Name: A. Shiva Surya Saran
Roll No.: BE-B 20

Software Testing and Quality Assurance

Assignment 5

Unit 5: Quality Management

1. Explain in detail elements of SQA.

Standards
Standards may be adopted voluntarily by a software engineering. The job of SQA is to ensure that standards that have been adopted are followed and that all work products conform to them.

Reviews and audits
Technical reviews are a quality control activity performed by software engineers for their intent is to uncover errors. Audits are a type of review performed by SQA personnel with the intent of ensuring that quality guidelines are being followed for software engineering work.

Testing
Software testing is a quality control function that has one primary goal – to find errors. The job of SQA is to ensure that testing is properly and efficient conducted.

Error/defect collection and analysis
SQA collects and analyses error and defect data to better understand how errors are introduced and what software engineering activities are best suited to eliminating them.

Change management
Change is one of the most disruptive aspects of any software project. If it is not properly managed, change can lead to confusion, and confusion almost always leads to poor quality.

Education
A key contributor to improvement is education of software engineers, their managers, and other stakeholders.

Vendor management
Three categories of software are acquired from external software vendors–shrink–wrapped packages (e.g., Microsoft Office), a tailored shell that provides a basic skeletal structure that is custom tailored to the needs of a purchaser, and contracted software that is custom designed and constructed from specifications provide by the customer organization.

Security management
With the increase in cyber-crime and new government regulations regarding privacy, every, every software organization should institute policies that protect data at all levels, establish

firewall protection for Web Apps, and ensure that software has not been tampered with internally.

Safety
SQA may be responsible for assessing the impact of software failure and for initiating those steps required to reduce risk.

Risk management
SQA organization ensures that risk management activities are properly conducted and that risk–related contingency plans have been established.

2. State & explain Principles of Quality management

1. Customer focus
   Understand the needs of existing and future customers and align organizational objectives with customer needs and expectations. Meet customer requirements, satisfaction along with managing Customer relationship and exceeding expectations.

2. Leadership
   Establish a vision and direction for the organization, set challenging goals for modeling organizational values and trust. Equip, empower employees, and recognize employee contributions.

3. Engagement of people
   Ensure that people's abilities are used and valued, making them accountable and enabling participation for continual improvement. Evaluating individual performance, learning and knowledge sharing and e open discussion of problems and constraints.

4. Process approach
   Manage activities as processes, measure the capability of activities and identify linkages between activities. Prioritizing improvement opportunities and deploying resources effectively.

5. Improvement
   Improve organizational performance and capabilities and aligning improvement activities. Empower people to make improvements, measure improvement consistently and celebrate the same.

6. Evidence-based decision making
   Ensure the accessibility of accurate and reliable data and using appropriate methods to analyze data. Make decisions based on analysis and balance the data analysis with practical experience.

7. Relationship management
   Identify and select suppliers to manage costs, optimize resources, and create value. Establish relationships considering both the short and long term and sharing expertise, resources, information, and plans with partners. Collaborate on improvement and development activities and recognize supplier successes.

3. Explain various activities performed in procedural approach for QM.

In the procedural approach to quality management, procedures and guidelines for the review and testing activities are established. In a project, these activities are planned during execution, they are carried out according to the defined procedures.

In short, the procedural approach is the execution of certain processes at defined points to detect defects.

The procedural approach does not allow claims to be made about the percentage of defects removed or the quality of the software following the procedure's completion. In other words, merely executing a set of defect removal procedures does not provide a basis for judging their effectiveness or assessing the quality of the final code.

Furthermore, such an approach is highly dependent on the quality of the procedure and the quality of its execution. For example, if the test planning is done carefully and the plan is thoroughly reviewed, the quality of the software after performance of the testing will be better than if testing was done but the test plan was not carefully thought out and the review was done perfunctorily.

A key drawback in the procedural approach is the lack of quantitative means for project managers to assess the quality of the software produced; the only factor visible to project managers is whether the quality control tasks are executed.

4. What is CMMI?

The Capability Maturity Model Integration (CMMI) is a capability maturity model developed by the Software Engineering Institute, part of Carnegie Mellon University in Pittsburgh, USA. The CMMI principal is that “the quality of a system or product is highly influenced by the process used to develop and maintain it”. CMMI can be used to guide process improvement across a project, a division, or an entire organization.

