

## • characteristics of software engineering

1. Functionality :- Required function are

(a) Suitability

(b) Accuracy

(c) Interoperability

(d) Security

2. Reliability :- Required function are

(a) Recoverability

(b) fault tolerance

Maturity

3. Efficiency :- Required function are

(a) In time

(b) In resources

4. Usability :- Required function are :-

(a) Understandability

(b) Learnability

Operability

5. Maintainability :- Required function are

(a) Testability

(b) Stability

(3) Changeability

Operability.

- 3.) ~~Pro~~ Portability :- Required for
- 4.) Adaptability
- 5.) Installability

Envisaging role of software,  
software delivers the most  
important product of our  
time - information.

Provide the means for  
acquiring information in  
all of its forms transform  
the data so that it can be  
more useful in a local  
context.

## Software components

- ① Off the shelf component:- Existing component that can be acquire from third party.
- ② Full Experihecd:- Component that are existed on the other software and team need to implements this component in the never software.
- ③ Partial experice component Existed component the need some modifications before implementing on the new system.
- ④ New component:- Software component that must be build the software team specially for need of current project.

## Software crisis

Software crisis is a term used in computer science for the difficulty of writing useful and efficient computer program in the required time.

### Causes software crisis

- The cost of owning and maintaining software was as expensive as developing the software.
- Projects was running over-time
- Software was very inefficient
- Software was low quality
- Software often did not meet requirement.
- The average software project overshoots its schedule by half
- software was never delivered.

## Solution of software crisis

- Reduction in software over-budget
- The quality of software must be high
- less time needed for Software Project
- Experience working team members on Software Project.
- software must be delivered.

### Engineering

#### Software problems

problem of SIE is the problem of scale. development of a very large system requires a very different set of method compared to developing a small system. In other words, the methods that are used for developing small system generally do not scale up to large system.

## [ SDLC ]

- SDLC stand for software development life cycle. It describe the sequence of phase or step to develope any software.

Simple word "entire life of SW from beginning to ending."

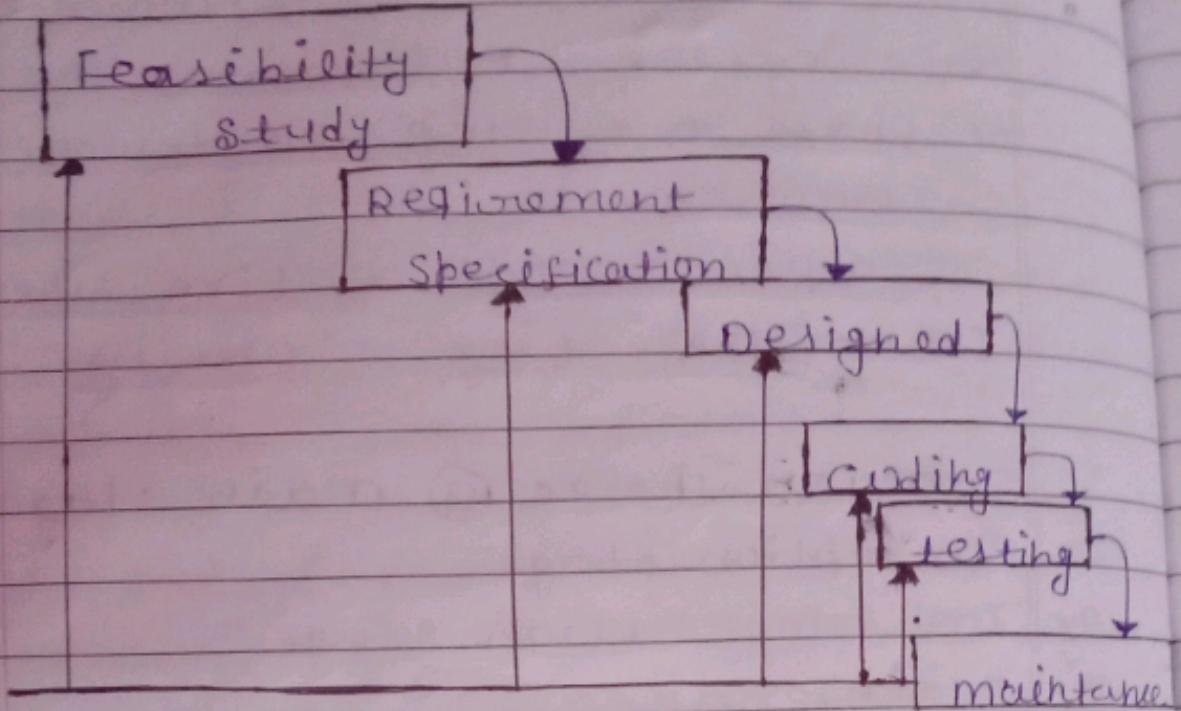
contains three ③ main stage:-

1. Conception stage
2. Implementation stage
3. Maintenance

The SDLC model classified into three catgree based on there advantage & disadvantage:

