

# [SE] Model Qstn Paper

(1) Explain the different s/w life cycle models and compare them with advantages and disadvantages.  
(Unit-2)

Ans A s/w is essentially a group of programs together with configuration of files and associated documentation that helps/enables user to perform some specific task as per the need.

Software process is a set of activities that leads to the production of s/w system from scratch (basic beginning).

The different s/w life cycle models are:

- \* Waterfall Model
- \* Incremental / Evolutionary Model
- \* Spiral Model (Optional)

## ① Waterfall Model:

A simplest s/w development cycle model that states, the phases are organized in a linear order.

This model follows the fundamental development process activities of specification, development (design & implementation), validation and evolution, and each of them are represented as separate process phases.

In this model, each phase starts only after the previous phase is completed.

completely; unless it is the very first stage.

The stages in WLF-model are:-

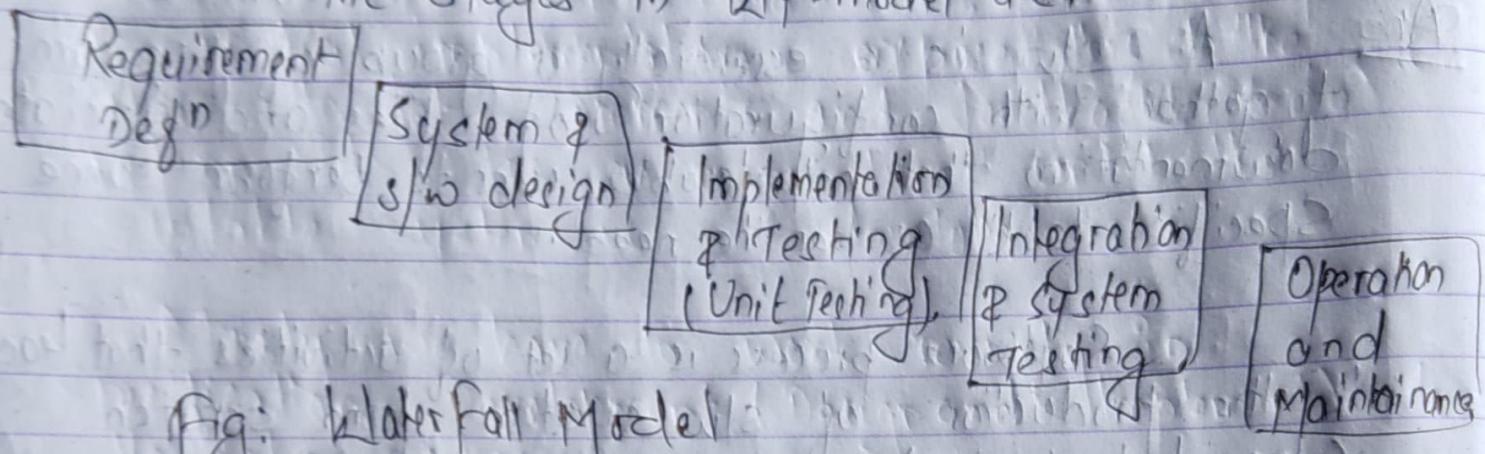


Fig: Waterfall Model

- ① Requirement Analysis and Definition:
- A documentation is formed, where all the request and needs of customers are stated and also, provide base for estimation of cost, risk, time, schedules etc.

- ② System and s/w design:
- A skeleton form or a framework is created on the basis of Req'n Analysis that makes a better understanding of s/w being developed to developers, stakeholders and even the customers.

Given clear understanding and relationship of the system components.

### ③ Implementation and Unit Testing:

Actual coding starts here in implementation and the developer team have ~~the~~ all the responsibility to make the s/w work as expected.

In unit testing, the each and every component of system are tested along with their interaction and relationship with other components.

### ④ Integration and System Testing:

All the program components are united (integrated) together and then whole system is tested, whether it performs as expected or not.

### ⑤ Operation and Maintenance:

System is delivered and deployed to users (customers) for practical use. Maintenance (Evolution) involves correcting errors and adding new features / functionalities.

#### Advantages

- \* Development progress is easy to estimate
- \* Even non-tech people can understand easily.
- \* Each phase has well defined i/p and o/p.

#### Disadvantages

- \* Doing changes while under development is difficult.
- \* No any flexibility in any stage.
- \* Requirements need to be well understood.

