UNIT-2

Software Requirement Specification (SRS)

Lecture No -11

Content :- Requirement Engineering ; Elicitation & Analysis.

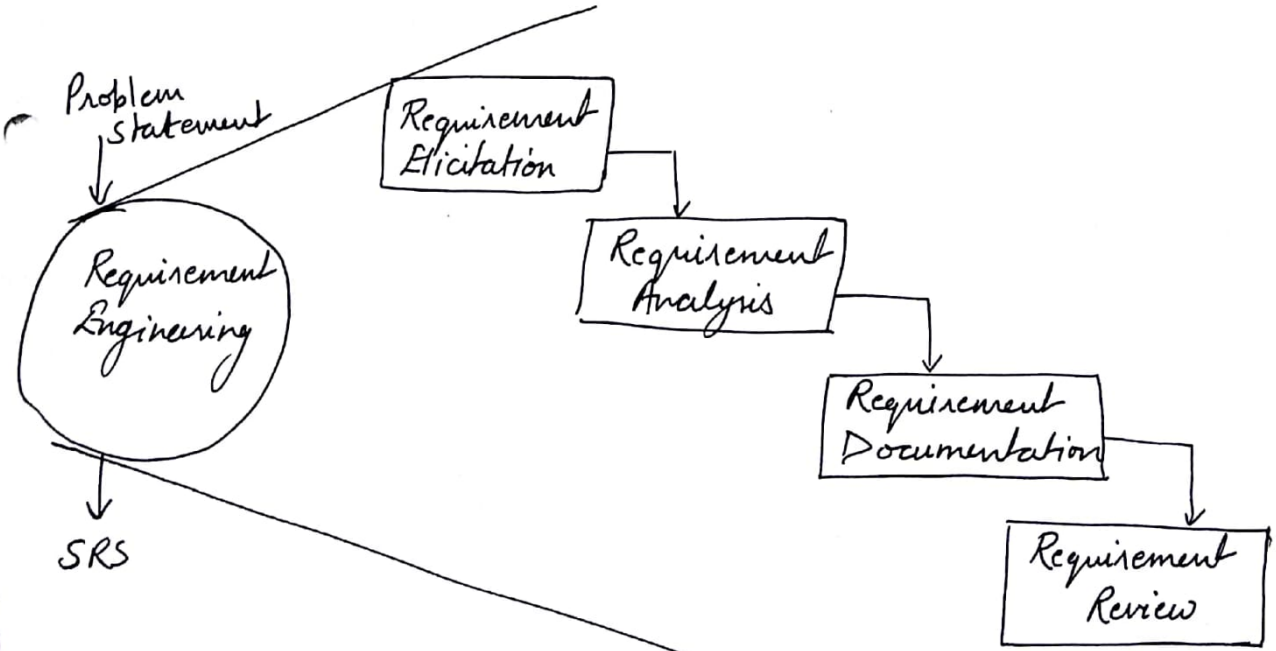
Requirement -

It is a feature of the system or a description something that the software is capable of doing in order to fulfill the purpose.

Requirement Engineering -

→ It is the process of creating a document written in natural language which contains a description of what the software will do without describing how it will do.

→ Disciplined application of proven principles, methods, tools & notations to describe a proposed system intended behaviour and its associated constraints.



Crucial Process Steps of Requirement Engineering

Requirement Elicitation -

* It means gathering or to capture.
* It is a process of learning, uncovering, extracting, discovering.
* 4 main categories of participants
  1) Facilitator
  2) Users
  3) Analyst.
  4) Design Team
* Steps in Requirement Elicitation-
  - → Assess the feasibility
  - → Identify the people who will specify requirement.
  - → Define the technical need. environment
  - → Identify domain constraint
  - → Define Elicitation Method.
  - → Identify ambiguous requirement.
  - → Create Usage scenario to help customers.