- (i) waterfall model ( classical model )  
prototype model.  
spiral model.

## \* waterfall model:-



- ① The waterfall model is the simple and classical model of all the model we have.
- ② This model is also know as linear sequential model.
- ③ This model is the theoretically model not a practical model.
- ④ In this model each an every phase must be completed before moving

to the next phase.

\* ADVantages:-

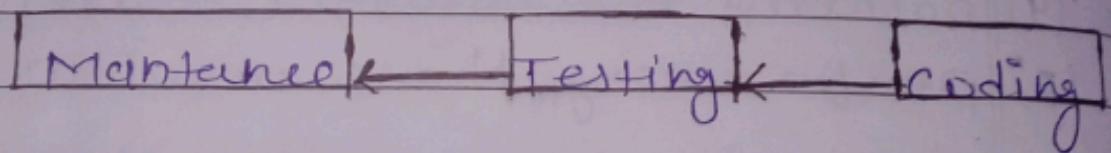
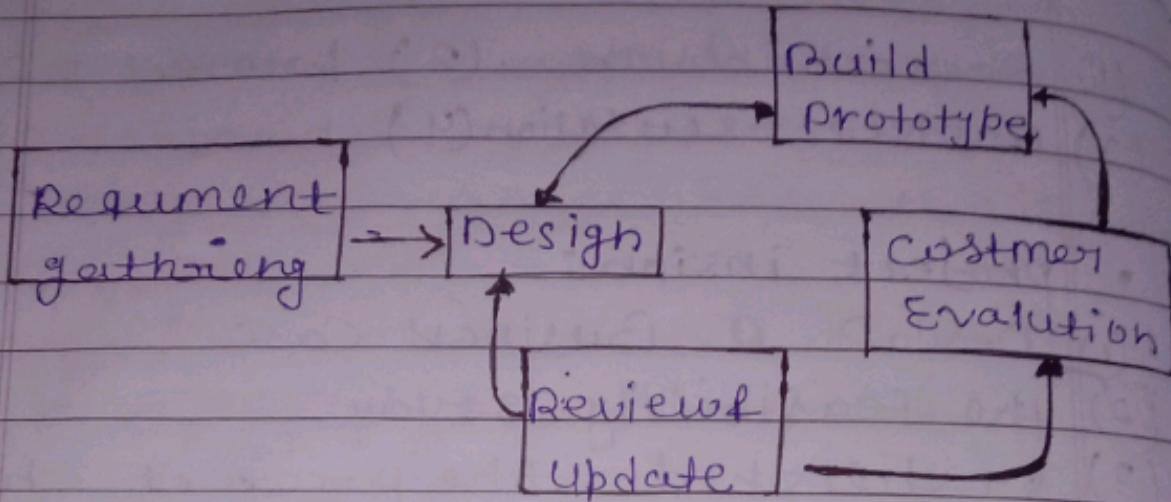
- (1) This model is simple and easy to understand and use.
- (2) In this model phases are processsed and completed one at time.

\* Disadvantages :-

- (1) Not use for big Project. ✓
- (2) This model contains high risk. ✓
- (3) We can't move back in last phase. ✓

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## Prototype model



① It is very famous slow developer model.

② In this model client is also involved of the time of design the system.

③ The goal of prototype model to provide a system with overall functionality.

