Unit-4 - STQA

Quality - degree of conformance to explicit or implicit requirement and expectations of customer.

functional quality
Non functional quality

Diff. b/w

Software Quality Assurance

It is the set of activities which ensure processes, procedure as well as standard are suitable for the project and implemented correctly

Software Quality Control.

→ Set of activities to ensure that quality in Software product.

Constraints of Software product Quality Assessment

Software product evaluation is assessment.

Constraints

(1) Software are virtual
(2) huge communication gap b/w user and developer/tester
(3) Software is unique in nature
(4) Software should in a same way everytime
(5) All aspects of software cannot be tested fully

Quality and productivity Relationship.

Quality ↑ productivity ↑ profit ↑ cost ↓

Requirement of product.

↳ These are features, Quality user wants in product

Types

(I) stated and Implied requirement.

* documented SRS.
* functional & Non functional. by BA & User

(II) Generic and specific requirement.

↳ generic requirement.

(III) present / future requirement.

Based on priority.

(I) primary - Must
(II) Secondary - Should
(III) Tertiary - could.

Characteristic of Software.

(I) Unique
(II) Virtual
(III) run in some way everytime
(IV) need testing Can't Measure with instrument

Software development process.

→ process how the software is developed.

(1) Analysis and planning
(2) Requirement
(3) Design
(4) Software development.
(5) Testing
(6) Deployment
(7) Maintenance & update.

* waterfall, Spiral, Prototyping
* Iterative, Agile
* RAD, Incremental

Types of Software product.

(I) products affecting life - causes death
(II) products affecting Investment.
(III) simulation based product → the product are test in simulation. eg. Space research.
(IV) other products - other 3.

Schemes of criticality

(I) dependency of business on system
  (1) Most critical
  (2) partial critical
  (3) less critical

(II) environment
  (I) environment like space research are very critical
  (II) Banking are critical
  (III) other are less critical.

(III) complexity.

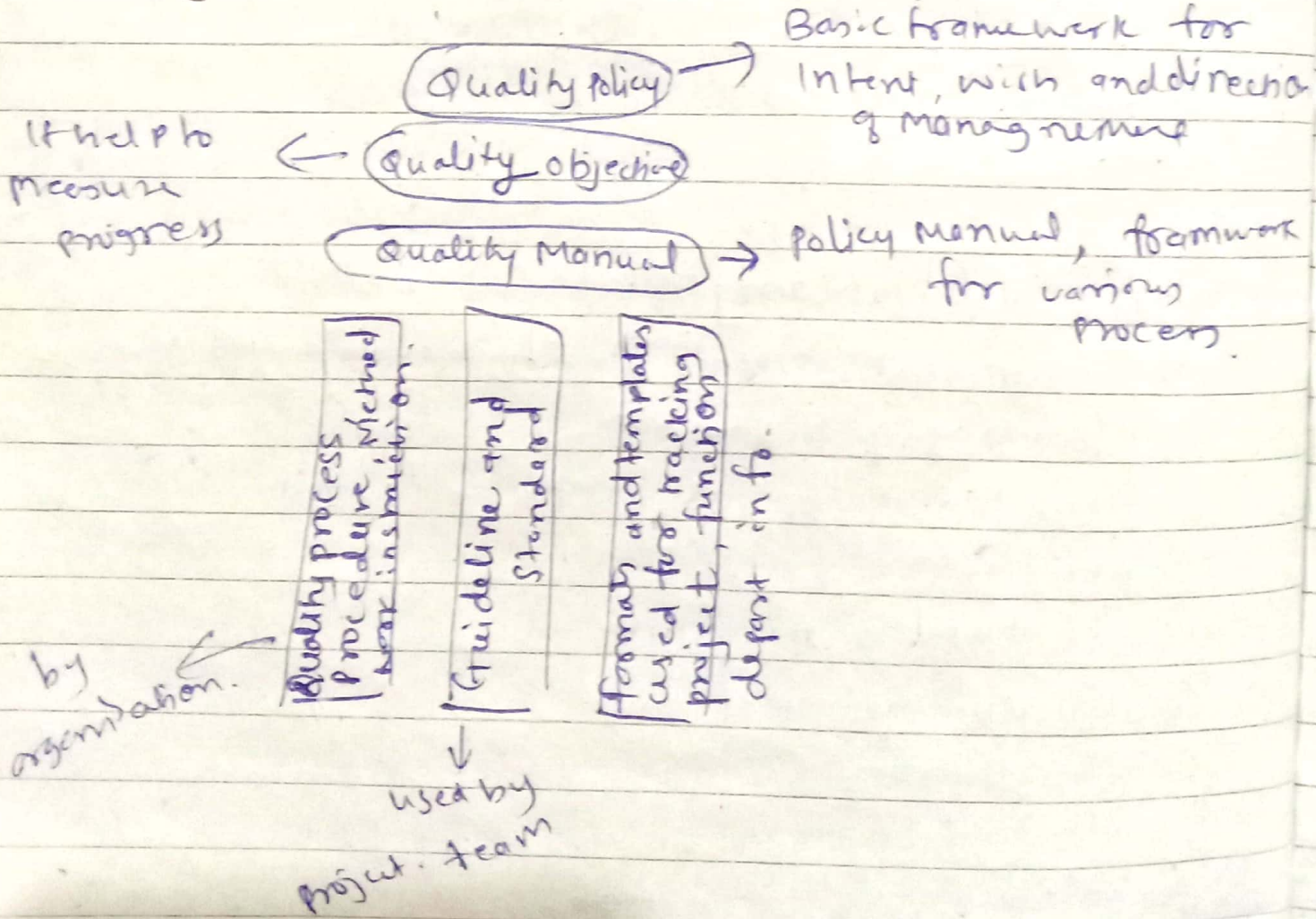
Software Quality Management.
→ Management process used to develop and manage the quality of Software.
→ Management of all Input & output
→ Activities.
  (I) Quality Assurance
  (II) Quality Planning
  (III) Quality Control.