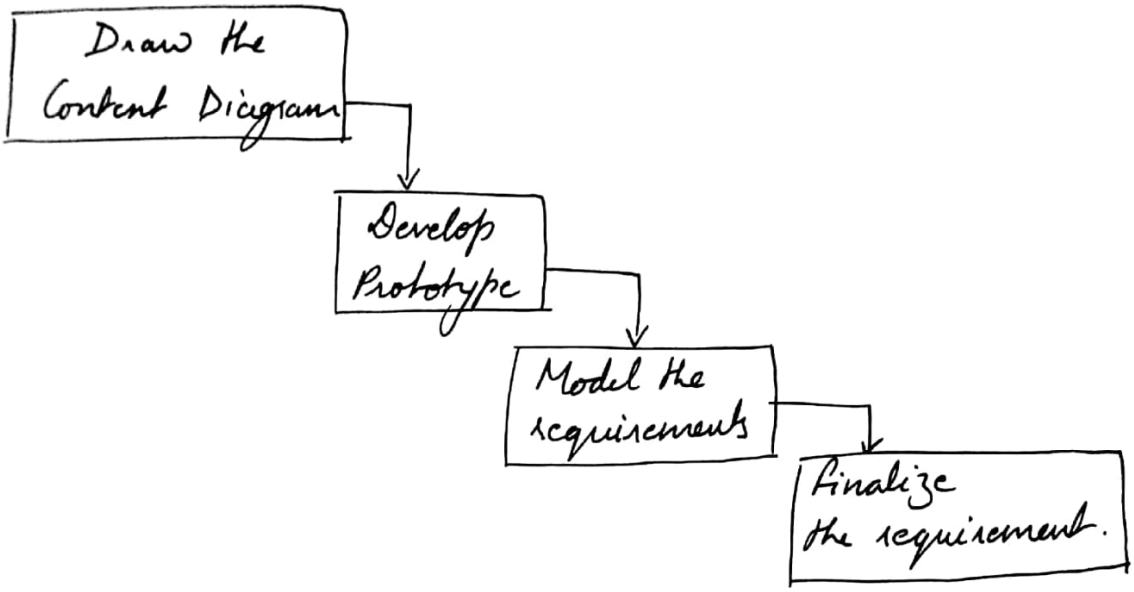
* Elicitation Requ Techniques

1) Traditional - generic data gathering technique
   - → Surveys
   - → Questionares
   - → Interviews
2) Groups Elicitation Technique
   - → Brain Storming, FAST (Facilitated Application specification Technique)
   - → Workshops
   - → Interviewing
   - → Survey
   - → Document Reviewing.
3) Prototyping

Lecture No-12

Content :- Documentation, Review, Management of User Needs

→ Requirement Analysis -



→ Requirement Documentation & Specification -

* Known as SRS.
* It can be defined as the written document, supported by graphical models, system charts & high level. It should include
  i) What the software is supposed to do.
  ii) What is speed, availability, response time, recovery time etc of software.
  iii) Interaction with people, h/w and other s/w.
  iv) Considerations for probability, correctness, maintainability, security & reliability.

→ Requirement Verification or review -

i) Plan a review.
ii) Review Meetings.

4) Model driven technique

5) Cognitive technique (knowledge acquisation for knowledge base)

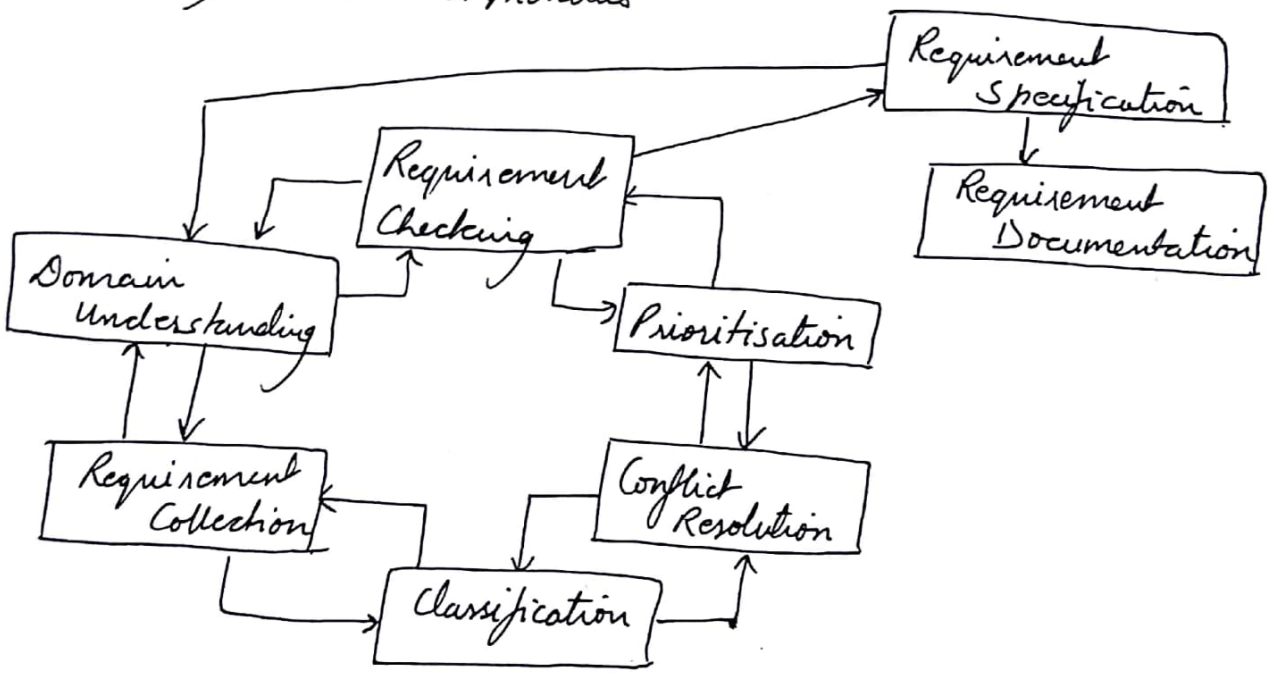
6)