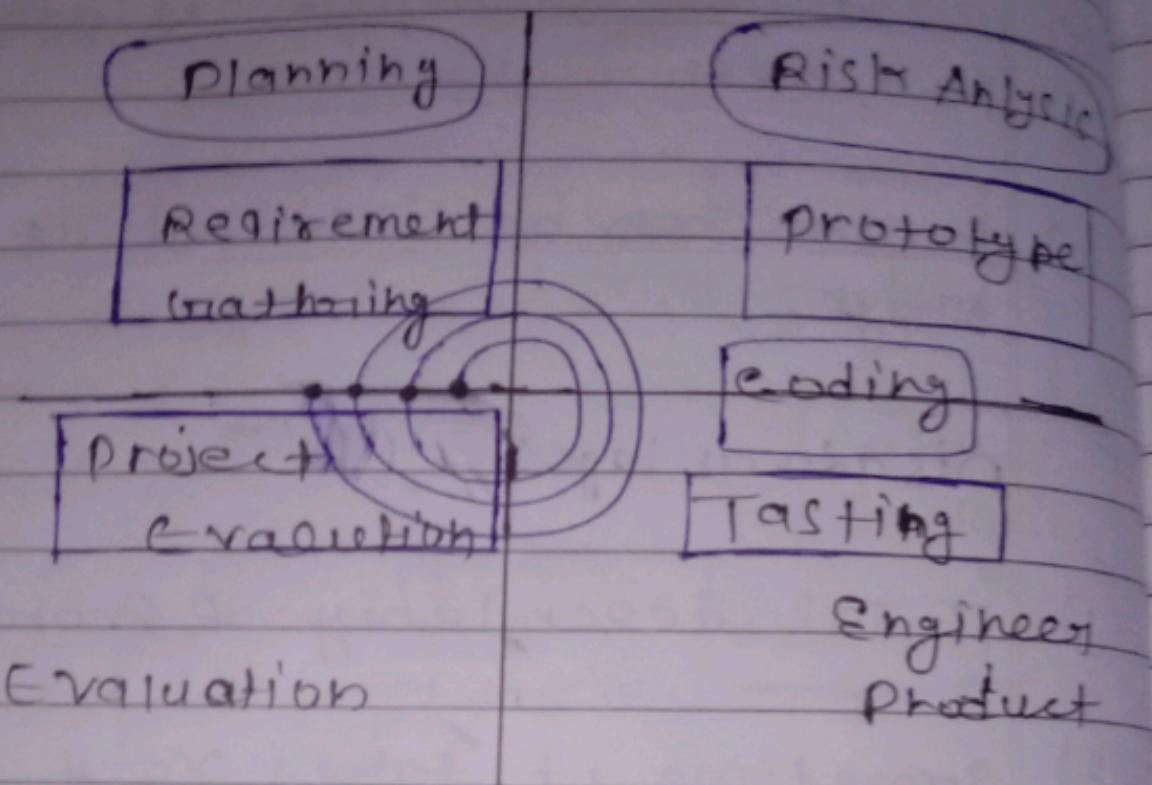
## \* ADVantages:-

- (1) customer feedback is available for better system.
- (2) Error can be detected at earlier stage.

## Disadvantages:-

- (1) Total dependency of Prototype.
- (2) Sometime it takes very long time to develop the prototype based on the user management.

## \* Spiral model:-



- ① Spiral model was developed by "Barry Boehm" in the year 1986 as a part of SEI (Software engineering institute)
- ② It is called meta model because it contains all the life cycle model.
- ③ One business analyst is required to reduce the risk with the help of developer and client then we can

Say how much cost it will to developer.

\* Advantage :-

1. Risk are analyzed at the early stage of project development.
2. very famous model. model to develop large & complex project.
3. Best technology has been used inside the spiral model.

\* Disadvantage:-

1. It is not suitable for small project.
2. It is not suitable for small project.

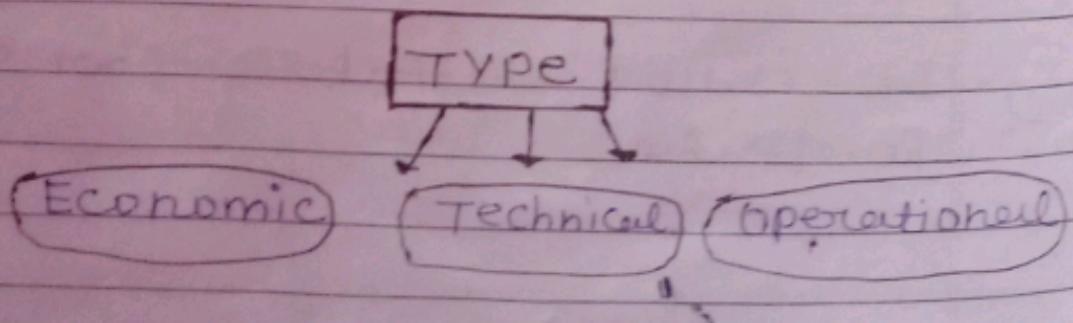
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- ① The feasibility study is a project done to determine software's technical and commercial viability before its development.
- ② A feasibility study is a study made before committing to a Project.
- ③ A feasibility study leads to a decision:

go ahead

do not go ahead

think again

- A feasibility study may be in the form of a proposal.