## ② Incremental | Evolutionary Model :-

- Based on the idea that, first develop an initial implementation, expose this to the users to get comments and feedback and refine it for as many times until the suitable system is developed.

Mainly, we have to work revisely in Specification, Development (Design and Implement) and Validation phases combined.

As shown in diagram below:

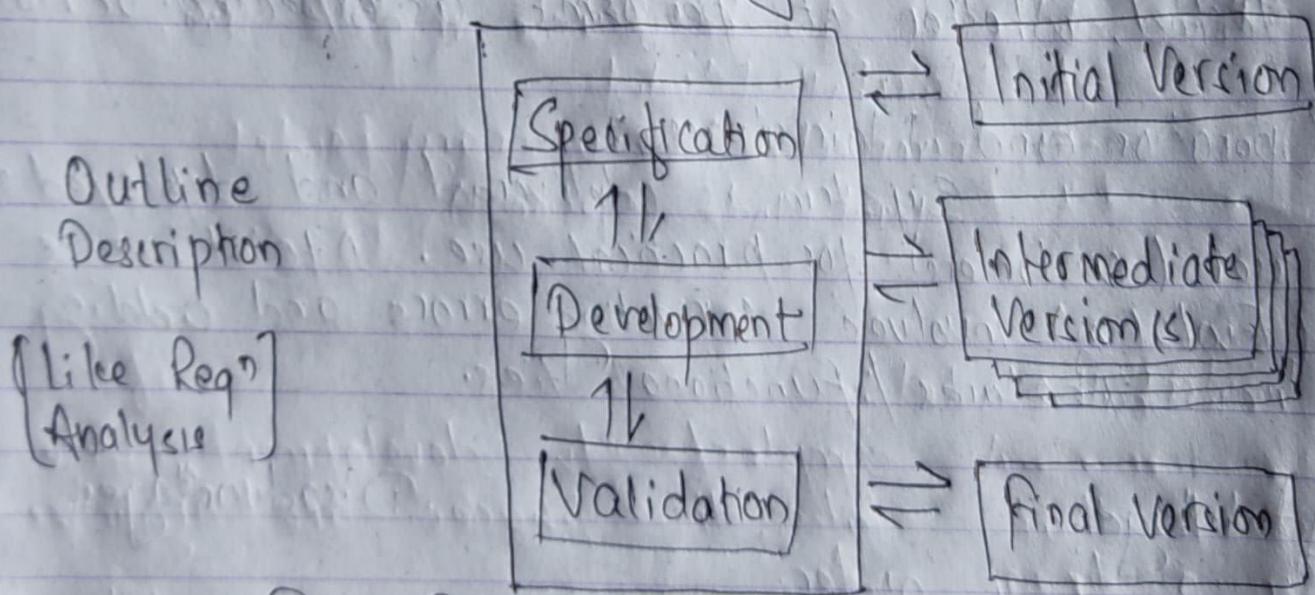


Fig: Evolutionary Model.

[ IF YOU WANT, DESCRIBE THESE 3 STAGES  
(They are already described in WIF+ model) ]

## Types of Evolutionary Model:

### (A) Exploratory Development: (To Explore)

Main objective is to work with users and explore their requirements and needs.  
(Rest of dev. process is same)

### (B) Throwaway Prototyping: (To experiment, users needs)

↳ Concentrates in experimenting with customers on those needs and requirements, which are not clearly understood.

#### Advantages

- Whole dev. team can involve so helps in faster development.
- Changes can be made quickly.

#### Disadvantages

- System may corrupt because of continuous changes.
- Special tools and techniques are needed.

(3) Differentiate b/w functional and Non-functional requirements? What are the various types of functional requirements and non-functional requirements that are placed in system? Explain with Example! (Unit-4)

S/W requirement deals with establishing the needs of users from the product.

Gathering and collecting the correct and complete needs and requirements is one of the most important and basic thing in s/w development.

### Functional Requirements

(1) They define the basic behaviour of the system.

(2) They specify "What should the s/w system do?"

(3) They define the system's components.

(4) They are applied in the component level.

(5) Mandatory

(6) Easy to define & understand

Eg: Internal operations, If, Processing, etc.

### Non Functional Requirements

(1) They define the external properties that can be needed for s/w.

(2) They specify "How the system should fulfill functional Requirements?"

(3) They define the quality of system.

(4) They are applied to whole s/w system.

(5) Non-Mandatory but it better if you have them.

(6) Difficult to define and understand.

(7) Eg: Maintainability, security etc.