Requirement Analysis -

→ In this step gathered information is analysed for conflicts, ambiguities, inconsistencies

→ Missing Requirement or extra requirement is to be understood & analysed by the analyst.

1) Pros
2) Importance
3) Possible Solutions
4) Possible data I/P & O/P's.
5) Possible complexities



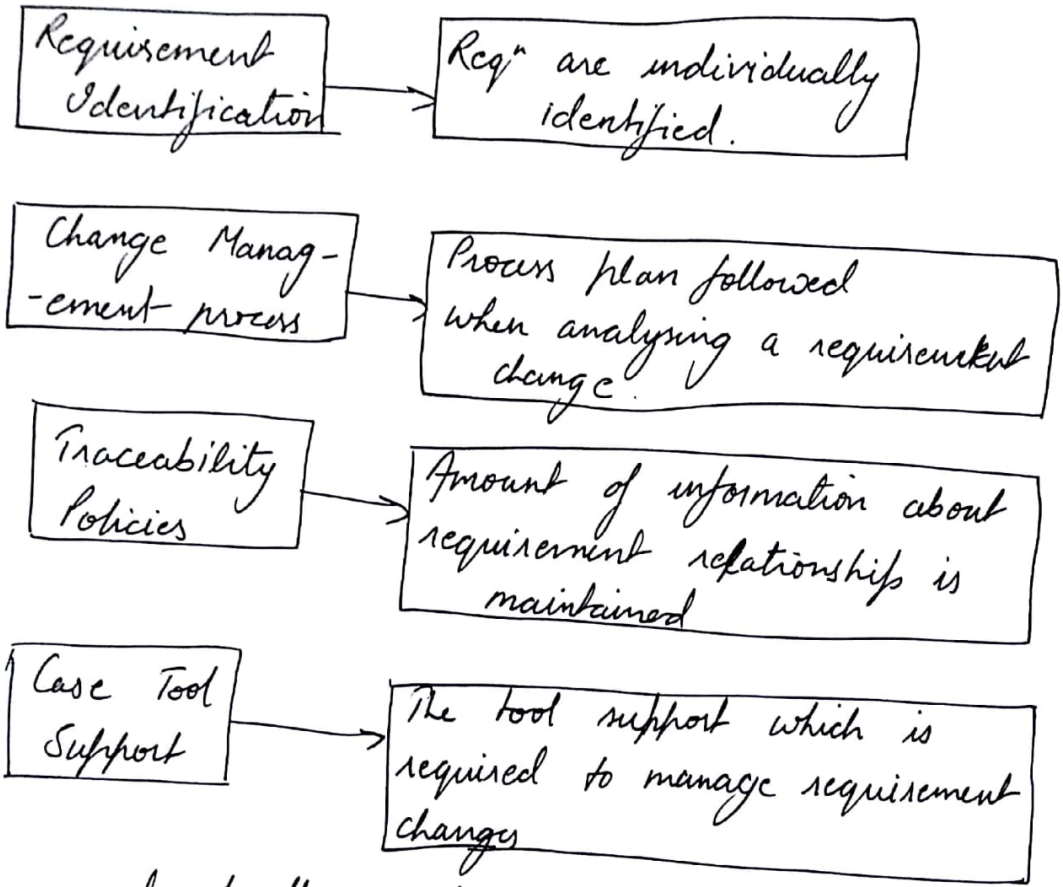
Types of Requirements -

Quality function deployment categorise requirement into 3 categories.

