products defeat after putting into use ~~later~~ due to ineffective testing techniques.

③ Cost:- Software development is costly i.e. in terms of time taken to develop and the money involved.

For ex:

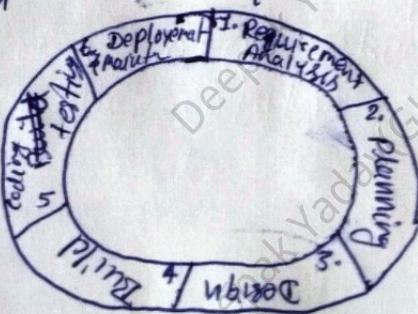
④ Delayed Delivery: Serious schedule overruns are common. Very often the software takes longer than the estimated time to develop, which in turn leads to cost shooting up.

SDLC Models

↳ Software Development Life Cycle

→ A software development life cycle mode is a pictorial and diagrammatic representation of this software life cycle.

→ SDLC is used by the software industry to design, develop and test high quality softwares.



Phase 1: Requirement Analysis:-

- ⇒ Gathering business requirements.
- ⇒ Creating process diagrams.
- ⇒ Performing a detailed analysis.

Phase 2: Planning

- ⇒ Identification of the system for development
- ⇒ Feasibility assessment
- ⇒ Creation of project plan.

Phase 3: Design

- ⇒ This phase includes business rules, pseudo-code, screen layouts, and other necessary documentation.
- ⇒ Designing of software model.

Phase 4: Build / Development

- ⇒ The implementation of design begins concerning writing code. Developers have to follow the coding guidelines described by their management and programming tools like compilers, interpreters, debuggers, etc. are used to develop and implement the code.

Phase 5: Code Testing

- ⇒ Writing test cases
- ⇒ Execution of test cases.
- ⇒ Tester follows the Software Testing Life cycle activities to check the software for errors, bugs, and defects.

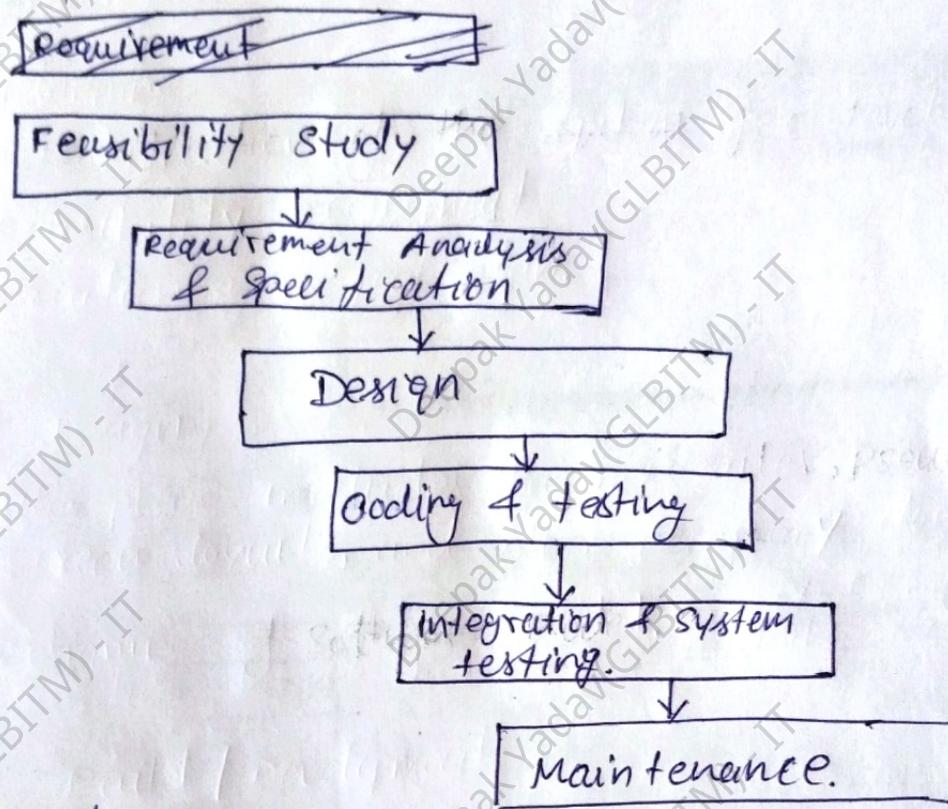
Phase 6: Deployment / Maintenance

- ⇒ In deployment software is deployed to a real-life environment where the actual user begins to operate the software.
- ⇒ Support the software users.
- ⇒ Software maintenance
- ⇒ Software changes and Adjustment.