Ex. of Functional Req'n in Authentication, Verification etc.

### II part

The functional Requirements that are placed in s/w system are:

- ① Business Requirements : Contain ultimate goal, such as an order placement system, an online catalogue etc. Eg: Online shopping cart, authorization etc.
- ② Administrative functions : These are such things, that a system do. Eg: Reporting, Authenticating etc.
- ③ User Requirements : What the user of the system can do? Eg: Place an order, browse the catalogue etc.
- ④ System Requirements : Describe the s/w and h/w specifications, system response etc.

The Non-functional Requirements of s/w systems are:

- ① Usability : Focus on the appearance of UI of system for the users. Eg: Screen color, buttons design etc.
- ② Reliability | Availability : Will it can work 24/7/365 ? Does it meet all the users requirements?

- ① Scalability : As the system grows, when needs of users grows, can it be able to handle of it?  
Can we add new features in future?
- ② Performance : How fast does it respond, operate, process etc?
- ③ Security : Is check whether, is it secure from cyber attacks or from any physical damage etc

## Group (B)

(A) Differentiate b/w s/w Engineering and Computer Science?  
(Unit 1)

### s/w Engineering

1. s/w Eng. applies those scientific principles to develop h/w & s/w programs.
2. They simply work to design and develop specific s/w program for the organization or users.

(B) Deals with only s/w programs.

(1) s/w Eng. actually do the programming practical work to develop the s/w system.

(2) s/w Eng. is a process of analysing, designing, building & testing of s/w.

### Computer Science

1. Computer science focuses on the science behind making the computer works.
2. Computer scientist mainly analyse and monitors the process of developing applications.

3. Deals with both h/w and s/w programs.

(1) They typically work on theories and algorithms.

(2) Involves only design and understanding of computational process.

(5) Differentiate b/w V shape model and spiral model; (Unit 2)

### V-shaped Model

- (1) A slow development model where development and testing can't be done simultaneously.
- (2) Testing activities starts with the first stage.
- (3) Cost of V model is expensive.
- (4) No more flexibility is available for any changes to be made.
- (5) High guarantee of success.
- (6) Not iterative.

### Spiral Model

- (1) It is also a development model composed of the features of incremental, waterfall model or prototyping model.
- (2) Testing is done at the end of engineering (implementation) phase.
- (3) It is also expensive.
- (4) You have a better flexibility to change.
- (5) Low guarantee of success.
- (6) Iterative.

(6) What is s/w quality assurance? Explain with example. (Unit 4)

Ans S/w quality assurance (SQA) is a process that ensures all the s/w engineering processes, methods, activities and work items are monitored and applied/done under remaining under the defined standards. And only method or process should comply against those standards.

Those defined standards may be one or combination of ~~or~~ two or more than two. Such standards are: ISO9000, CMMI model, ISO15504 etc.

SQA comprises (contains) of the procedures, techniques and tools that are employed to make sure that a product or services just aligns (support) with the requirements defined in SRS (s/w Requirement Specification).

Eg: Library Management System (s/w)

To build this s/w system, first of all we have to create an SQA mgt. plan that includes, how SQA will be carried out in our project.

Second thing we do, setting up the checkpoints or making schedule by dividing work so that particular work can be finished on time.

Then we can apply s/w Eng. Techniques (specification, development, testing) and then executing it for formal review to assure its quality.

In this way we can assure SQA in our project.

(7) Difference b/w: \*

(Unit: 8)

### Validation

- (1) Includes testing and validating actual product.
- (2) Validation is a dynamic testing.
- (3) Includes the execution of code.
- (4) Validation methods are: Blackbox Testing, Whitebox testing and Non functional testing.
- (5) It can find bugs, that are not found by verification.
- (6) Validation is done after development.
- (7) Validation is done by testing team and developers too.

### Verification

- (1) Includes checking documents, design codes and programs.

(2) Verification is static testing.

(3) Does not include execution of code.

(4) Verification methods are: Review, walkthroughs, inspections etc.

(5) Can find the bugs in early stage of development.

(6) Verification is done during development.

(7) Quality assurance team does verification.

((CBSE))

(Q) Explain the component base s/w engineering and its advantages. (Unit 2)

Ans

CBSE is an idea of building s/w from established s/w components rather than building it from ground level.

The components of already developed s/w of system can be used to develop new s/w by removing some unwanted components (features and functionalities) and adding new components as those already developed components can interact through well defined interfaces.