* Normal Requirements
* Expected Requirements
* Existing Requirements

iii) follow-up actions.
iv) Document after review.
v) Understandability
vi) Checking for redundancy.
vii) Completeness.
viii) Adaptability.
ix) Conformation of standards.

→ Requirement Management -



→ Management of User needs -

i) Background information of the organisation.
ii) Understanding the current issues to be tackled.
iii) Understanding the profile.

Lecture No - 13

Content : Feasibility Study & Information Modelling.

Feasibility Study -

It includes

i) An outline description of the system.
ii) How the system will be used within an organisation
iii) Overall objectives are also covered.
iv) Can the system be integrated with the other systems.

- Information assessment
- Information collection
- Report Writing

Information Modelling -

→ Req^{n} gathering is usually achieved by the development of diagrams & requirement specification after discussion with the users.

→ The user then reviews the diagram & specification to determine if the developer has understood the requirements.

Structured Analysis

→ Its aim is to transform the textual description of prob. into graphical model.

→ Each function is analysed & hierarchically decomposed into more detailed function

Structured Design

→ In this all the functions are identified during structural analysis are mapped to be a module structure.

Tools Used for Structured Analysis-

1. DFD (Data Flow Diagram)
2. Content Diagram
3. Event List.
4. Data Dictionary.
5. E-R Diagram (Entity Relationship Diagram)

DFD Data Flow Diagram-

- → Useful in understanding a system
- → Models functionality and flow of data through a system.
- → Views a system as a function that transforms the input to output.
- → Follows some rules and represent the result of structured analysis.
- → DFD is of 2 types

Physical DFD

→ Used in Analysis phase to study the functioning of the current system.

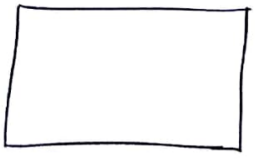
Logical DFD.

→ These are used in the design phase for depicting the flow of data in the proposed system.

Elements of DFD

i) External Entity

- → Determine System Boundaries
- → Represent as the source or sink of the system.
- → Graphical Representation.



② Process -

→ It is work or action

→ It is performed in incoming data flow to produce outgoing dataflow.

→ Major functions are computation & making decision

→ Graphical Representation

③ Data Flow -

→ Represent the input or output of data to a process.

→ Data flow must begin or and at dat a process.

→ It connects the process each other or to source or sink.

→ Graphical representation

④ Data Store -

→ It is a repository for data that are temporary or permanent. in the system.

→ Graphical Representation

Lecture No - 14

Content :- Data Dictionary, ER-Diagram.

Data Dictionary -

→ It list all data-items appearing in DFD.

→ Data-dictionary list all data-items.

→ Data-item listed include all data flow and the contents on all the DFD's.

→ It determines the definition of different data structures in terms of their component element.

→ It list the purpose of all data items and the definition in terms of their component

Data Definition -

Composite data items can be defined in terms of primitive data items using the following data definition operators.

① [+] : denotes composition of 2 data items.

② [,,] : represents selection

③ ( ) : Content inside the bracket represents optional data which may or may not appear.

④ { } : represents iterative data definition.

⑤ = : represents is an iterative data equivalence.

ER Diagram (Entity Relationship Diagram)

① Entity - Represented by means of rectangle.

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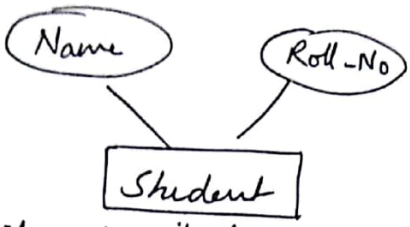
② Attributes -

These are properties of entities. Represented by means of ellipses. connected to entity (rectangle)

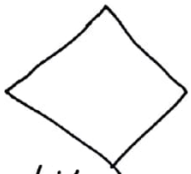


Types -

i) Composite Attribute
ii) Multivalued Attribute
iii) Derived Attribute

③ Relationship -

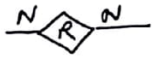
Represented by dimond-shaped box.
All the entities participating in a relationship, are connected to it by a line.



Binary Relationship and Cardinality.

→ One - to - One 

→ One - to - many 

→ Many to many 

→ Many to one. 