## changing nature of software.

1. System software:- Infrastructure software come under this category like compilers, operating system editors, drivers, etc. Basically system software is a collection of program to provide to other program.
2. Real time software:- These software are used to monitor, control, control and analyze real world events as they occur.
3. Embedded software:- This type of software is placed in read-only memory of the product and controls the various function of the product.
4. Business software:- This is the largest application area.
5. Personal computer software:- The software used in personal computers are covered in this category.

3. Artificial intelligence Software:-  
Artificial intelligence software make use of non numerical algorithm to solve complex problems that are not amenable to computation or straight forward analysis.

4. web base Software:-

The software related to web application come under this category, Example:- CGI, HTML, Java, Perl, DHTML etc

## SRS full explain

- SRS stand for Software Requirements Specification. It is document prepared by business analyst or system analyst. The SRS document consists of all necessary requirement required for the project development.

SRS document is actually an agreements b/w the client & developer.

### \* Parts of SRS document:-

- (1) functional requirement of the system
- (2) non-functional requirement of the system
- (3) goal of implementation.

### ◆ characteristics of SRS document

1. Complete
2. consistent
3. feasible
4. modifiable
5. testable
6. correct
7. verifiable
8. Unambiguous

Ques:- what is functional and non-functional SW system requirement?

Answer:-

- Functional Requirements :-

Functional requirements define a function that a system or system element must be qualified to perform and must be documented in different forms. The functional requirement describes the behavior of the system as it correlates to the system's functionality.

functional requirement should be written in a simple language, so that it is easily understandable.

Ex:- business rules, audit tracking, certification requirement, transaction corrections, etc.

Ques:- other formats of preparing the functional requirement are use cases, models, Prototype, user stories and diagrams. There are a number of way to prepare functional requirement.

- Non-functional requirements:-  
Non-functional requirements are not related to the system's functional aspect. They can be the necessities that specify the criteria that can be used to decide the operation instead of specific behaviors of the system.

Basic non-functional requirements are - usability, reliability, security, storage, cost, flexibility, configuration, performance, legal or regulatory requirements etc.

They are divided into two main categories:-

- Execution qualities:- like security and usability which are observable at run time.

- Evolution qualities:- like testability, maintainability, extensibility, and scalability that embodied in the static structure of the SW system.

Explain coupling & cohesion?

We represent coupling in top level design and it describes the inter-dependency and interaction between the module. A low and coupling should be low for better flow.

#### Type

- 1) Content coupling - high coupling
- 2) common coupling (global coupling)
- 3) external coupling
- 4) functional coupling
- 5) stamp coupling
- 6) Data coupling :- Pas the data

Cohesion:- cohesion represent detail design and it describe how the element in a particular module are closely related to each other and it should be high for better flow design.

Type:-

- 1) Functional cohesion :- it is high
- 2) Sequential cohesion
- 3) Communicational cohesion
- 4) procedural cohesion
- 5) temporal cohesion
- 6) logical cohesion
- 7) co-incidental cohesion :- this is low.

## Extended

Page No.

### function point (EFP)

- a) Feature point
- b) 3D functional Point

(i) Feature point:- Feature point is the superset of functional point measurem that can be applied to system an eng slw application.

#### 3D function Point :-

Three dimensions may be used to represent 3D function?  
~~time~~: data dimension, ~~control~~ function dimension, and control dimension.

#### FP point (Function Point)

FP point is most widespread functional type metrics suitable for quantifying a slw application  
it is based on five user identifiable logical "functions" which are divided into two data function types and three transactional function types.

A distinct final formula is used for each count type application Development project, or Enhancement project.

Applying Boehm's function point method.

Its procedure is as follows-

Determine the number of components (C, EI, EO, ED, ILF, and ELF).

Q:- What do you mean by project scheduling? Explain PERT and Gantt chart with the help of an example.

