14.4 Achieving Software Quality

S/w Quality is the result of good Project management and solid S/w engineering practices. Management and practice are applied within the context of 4 broad activities that help a S/w team to achieve high S/w quality.

These broad activities are

1) Software engineering methods : To build high quality S/w - a complete understanding of the problem and a good design that establishes a solid foundation for the construction activity. finally umbrella activities such as technical reviews, change management helps to improve the S/w quality.

2) Project Management Techniques : The impact of good project management, are improved S/w quality
   (1) Project manager uses estimation to verify delievery dates are achievable
   (2) Schedule dependencies are understood and the team resists the temptations to use short cuts
   (3) Risk planning is conducted so problems do not breed chaos.
   In addition, the project plan should include explicit techniques for quality and change management.

3) Quality Control : Quality control encompasses a set of S/w engineering actions that help to ensure that each work product meets its quality goal.
   (1) Models are reviewed to ensure that they are complete and consistent
   (2) Code may be inspected ~~tested~~ in order to uncover errors before testing commences
   (3) Testing steps is applied to uncove errors in logic, data manipulation and interface communication.
   4) Combination of measurement & feedback allows a S/w team to asses the quality goals

4) Quality Assurance
   1) It establishes the infrastructure that supports S/w engineering methods, Project management and quality control actions - to build high quality S/w
   2) It also consists of set of auditing and reporting functions that assess the effectiveness and completeness of quality control actions
   3) To provide management & technical staff with the data necessary to be informed about product quality so that to achieve product quality

SMP year 2015

16. # What is Quality Management or SQA

16.1

- Also called software quality assurance (SQA)
- Serves as an umbrella activity that is applied throughout the software process
- Involves doing the software development correctly versus doing it over again
- Reduces the amount of rework, which results in lower costs and improved time to market
- Encompasses
  - A software quality assurance process
  - Specific quality assurance and quality control tasks (including formal technical reviews and a multi-tiered testing strategy)
  - Effective software engineering practices (methods and tools)
  - Control of all software work products and the changes made to them
  - A procedure to ensure compliance with software development standards
  - Measurement and reporting mechanisms

The SQA Group

- Serves as the customer's in-house representative
- Assists the software team in achieving a high-quality product
- Views the software from the customer's point of view
  - Does the software adequately meet quality factors?
  - Has software development been conducted according to pre-established standards?
  - Have technical disciplines properly performed their roles as part of the SQA activity?
- Performs a set of of activities that address quality assurance planning, oversight, record keeping, analysis, and reporting (See next slide)

16.2 ## Elements Of Software Quality Assurance (SQA)

Software Quality Assurance encompasses a broad range of concerns and activities that focus on the management of software quality.
These can be summarized in the following manner:

1. **Standard:** The IEEE, ISO, and other standards organizations have produced a broad range of software engineering standards and related documents. The job of SQA is t

ensure that standards that have been adopted are followed and that all work products conform to them.

2. **Reviews And Audits**: Technical reviews are quality control activity performed by software engineers to uncover errors. Audits are a type of review performed by SQA personnel with the intent of ensuring that quality guidelines are followed for software engineering work. E.g., an audit of review process might be conducted to ensure that reviews are being performed in a manner that will lead to the highest likelihood of uncovering errors.

3. **Testing:** Testing is a quality control function to find errors. The job of SQA is to ensure that testing is properly planned and efficiently conducted so that it has the highest likelihood of achieving its primary goal.

4. Error/defect collection and analysis:
SQA collects and analyzes 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 attribute to improvement is education of software engineers, their managers, and their stakeholders.
The SQA organization takes the lead in the software process improvement and is a key proponent and sponsor of educational programs.

7. **Vendor management**: Different categories of software are acquired from external software vendors. The job of SQA organization is to ensure that high-quality software results by suggesting specific quality practices that the vendor should follow, and incorporating quality mandates as a part of any contract with the external vendor.
8. Security Management : Every software organization should institute policies that protect data at all levels, establish firewall protection for
WebApps, and ensure that software has not been tampered with internally. SQA ensures that appropriate process and technology are used to achieve software security.

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

10. **Risk management**: SQA organization ensures that risk management activities are properly conducted and that risk-related contingency plans have been established. SQA organization ensures that risk management activities are properly conducted and that risk-related contingency plans have been established."

Software Reviews

→ S/w reviews are a "filter" for the s/w process. i.e reviews are applied at various points during s/w engineering & serve to uncover errors / defects that can be removed.

→ An informal meeting around the coffee m/c is a form of review, if technical problems are discussed.

→ A formal technical review (FTR) is the most effective filter from a quality assurance standpoint. It is conducted by s/w engineering for the s/w engineers to uncover errors and improving s/w quality.

E.g: why s/w reviews are conducted
Defect removal amplication

Advantage of Technical reviews

1) Reviews helps to uncover errors ~~and defects and thus can be removed~~ during the process so that they do not become defects after release of the s/w
2) By detecting and removing a large percentage of these errors, the review process substantially reduce the cost of activities in the s/w process.
3) To verify that the s/w under review meets its requirement
4) To make projects more manageable.