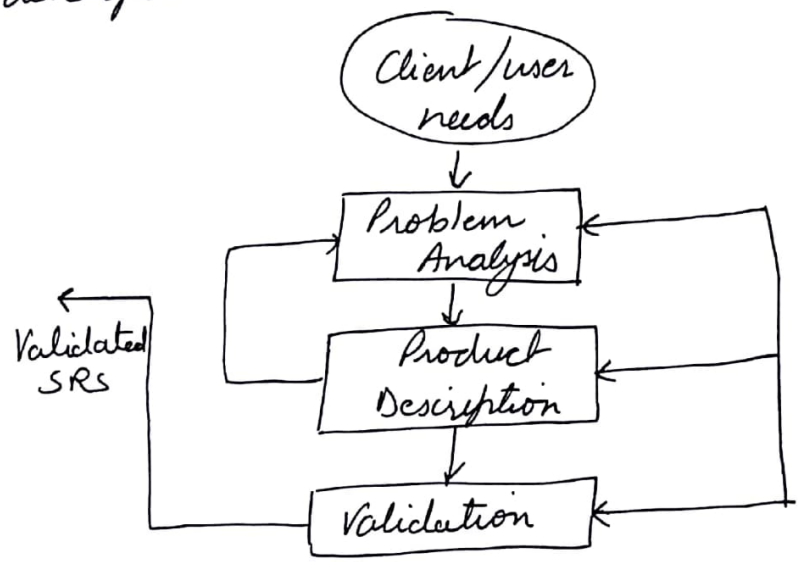
Lecture No - 15

Content:- SRS, Document, IEEE standard for SRS.

Software Requirement Specification (SRS)

→ It is a vital documentation that is crucial to the success of any s/w development project.

→ It serves many purpose depending upon who is writing it. It serves as constraint between the customer & developer.



Characteristics of SRS - (Good SRS)

An SRS is complete if and only if these characteristics are fulfilled.

→ Complete
→ Correct
→ Unambiguous
→ Consistent
→ Verifiable
→ Modifiable
→ Traceable

Benefits of a good SRS-

→ Describes the clear view of s/w functionalities and what is all about.
→ Reduce the development effort.
→ Provides a basis for estimating cost & schedules.
→ Provide a baseline for validation & verification.
→ Serves as a basis for enhancement
→ Facilitate transfer.

Components of an SRS-

① Functional Reqⁿ
→ Specify which o/p should be produced from the given i/p.
→ Describe the relationship b/w the i/p & o/p of system.
→ Includes specifying the validity checks.
→ System behaviour in abnormal situation. like invalid i/p.
→ Behaviour for situations where the i/p is valid. but the normal o/p cannot be reached.

② Performance Requirement.
→ 2 types Static & Dynamic.

Static
→ Are those that do not impose constraint on execution of system. includes reqⁿ like no. of simultaneous users also called capacity requirement.

Dynamic
→ It specify constraints on the execution behaviour of the system. It includes response time, throughput constraints, expected no. of operations that can be performed in unit time.

IEEE Standard for SRS.

1. Introduction
   - 1.1 Purpose
   - 1.2 Scope
   - 1.3 Definitions, acronyms & abbreviations
   - 1.4 References
   - 1.5 Overview.
2. Overall Description -
   - 2.1 Product Perspective
   - 2.2 Product Functions
   - 2.3 User characteristics.
   - 2.4 Constraints
   - 2.5 Assumptions & Dependencies
   - 2.6 Apportioning of Requirements.
3. Specific Requirements
   - 3.1 External Interface. requirements
   - 3.2 Specific Req^n
   - 3.3 Performance Req^n
   - 3.4 Design Constraints
   - 3.5 S/w System Attributes
   - 3.6 Other Requirements.
4. Supporting Information
   - 4.1 Table of content and index
   - 4.2 Appendixes.

Lecture No - 16

Content :- Software Quality Assurance

Software Quality -

→ Defined in terms of its fitness of purpose.
→ Fitness of purpose is interpreted with satisfaction of the requirements by the user from the SRS.
→ Two kinds of S/w Quality.

Quality of design
It encompasses requirements specifications & design of the system.