Project-task scheduling is a significant project planning activity. It comprises deciding which function would be taken up when. To schedule the project plan, a S/W project manager wants to do the following

PERT and Gantt charts enable project managers to track tasks and project status.

PERT chart displays tasks in a network diagram highlighting dependencies; Gantt chart shows tasks and timelines as a bar graph.

Explain short any two the following  
CMMI level - 4

② RAD

③ CASE (Computer aided SW Engineering)

④ ISO 9000 certification

① RAD :- RAD stand for Rapid Application development. <sup>RAD</sup> ~~RAD~~ is a linear sequential SW development process model that emphasizes a concise development cycle using an element based construction approach. RAD is a concept that products can be developed faster and higher quality through.

Phase

① Business modeling

② Data modeling

③ Process modeling

④ Application Generation

⑤ Testing & turnover

CASE:- Computer - guided SW eng describes a broad set of tools used in SW development. They create a framework for managing project and are intended to help user stay organized and improve productivity.

ISO 9000 certification:- ISO 9000 (International Standards Organization) is a group of consortium of 63 countries established to plan and foster standardization. ISO declared its 9000 series of standards in 1987.

Type of ISO 9000 quality standards

- ① ISO 9001
- ② ISO 9002
- ③ ISO 9003

(1)

ISO: 9001  $\Rightarrow$  This standard applies to the organizations engaged in design, development, production, and servicing of goods.

This is the standard that applies most to development organizations.

(2)

ISO 9002:- This standard applies to those organizations which do not design products but are only involved in the production.

(3)

ISO 9003:- This standard applies to organizations that are involved only in the installation and testing of the product.

Ex. :- Gas Companies.

Ques:-

### Black box testing

1) It is less time-consuming.

2) It is also called closed testing as clear box testing.

3) It is not suitable for algorithm and recommended for algorithm testing.

### Type -

4) Functional  
and non-functional testing

5) mostly done by tester

### white box testing

It is more time-consuming.

It is also called

open box testing.

### Type

path testing  
loop testing.

mostly done by developer.

## short notes

- (1) Computer aided SW Engineering
- (2) capability maturity model (CMM)
- (3) Quality Assurance
- (4) SCM

(2) CMMI capability maturity model.

CMMI is a methodology used to develop and refine an organization SW development processes.

The model define a five-level evolutionary stage of increasingly organized and consistently more mature processes.

there are two method of CMMI

- ① capability Evaluation
- ② software process assessment

### (iii) Quality Assurance (QA)

Quality:- Quality ~~assurance~~ is defined as the product or service that should be "fit for use and purpose."

### (2) Assurance:- Assurance is a positive declaration on a product or service.

Quality Assurance:- Quality Assurance is also known as QA testing. QA is defined as an activity to ensure that an organization is providing the best product or service to the customers.

### (4) SCM:- SCM stand for slow Configuration management process it is used tools which keep that the necessary change has been implemented adequately to the appropriate component

The SCM Process defines a number of tasks:-

- Identification of objects in the software configuration.
- Version Control
- Change control
- Configuration Audit
- Status Reporting.

## ● 5 Level of CMMI:-

- ① Initial level :- Ad hoc activities characterize a S/w development organization at this level. very few or no process are describe and follows. since S/w production process are not limited , different engineers follow their process and as a result , development efforts become chaotic.
- ② Level 2 :- Repeatable :- at this level , the fundamental project management practices like tracking cost and schedule are established. size and cost estimation methods , like function point analysis , COCOMO , etc. are used.

③ Level 3 :- defined

At this level, the method for both management and development activities are defined and documented. This is common organization-wide understanding of operation, role and responsibility.

④ Level 4 :- Managed :-

At this level focus is on software metrics. Two kind of metrics are composed.

Product metrics follow the effectiveness the process being used, such as average defect correction time, productivity, the average number of defects found per hour inspection, the average number of failures detected during testing per LOC etc.

(5)

### LEVEL 5 OPTIMIZING :-

At this phase, process and product metrics are collected. Process and product measurement data are analyzed for continuous process improvement.

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SILW metrics

\* X

4 Function of SILW metrics

1) Planning

2)

Organizing

3)

Controlling

4)

Improving

Characteristics of SILW metrics:-

①

Quantitative

②

Understandable

③

Applicability

④

Repeatable

⑤

Economical

⑥

Language Independent.