Prototype Model

Water Fall Model

In waterfall Model progress is seen as ~~water~~ flowing steadily downwards (like a waterfall)



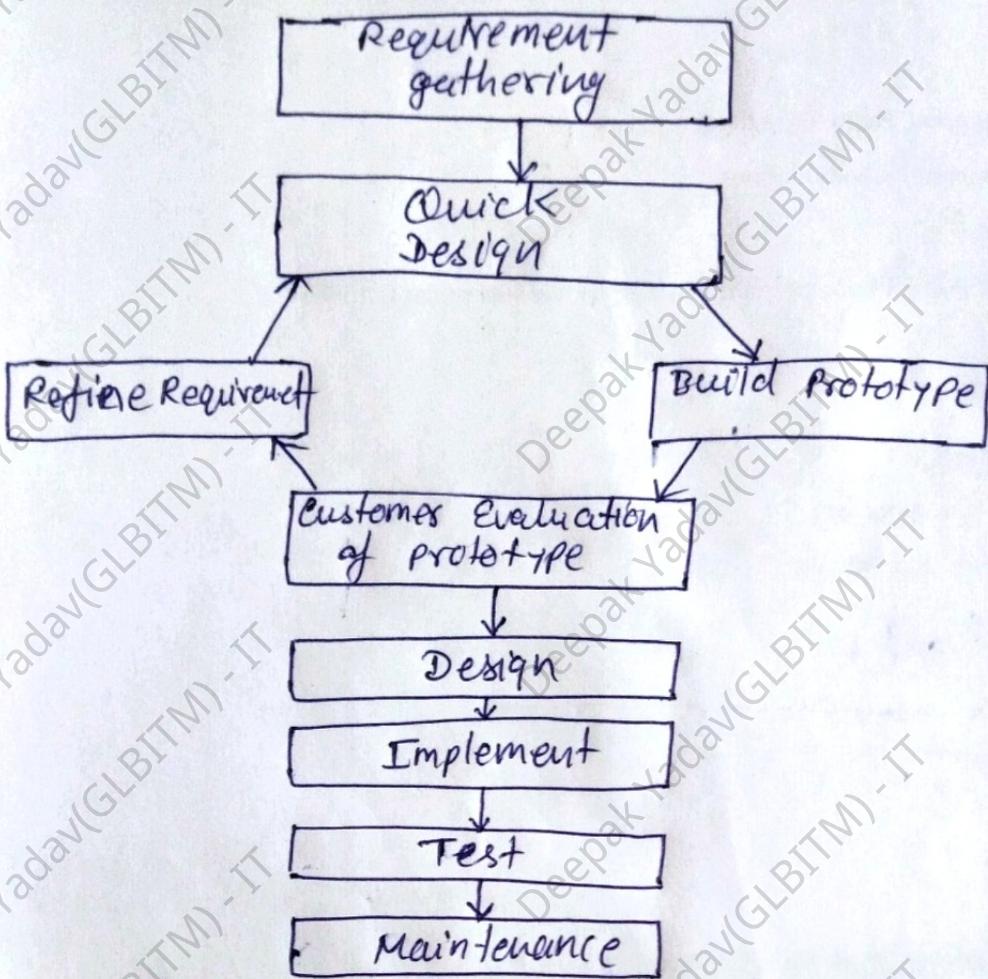
Advantages

- ⇒ It is easy to use and understand.
- ⇒ No overlapping b/w the phases.
- ⇒ This model is suitable for small projects.
- ⇒ Provides better documentation for the employees.
- ⇒ Low cost.
- ⇒ It is easy to maintain.

Disadvantages

- ⇒ This model does not work for large projects.
- ⇒ We can't go back at previous phase to change anything or any requirement.
- ⇒ If customer is not satisfied with the project then it is hard to change the requirements.
- ⇒ High risk to make ~~the~~ a project.