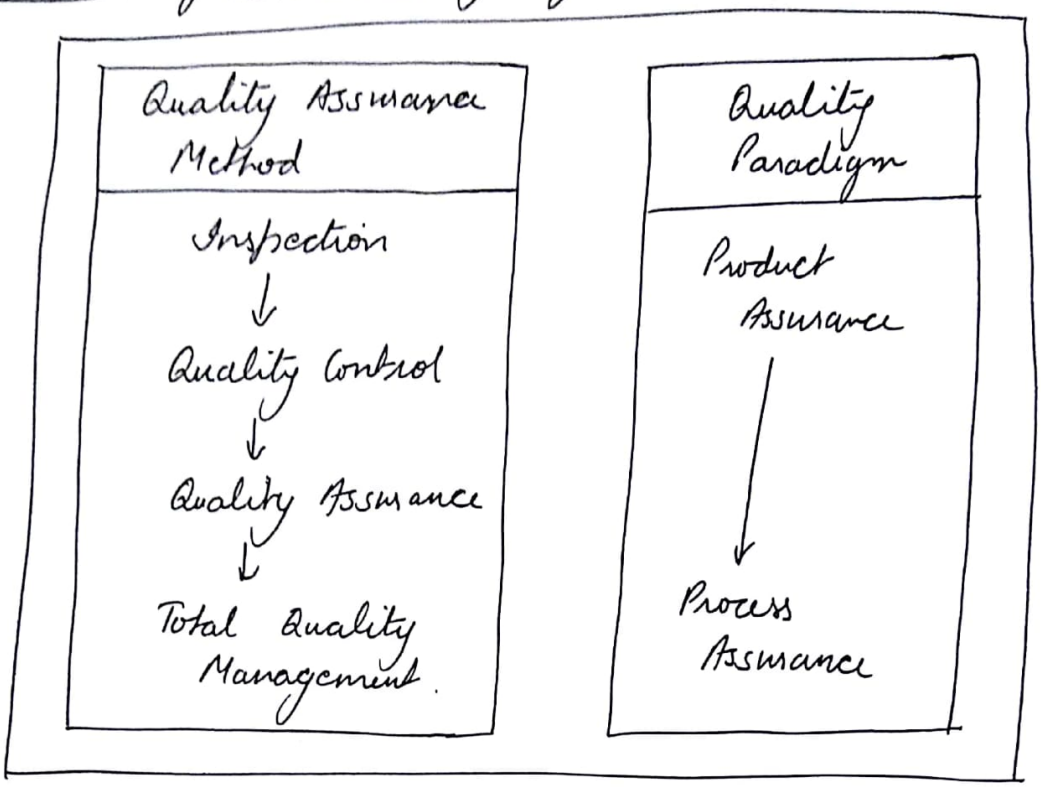
Quality of Conformance
→ Focus is on implementation
→ If the implementation follows the design and the resulting system meets the req^{n} & performance goal.
Then the quality of conformance is high.

Attribute domain in S/w Quality:

→ Portability
→ Usability
→ Reusability
→ Correctness
→ Maintainability

Product
↑
Procedures
↑
Plan
↑
Standards

Evolution of S/w Quality System -



Software Quality Assurance - (SQA)

It is done by checking these activities

i) Plans are defined according to the standards.
ii) Procedures are defined according to plans.
iii) Products are implemented according to the standards.

SQA is planned and systematic pattern of all actions necessary to provide adequate confidence that the item or product confirms to establish technical requirements.

