# Unit-III

# Software Review Techniques– Software Engineering

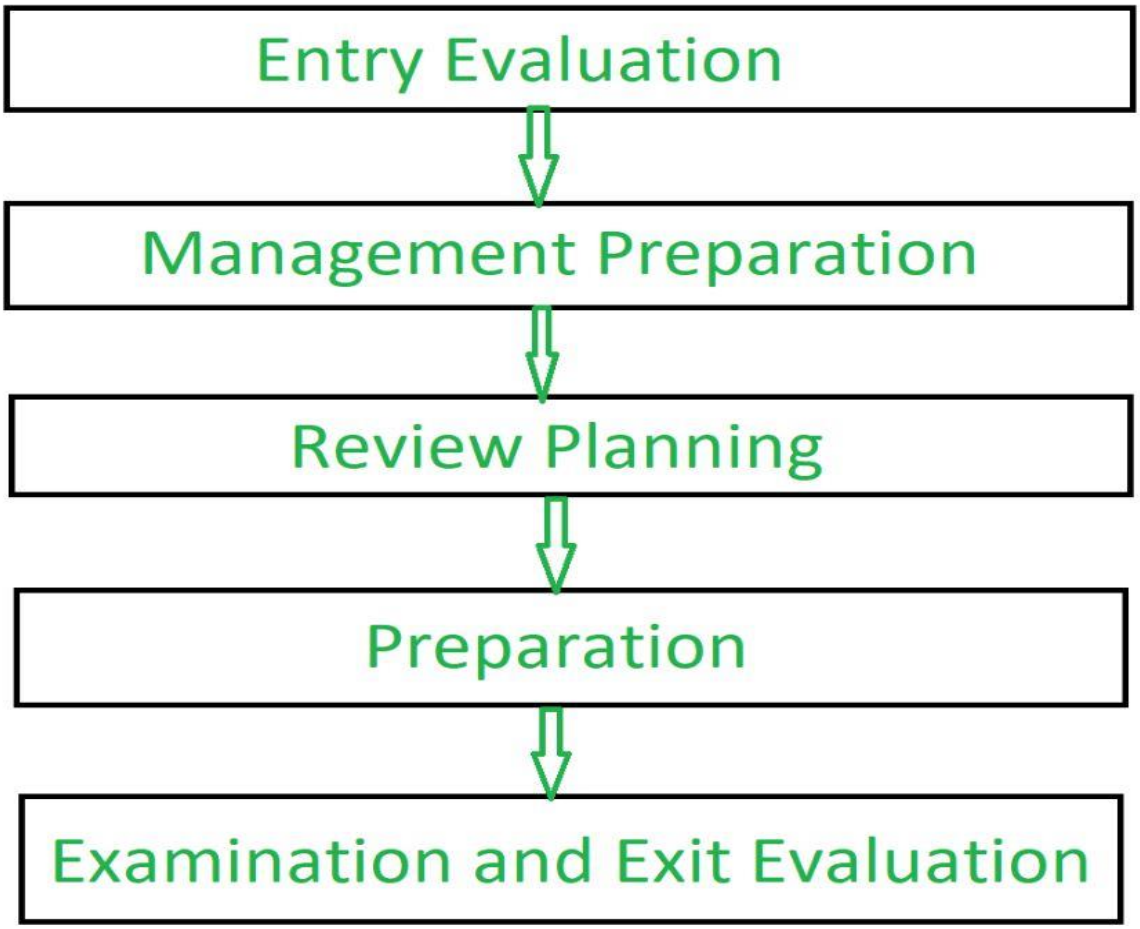
- **Software Review** is a systematic inspection of software by one or more individuals who work together to find and resolve errors and defects in the software during the early stages of the Software Development Life Cycle (SDLC). A software review is an essential part of the Software Development Life Cycle (SDLC) that helps software engineers in validating the quality, functionality, and other vital features and components of the software. It is a whole process that includes testing the software product and it makes sure that it meets the requirements stated by the client.
  Usually performed manually, software review is used to verify various documents like requirements, system designs, codes, test plans, and test cases.

## Objectives of Software Review

The objective of the software review is:

1. To improve the productivity of the development team.
2. To make the testing process time and cost-effective.
3. To make the final software with fewer defects.
4. To eliminate the inadequacies.

## Process of Software Review




*Software Review process*

1. **Entry Evaluation:** By confirming documentation, fulfilling entry requirements and assessing stakeholder and team preparation, you can determine the software's availability.
2. **Management Preparation**: To get ready for the review process, assign roles, gather resources and provide brief management.
3. **Review Planning:** Establish the Review's goals and scope, invite relevant parties and set a time for the meeting.
4. **Preparation**: Distribute appropriate resources, give reviewers time to get familiar and promote issue identification to help them prepare.
5. **Examination and Exit Evaluation:** Reviewers should collaborate to examine the results, record concerns, and encourage candid communication in meetings. It assess the results, make remedial plans based on flaws that have been reported and assess the process's overall efficacy.

## Types of Software Reviews

There are mainly 3 types of software reviews:

**1. Software Peer Review**

Peer review is the process of assessing the technical content and quality of the product and it is usually conducted by the author of the work product along with some other developers.

Peer review is performed in order to examine or resolve the defects in the software, whose quality is also checked by other members of the team.
Peer Review has following types:

1. **Code Review:** Computer source code is examined in a systematic way.
2. **Pair Programming:** It is a code review where two developers develop code together at the same platform.
3. **Walkthrough:** Members of the development team is guided by author and other interested parties and the participants ask questions and make comments about defects.
4. **Technical Review:** A team of highly qualified individuals examines the software product for its client's use and identifies technical defects from specifications and standards.
5. **Inspection:** In inspection the reviewers follow a well-defined process to find defects.