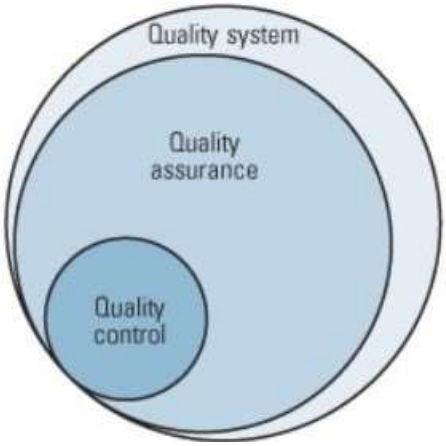
CMMI provides:

- Guidelines for processes improvement
- An integrated approach to process improvement
- Embedding process improvements into a state of business as usual
- A phased approach to introducing improvements

5. Differentiate between Quality Control, Quality Assurance and Quality Management.

Quality assurance and quality control are two aspects of quality management. While some quality assurance and quality control activities are interrelated, the two are defined differently.

QA activities and responsibilities cover virtually all the quality system in one fashion or another, while QC is a subset of the QA activities.



Quality System, Quality Assurance, and Quality Control Relationships+

Quality assurance can be defined as "part of quality management focused on providing confidence that quality requirements will be fulfilled." The confidence provided by quality assurance is twofold—internally to management and externally to customers, government agencies, regulators, certifiers, and third parties.

Quality control can be defined as "part of quality management focused on fulfilling quality requirements." While quality assurance relates to how a process is performed or how a product is made, quality control is more the inspection aspect of quality management.

6. Short note on Six Sigma. Explain the terms DMAIC and DMADV.

Six Sigma is a method that provides organizations tools to improve the capability of their business processes. This increase in performance and decrease in process variation helps lead to defect reduction and improvement in profits, employee morale, and quality of products or services.

The term generally used to indicate a process is well controlled (within process limits ±3s from the centre line in a control chart, and requirements/tolerance limits ±6s from the centre line).

DMAIC

Define, Measure, Analyse, Improve and Control (DMAIC) is a Six Sigma Framework.
It is used when a project's goal can be accomplished by improving an existing product, process, or service. It focuses on processes including those supporting development that persist from product to product.

DMADV

Define, Measure, Analyse, Design and Verify (DMADV) is another Six Sigma Framework. It is used when the goal is the development of a new or radically redesigned product, process, or service.

7. What does SQA ensure? What are the goals of SQA? What is SQA? Elements of SQA. List the various objectives of SQA.

Software Quality Assurance (SQA) is a set of activities for ensuring quality in software engineering processes.

It ensures that developed software meets and complies with the defined or standardized quality specifications. SQA is an ongoing process within the Software Development Life Cycle (SDLC) that routinely checks the developed software to ensure it meets the desired quality measures.

SQA incorporates and implements software testing methodologies to test the software. With SQA, the software development process moves into the next phase only once the current/previous phase complies with the required quality standards. SQA generally works on one or more industry standards that help in building software quality guidelines and implementation strategies.

The goals of SQA are as follows:

- SQA activities are planned.
- Non-compliance issues that cannot be resolved within the software project are addressed by senior management.

- Adherence of software products and activities to the applicable standards, procedures, and requirements is verified objectively.
- Affected groups and individuals are informed of SQA activities and results.

And the objectives of SQA are:

- Assuring an acceptable level of confidence that the software will conform to functional technical requirements.
- Assuring an acceptable level of confidence that the software will conform to managerial scheduling and budgetary requirements.
- Initiating and managing activities for the improvement and greater efficiency of software development and SQA activities.

8. Explain ISO 9000 quality standards. What are the advantages?

The ISO 9000:2015 and ISO 9001:2015 standards are based on seven quality management principles that organisation can apply to promote organizational excellence.

1. Customer focus
   Understand the needs of existing and future customers and align organizational objectives with customer needs and expectations. Meet customer requirements, satisfaction along with managing Customer relationship and exceeding expectations.

2. Leadership
   Establish a vision and direction for the organization, set challenging goals for modeling organizational values and trust. Equip, empower employees, and recognize employee contributions.

3. Engagement of people
   Ensure that people's abilities are used and valued, making them accountable and enabling participation for continual improvement. Evaluating individual performance, learning and knowledge sharing and e open discussion of problems and constraints.

4. Process approach
   Manage activities as processes, measure the capability of activities and identify linkages between activities. Prioritizing improvement opportunities and deploying resources effectively.

5. Improvement
   Improve organizational performance and capabilities and aligning improvement activities. Empower people to make improvements, measure improvement consistently and celebrate the same.

6. Evidence-based decision making
   Ensure the accessibility of accurate and reliable data and using appropriate methods to analyze data. Make decisions based on analysis and balance the data analysis with practical experience.

7. Relationship management
   Identify and select suppliers to manage costs, optimize resources, and create value. Establish relationships considering both the short and long term and sharing expertise, resources, information, and plans with partners. Collaborate on improvement and development activities and recognize supplier successes.

Advantages of ISO 9001

- Minimizes mistakes
- Improves reporting and communications
- Better quality products and service
- More reliable production scheduling and delivery
- Standards maintained by annual assessments