Difference b/w SQA & SVV -

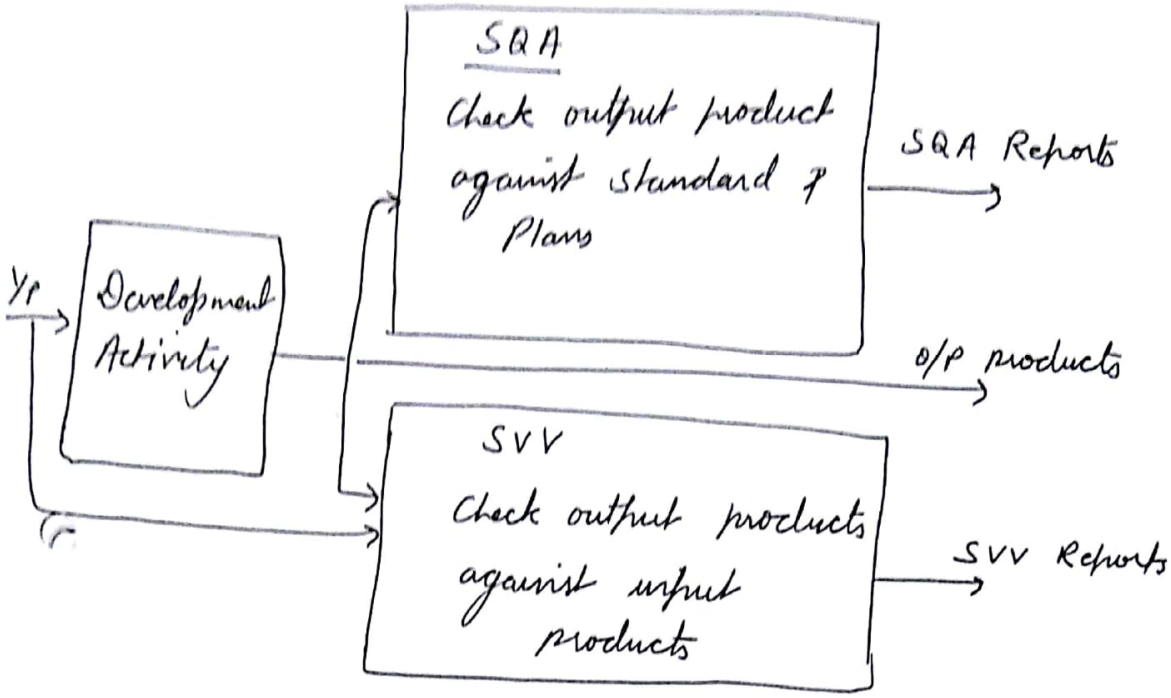
In SPM & s/w testing & s/w Engg it consists of Verification & Validation process.

Verification → Are we building the ~~right~~ product in right manner

Validation →

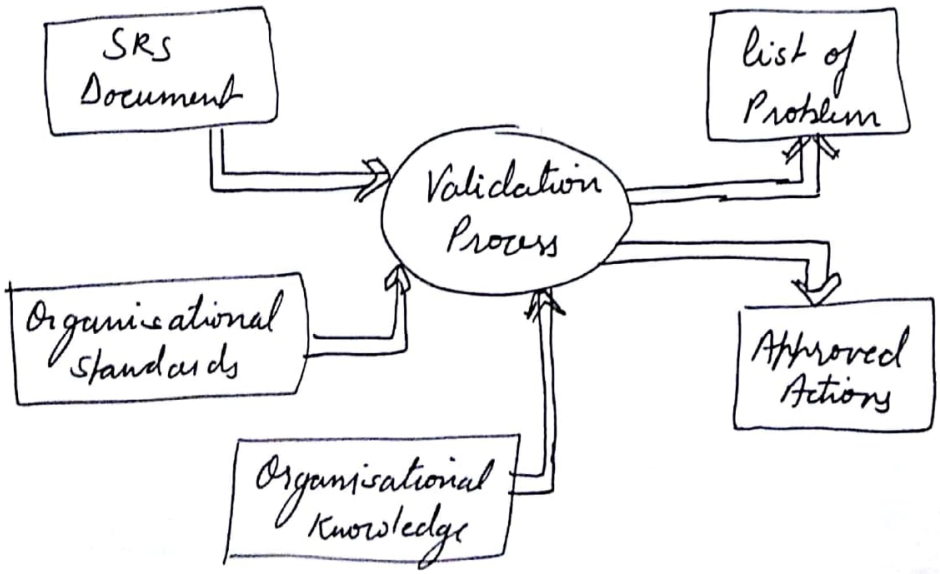
Lecture No - 17

Content :- Software Validation & Verification (SVV), SEI-CMM.



Difference b/w SQA & SVV

Verification	Validation
→ Are we building the product right.	→ Are we building the right product.
→ The S/w should confirm to its specification.	→ The S/w should do what the user wants.



Verification Technique -

i) Dynamic Testing

ii) a) Functional Testing
b) Structural Testing
c) Random Testing

ii) Static Techniques/ testing
a) Consistency technique.
b) Measurement technique.