Prototype Model



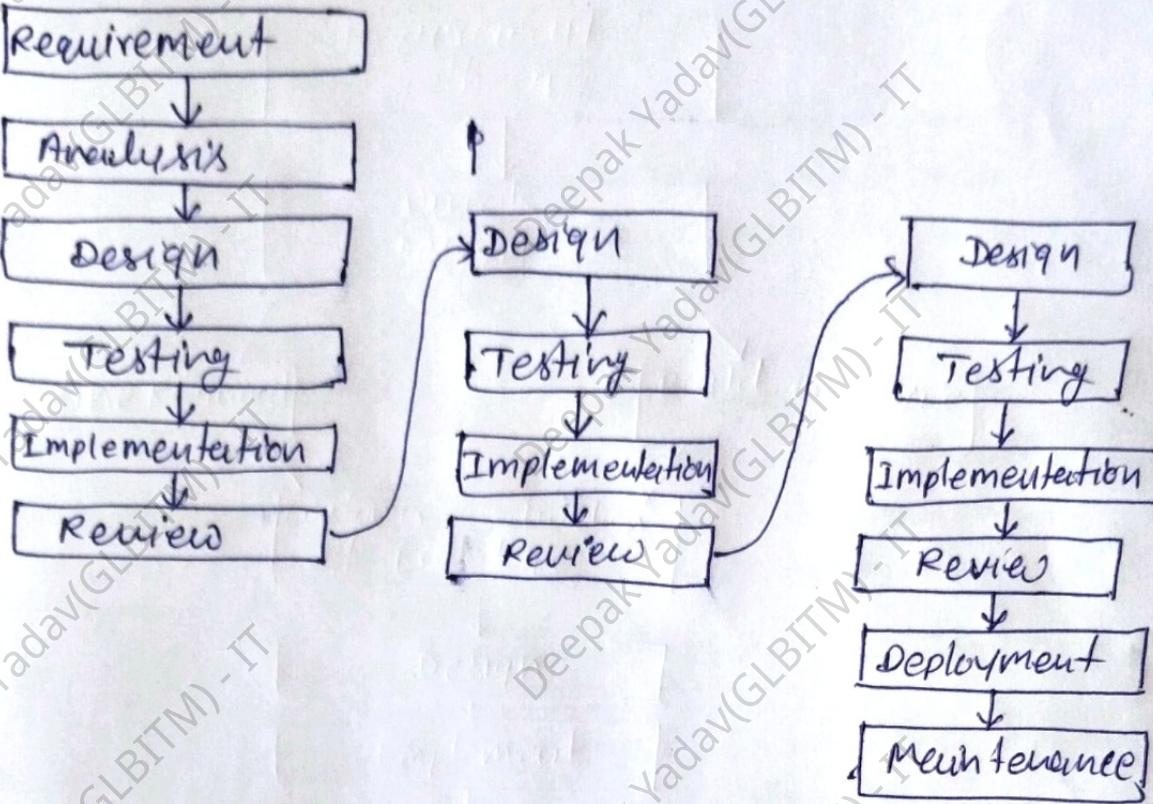
- Advantages

- ⇒ It provides higher customer satisfaction and gets reviews from the customers.
- ⇒ Requirements can change easily acc'n to the customer. It means this model has high adaptability.
- ⇒ It gives high flexibility.
- ⇒ Prototype model increases the involvement of customer.
- ⇒ Reduce Maintenance Cost.

- Disadvantages

- ⇒ Difficult to know how long the project will last.
- ⇒ Prototyping tools are expensive.
- ⇒ If a customer refuses to accept the prototype, then there may be wastage of a lot of cost and developer's efforts.
- ⇒ It is a time-consuming process.

Iterative Waterfall Model



Spiral Model

⇒ Determines object & Identify alternative solution.

⇒ Review & plan for next phase.

2) Identify & resolve risk.

3) Development version of product.



⇒ The spiral model combines the idea of iterative development with the systematic, controlled aspects of the waterfall model.

⇒ The spiral model has following 4 phases:-

- Planning Phase
- Risk analysis Phase.
- Development & Testing Phase.
- Plan the next iteration.

Features

- ⇒ Risk handling
- ⇒ Radius of spiral = cost
- ⇒ Angular Dimension = Program.
- ⇒ Meta Data.

Advantages

- ⇒ Risk handling
- ⇒ Large Projects.
- ⇒ Flexible
- ⇒ Customer Satisfaction.
- ⇒ used in Large Project.

Disadvantages

- ⇒ Complex.
- ⇒ Expensive
- ⇒ Too much risk analysis
- ⇒ Time taking.

Evolutionary development Model

- ⇒ It is iterative type models which allow to develop more complete version of the software.
- ⇒ In this model, the system is first broken down into the several modules or functional units that can be incrementally implemented and delivered.
- ⇒ The developer first develops the core modules of the system.
- ⇒ This model is also known as the ~~successive~~ successive versions model.

Advantages

- ⇒ In this model, user gets a chance to experiment partially developed system.
- ⇒ It reduces the error because the core modules get tested thoroughly.

Disadvantages

- ⇒ Sometimes it is hard to divide the problem into several versions that would be acceptable to the customer which can be incrementally implemented and delivered..

Iterative Enhancement Model

In this model, you can start with some of the software specifications and develop the first version of the software. After the first version if there is a need to change the software, then a new version of the software is created with a new iteration. Every release of the iterative model finishes in an exact and fixed period that is called iteration.

Advantages

- ⇒ Testing and debugging is easy.
- ⇒ A parallel development can begin.
- ⇒ Risks are identified and resolved during iteration.
- ⇒ Limited time spent on documentation and extra time on designing.

Disadvantage

- ⇒ It is not suitable for smaller projects.
- ⇒ More resources may be required.
- ⇒ Requirement changes can cause over budget.
- ⇒ Project completion date not confirmed because of changing requirements.

Product vs Process

Product ⇒ A product may be defined as an output.
A product can produce the good services.

Process ⇒ A process may be defined as an investment of time and efforts for getting a good product.