**2. Software Management Review**
Software Management Review evaluates the work status. In this section decisions regarding downstream activities are taken.
**3. Software Audit Review**
Software Audit Review is a type of external review in which one or more critics, who are not a part of the development team, organize an independent inspection of the software product and its processes to assess their compliance with stated specifications and standards. This is done by managerial level people.

## Advantages of Software Review

1. Defects can be identified earlier stage of development .
2. Earlier inspection also reduces the maintenance cost of software.
3. It can be used to train technical authors.
4. It can be used to remove process inadequacies that encourage defects.

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**Software Quality Assurance (SQA)** is simply a way to assure quality in the software. It is the set of activities that ensure processes, procedures as well as standards are suitable for the project and implemented correctly.
Software Quality Assurance is a process that works parallel to Software Development. It focuses on improving the process of development of software so that problems can be prevented before they become major issues. Software Quality Assurance is a kind of Umbrella activity that is applied throughout the software process.

## quality

Quality in a product or service can be defined by several measurable characteristics. Each of these characteristics plays a crucial role in determining the overall quality.

## Software Quality Assurance (SQA) encompasses

SQA process Specific quality assurance and quality control tasks (including technical reviews and a multitier testing strategy) Effective software engineering practice (methods and tools) Control of all software work products and the changes made to them a procedure to ensure compliance with software development standards (when applicable) measurement and reporting mechanisms

## Elements of Software Quality Assurance (SQA)

1. **Standards:** The IEEE, ISO, and other standards organizations have produced a broad array of software engineering standards and related documents. The job of SQA is to ensure that standards that have been adopted are followed and that all work products conform to them.
2. **Reviews and audits:** Technical reviews are a quality control activity performed by software engineers for software engineers. Their intent is to uncover errors. Audits are a type of review performed by SQA personnel (people employed in an organization) with the intent of ensuring that quality guidelines are being followed for software engineering work.
3. **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 planned and efficiently conducted for primary goal of software.
4. **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.
5. **Change management:** SQA ensures that adequate change management practices have been instituted.
6. **Education:** Every software organization wants to improve its software engineering practices. A key contributor to improvement is education of software engineers, their managers, and stakeholders. The SQA organization takes the lead in software process improvement which is key proponent and sponsor of educational programs.
7. **Security management:** SQA ensures that appropriate process and technology are used to achieve software security.
8. **Safety:** SQA may be responsible for assessing the impact of software failure and for initiating those steps required to reduce risk.
9. **Risk management**: The SQA organization ensures that risk management activities are properly conducted and that risk-related contingency plans have been established.

# Software Quality Assurance (SQA) focuses

**The Software Quality Assurance (SQA) focuses**

- **Software's portability:** Software's **portability** refers to its ability to be easily transferred or adapted to different environments or platforms without needing significant modifications. This ensures that the software can run efficiently across various systems, enhancing its accessibility and flexibility.
- **software's usability: Usability** of software refers to how easy and intuitive it is for users to interact with and navigate through the application. A high level of usability ensures that users can effectively accomplish their tasks with minimal confusion or frustration, leading to a positive user experience.
- **software's reusability: Reusability** in software development involves designing components or modules that can be reused in multiple parts of the software or in different projects. This promotes efficiency and reduces development time by eliminating the need to reinvent the wheel for similar functionalities, enhancing productivity and maintainability.
- **software's correctness: Correctness** of software refers to its ability to produce the desired results under specific conditions or inputs. Correct software behaves as expected without errors or unexpected behaviors, meeting the requirements and specifications defined for its functionality.
- **software's maintainability: Maintainability** of software refers to how easily it can be modified, updated, or extended over time. Well-maintained software is structured and documented in a way that allows developers to make changes efficiently without introducing errors or compromising its stability.
- **Software's error control: Error control** in software involves implementing mechanisms to detect, handle, and recover from errors or unexpected situations gracefully. Effective error control ensures that the software remains robust and reliable, minimizing disruptions to users and providing a smoother experience overall.

# Software Quality Assurance (SQA) Include

1. A quality management approach.
2. Formal technical reviews.
3. Multi testing strategy.
4. Effective software engineering technology.
5. Measurement and reporting mechanism.

# Major Software Quality Assurance (SQA) Activities

1. **SQA Management Plan:** Make a plan for how you will carry out the SQA throughout the project. Think about which set of software

engineering activities are the best for project. Check level of SQA team skills.

2. **Set The Check Points:** SQA team should set checkpoints. Evaluate the performance of the project on the basis of collected data on different check points.
3. **Measure Change Impact:** The changes for making the correction of an error sometimes re introduces more errors keep the measure of impact of change on project. Reset the new change to check the compatibility of this fix with whole project.
4. **Multi testing Strategy:** Do not depend on a single testing approach. When you have a lot of testing approaches available use them.
5. **Manage Good Relations:** In the working environment managing good relations with other teams involved in the project development is mandatory. Bad relation of SQA team with programmer's team will impact directly on project. Don't play politics.
6. **Maintaining records and reports:** Comprehensively document and share all QA records, including test cases, defects, changes, and cycles, for stakeholder awareness and future reference.
7. **Reviews software engineering activities:** The SQA group identifies and documents the processes. The group also verifies the correctness of software product.
8. **Formalize deviation handling:** Track and document software deviations meticulously. Follow established procedures for handling variances.

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