It handles
  (I) correction
  (II) Corrective Action
  (III) Preventive Action.

Why Software has defects?

(1) communication
(2) Requirement Change
(3) Time pressure
(4) poorly document.
(5) overconfidence
(6) programming error
(7) Lack of Skill

Quality Management system Structure



Important Aspects of Quality Management.

(14)

Software Quality Control.

aim to check whether product meet the specification and requirement of the customer.

Software Quality Model.

→ product quality evaluation system
→ a set of characteristics & their relationship b/w them that provide basic for specifying quality requirement and evaluting quality.
→ It specifies which properties are important for an artefact (usability, performance, visibility) and how these properties are to be determined.

Models

(1) McCall's Quality Model

1) Main factors

* product revision.
  (a) Maintainability
  (b) flexibility
  (c) Testability
* product transition
  (a) portability (c) Interoperability.
  (b) reusability

* product operations.
  (a) correctness
  (b) Reliability
  (c) efficiency
  (d) Integrity
  (e) usability.

(2) Boehm's Quality Model
  - Based on McCall Model.
  → High level characteristics, intermediate level, and primitive characteristics.

(3) FURPS Model.
  (I) functional requirement.
  (II) Non functional requirement
    (a) Usability
    (b) reliablity
    (c) Performance
    (d) Supportability

(4) ISO 9126
  → International Standard Software quality model
  → four parts
    (a) Quality Model
    (b) External Metrics - those are applicable to running Software

(c) Internal Metrics - those which do not rely on software Execution.

(d) Quality in use Metrics - only available when final product is used in real condition.

Quality attributes

(I) functionality - A set of software attributes with specific properties that provide functions that satisfy the need of user

(II) Reliablity - ability to maintain level of performance under specific stated condition.

(III) Usability - effort needed to user to learn use of product

(IV) efficiency - relationship blw level of performance & amt of resources required.

(V) Maintainbility : how ease with the software product can be changed.

(VI) portability - ability to transfer from one enviroment to another environment.

*Quality Measurement and Metrics

Quality Metrics is measurement of the value and performance of product.

→ used to assess customer satisfaction level

→ Identify the area for improvement

1. Code Quality
2. Reliability
3. performance
4. usability
5. Correctness
6. Maintainability
7. Integrity
8. Security

* Quality plan.

- It is written document that describe the overall goal & objective for quality Management system.
- It include
  - * overview of QMS
  - * organizational objective
  - * Roles & responsibilities
  - * Resource need to Implement the plan
  - * Applicable operating Practice, Procedure work Instruction.

* Method to check compliance : Inspection, Audit, test

* The process to manage the change
* way to acheive objective.

* Implementation & Documentation.

(a) Implementation
- (I) Requirement phase
- (II) Design phase
- (III) Implementation phase
- (IV) Software testing phase.

(b) Documentation
- (I) SRS.
- (II) SDD
- (III) SUM.

* Quality tools Including Case Tool.

- Tools assist an organisation for problem solving & process Improvement

- Ishikawa 7 tools.

(1) Cause and effect diagram.
(2) check sheet.
(3) Control chart
(4) Histogram.

(5) Pareto chart
(6) Scatter diagram
(7) Stratification.

CASE Tool.
→ It stands for Computer aided Software Engineering
→ automated tools
→ Analysis tool, Development tool, Design tool, DBMS tool, Documentation tool.
→ used by Engineers, Analyst, Manager.

Central respository.
→ It is a central place of storage where product Specification, requirement document, report etc Stores.

upper case Tools - planning, analysis & design

lower case Tools - Implementation, testing & Maintenance

Integrated case Tools - All stages.

Complexity metrics.

→ used to predict the critical information about reliability and maintainability of software system.

ISO 9000

→ It is international standard of quality management.
→ used by any industry.
→ accepted across labs & countries.
→ It guide about concept, principle and safeguards to be in place in a workplace.
→ only one level
→ It focuses on hardware, software, & service.
→ pass or fail criteria is provided.
→ 3 year validity.

CMM - Capability Maturity Model.

→ for software industry to certify them at which level, they are following and maintaining the quality standard.
→ mostly used in software industry
→ mostly used in USA
→ steps by steps progress among in maturity levels
→ 5 level → (1) Initial.

(2) Repeatable
(3) Defined
(4) Managed
(5) Optimized

→ by SEI -