CBSE mainly focuses on custom development of the components that already exist. (ie. modification)

CBSE is used when one have to achieve the better s/w quality, more quickly, at lower costs. To achieve this, s/w engineers adopt the systematic reuse as a design process from old s/w to new s/w.

This reuse of s/w ensures:

- \* Reusability      \* Sustainability      \* Extensibility
- \* Maintainability.

Advantages:

- \* Divides large project into smaller sub projects
- \* Reduces time and cost of development
- \* Increased productivity and quality
- \* Easy to replace components.

(Q) What are the drawbacks of s/w reuse? Explain.

Ans s/w elements of a product take time to create and reuse of them saves development time.  
But still it got some drawbacks:

① Maintenance Cost Increase:

Some time the old created components may fail doing their functions time and again resulting in high maintenance cost.

② S/w tools require longer support:

As the s/w tools that were used previously may not be in use today, so we too have to maintain those tools which may be in waste of time and money.

③ S/w tools may become obsolete:-)

S/w tools we used today to create s/w component may become outdated soon to the org.  
Have to be up to date for such tools.

④ It takes time to select which component can be reused for long term and any mistake in selection may cause huge loss.

(e) One component may not work with all interconnected components, resulting failure of system.

## (10) Differentiate b/w : (Unit 5)

### Structural Model

They display the organization of system in terms of components and their relationships.

They may be static (that show structure of system) or dynamic (that show org. of system while executing).

Structural models are created when designing system architecture.

Class diagrams are used to object oriented system models to show ~~the~~ classes and their relationships in the system.

Eg: Class diagrams, Association links and Generalization are used to show system structure.

### Behavioural Model

They display what happens or what is supposed to happen when system respond to stimulus from its env. (Eg: when user gives input)

They are the dynamic behavioural model because they show the org. of system while executing.

They are of two types:

- (a) Data Driven modeling
- (b) Event Driven modeling

In data driven, whole process is concerned, and in event driven, only a certain event process is concerned.

Eg: Sequence diagram and State Transition diagram are used for behavioural model.

(1) Discuss COCOMO model in cost estimation of s/w in detail. (Unit 10)

Ans

The constructive cost model is an algorithmic s/w cost estimation model developed by Barry Boehm in 1981.

This model uses a basic regression formula, with parameters that are derived from historical projects data and current project plans and characteristics.

- The very first known COCOMO model is COCOMO-81 that assumes s/w to be developed using waterfall model from scratch.

In COCOMO, projects are categorised as:

(a) Organic: Any project that is developed after well understanding of applications, such project is called organic. Also should include small team with great experience. Eg: Data processing system.

(b) Moderate: Any project having mixed of skilled, experienced and inexperienced staffs is called moderate. Eg: DBMS, OS etc.

(c) Embedded: If the project to be developed is highly coupled with complex h/w.  
Eg: ATM, Air Traffic Control etc.

Formulae:

(a) Organic :  $Effort = 2.4(\text{KLOC}) + 1.05 \text{ PM}$  ] Effort Based

(b) Moderate : " =  $3.0(\text{KLOC}) + 1.12 \text{ PM}$  ] Based

(c) Embedded : " =  $3.6(\text{KLOC}) + 1.20 \text{ PM}$

(a) Organic :  $T_{dev} = 2.5(Effort) / 0.38 \text{ months}$  ] Development

(b) Moderate :  $T_{dev} = 2.5(Effort) / 0.35 \text{ months}$  ] Time

(c) Embedded :  $T_{dev} = 2.5(Effort) / 0.32 \text{ months}$  ] Based

LOC : No. of line of Codes

PM : Effort in Person Month

(12) Explain Maintenance Process in details. (Unit 9)

S/w maintenance is a process of modifying a s/w product after it has been delivered to the customer.

The main purpose of s/w maintenance is to modify and update s/w applications after delivery to correct faults and improve performance.

S/w maintenance must be performed in order to:

- Correct faults
- Improve the design
- Implement Enhancements
- Interface with other systems
- Add / Remove features

Categories of s/w Maintenance :-

① Corrective Maintenance : Deals with repairing faults or bugs found in day to day system functions.

② Adaptive Maintenance : Deals with maintenance of particular function/ feature that may have changed due to change in any other function.

③ Perfective Maintenance : Deals with functionalities enhancement either to add or remove or enhance.

④ Preventive Maintenance : Deals with updating and modifying so, is to prevent future occurring problems.  
*(Prevention is better than cure!)*