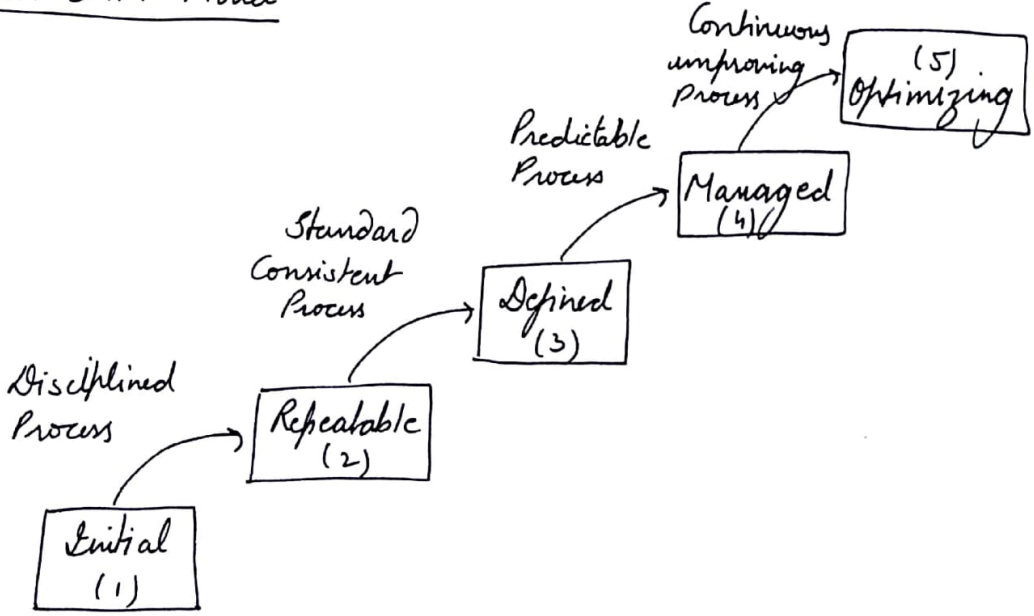
Validation Technique -

i) Formal Method.

ii) i) Fault injection
a) H/w fault injection
b) S/w fault injection

iii) Dependability Analysis.

SEI-CMM Model -



S/w Process -

→ Set of activities, methods & practices, use to develop & maintain S/w.

S/w Process Capability -

→ It describes the range of expected O/P's
→ Means of predicting most likely O/P's.

S/w Process Performance -

→ Actual results achieved by S/w Process.

S/w Process Maturity -

→ Implies potential growth in capability
→ Indicate richness of process.
→ extent to which a process is explicitly, managed measured and controlled.

CMM → Capability Maturity Model -

→ Developed by S/w Institute of Carnegie Mellon University.
→ Framework that describes the "key element of an effective S/w process".
→ Describes evolutionary improvement path. from immature to a mature & disciplined process.

~~Level~~ 1 - Initial

Lecture No-18

Contents :- SEI-CMM, ISO-9000

Levels of CMM- (Capability Maturity Model)

① Level 1 Initial:

→ S/w Process is adhoc
→ Few processes are defined
→ Goes over budget
→ Over scheduled.
→ Capability is Characteristics of individuals not organisational.

Level 2: Repeatable -

→ Basic Process Management to establish cost, schedule ; function.
→ Realistic commitments based on results of previous projects.
→ Project standards are defined.
→ Process is disciplined.

Level 3: Defined -

→ S/w Process is documented, standardized & integrated
→ All project use approved versions of org^n standard S/w Process for development of S/w.

→

Level 4: Managed -

→ Process capability is established at this level.
→ Detailed measures of S/w process & product quality are collected.
→ Quantitatively understood & Controlled & Predictable.

Level 5: Optimized. -

→ Continuous process improvement is enabled by feedback
→ Innovative ideas.
→ New technologies.
→ Goal is to prevent the occurence of defects.

ISO 9000 Model - (1946)

→ International Organisation for standardization.
→ Adopted as a series of written quality standards. (1987)
→ It tells the manufacturers and suppliers what is required from a quality oriented system.

Objective of ISO 9000 -

→ To facilitate international trade of goods & services.
→ To obtain competitiveness by obtaining required quality in a cost effective manner.

How to achieve these objectives? -

→ Maintain & seek to continuously improve product quality.
→ Improve the quality of operations to continuously meet customers and stakeholders stated and implied needs.
→ provide confidence to internal management.
→ provide confidence to other employees.
→ provide confidence that quality system requirements are fulfilled.

Advantages of ISO 9000 model -

- → Creates more efficient & effective operation.
- → Increase customer satisfaction & retention.
- → Enhance Marketing.
- → Increase Profit.
- → Improves employee motivation, awareness.
- → Reduce audits.
- → Reduce waste and increase productivity.
- → Promote international trade.