Chapter 16

Software Quality Assurance

Comment on Quality

- Phil Crosby once said:
  - The problem of quality management is not what people don't know about it. The problem is what they think they do know . . . In this regard, quality has much in common with sex.
  - *Everybody is for it.* (Under certain conditions, of course.)
  - *Everyone feels they understand it.* (Even though they wouldn't want to explain it.)
  - *Everyone thinks execution is only a matter of following natural inclinations.* (After all, we do get along somehow.)
  - *And, of course, most people feel that problems in these areas are caused by other people.* (If only they would take the time to do things right.)

Elements of SQA

- **Standards**
- **Reviews and Audits**
- **Testing**
- **Error/defect collection and analysis**
- **Change management**
- **Education**
- **Vendor management**
- **Security management**
- **Safety**
- **Risk management**

Elements of SQA

- Standards- like IEEE,Iso may be adopted voluntarily by Se Organ8isation or i9mposed by the Customer or stakeholders. SQAQ has to ensure that standards that have been adopted are being followed and work products conform to it.
- Reviews and audits- Technical Reviews for uncovering errors, audits by SQA personnel to ensure quality guidelines are being followed are done.

Elements of SQA

- Testing-Software testing is a quality control function that is done with the primary goal of uncovering errors. SQA has to ensure that test plans are efficiently conducted to get maximum errors.
- Error/Defect Collection and analysis-SQA collect and analyse errors and defects data to understand how errors are introduced and how best they can be removed.

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Elements of SQA

- Change Management-Change needs to be monitored strictly else it can create a havoc and confusion and poor quality. SQA ensure change management practices are taken care of.
- Ass. Q – How can change create havoc?
- Education- In order to improve SE practices of Software Engineers, the key contributor is education. The SQA leads this process and sponsors educational programs for SE.

Elements of SQA

- Vendor management-SQA ensures that a high quality software results by ensuring that the vendor follow specific quality practices and incorporate in the contract.
- Ass Q- what three type of vendors are there give real world examples?
- Security Management-SQA ensures proper process has been followed for software security to protect it against cyber crime and abides the new govt. regulation policies.

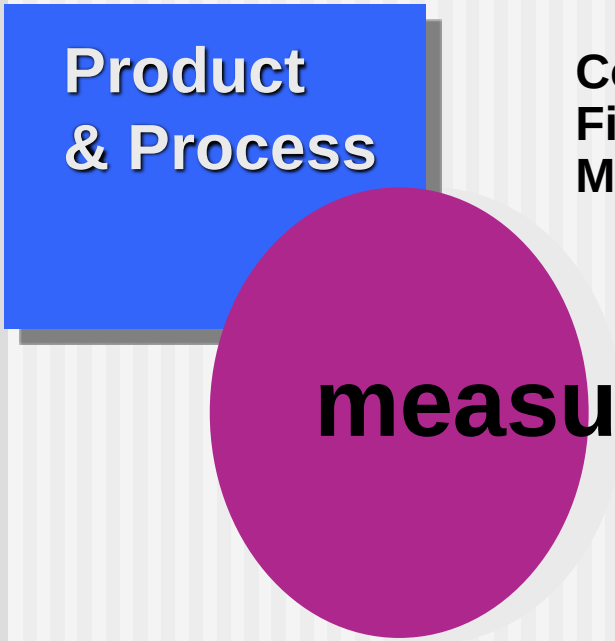
Elements of SQA

- Safety- SQA is responsible for assessing the effect of software failure and for initiating steps to ensure to reduce risk and catastrophe due to defects.
- Risk management-SQA ensure RMM activities have been conducted and contingency plan has been established.
- Ass Q- Explain any five SQA activities

SQA Goals (see Figure 16.1 of Pressman)

- **Requirements quality.** The correctness, completeness, and consistency of the requirements model will have a strong influence on the quality of all work products that follow.
- **Design quality.** Every element of the design model should be assessed by the software team to ensure that it exhibits high quality and that the design itself conforms to requirements.
- **Code quality.** Source code and related work products (e.g., other descriptive information) must conform to local coding standards and exhibit characteristics that will facilitate maintainability.
- **Quality control effectiveness.** A software team should apply limited resources in a way that has the highest likelihood of achieving a high quality result.

Statistical SQA



Collect information on all defects
Find the causes of the defects
Move to provide fixes for the process

... an understanding of how to improve quality ...

Software Reliability

- A simple measure of reliability is *mean-time-between-failure* (MTBF), where

$$MTBF = MTTF + MTTR$$

- The acronyms MTTF and MTTR are *mean-time-to-failure* and *mean-time-to-repair*, respectively.
- *Software availability* is the probability that a program is operating according to requirements at a given point in time and is defined as

$$Availability = [MTTF/(MTTF + MTTR)] \times 100\%$$

ISO 9001:2000 Standard

- ISO 9001:2000 is the quality assurance standard that applies to software engineering.
- The standard contains 20 requirements that must be present for an effective quality assurance system.
- The requirements delineated by ISO 9001:2000 address topics such as
  - management responsibility, quality system, contract review, design control, document and data control, product identification and traceability, process control, inspection and testing, corrective and preventive action, control of quality records, internal quality audits, training, servicing, and statistical techniques.