SOFTWARE QUALITY Assurance & Test

LECTURE # 2

SOFTWARE QUALITY-I

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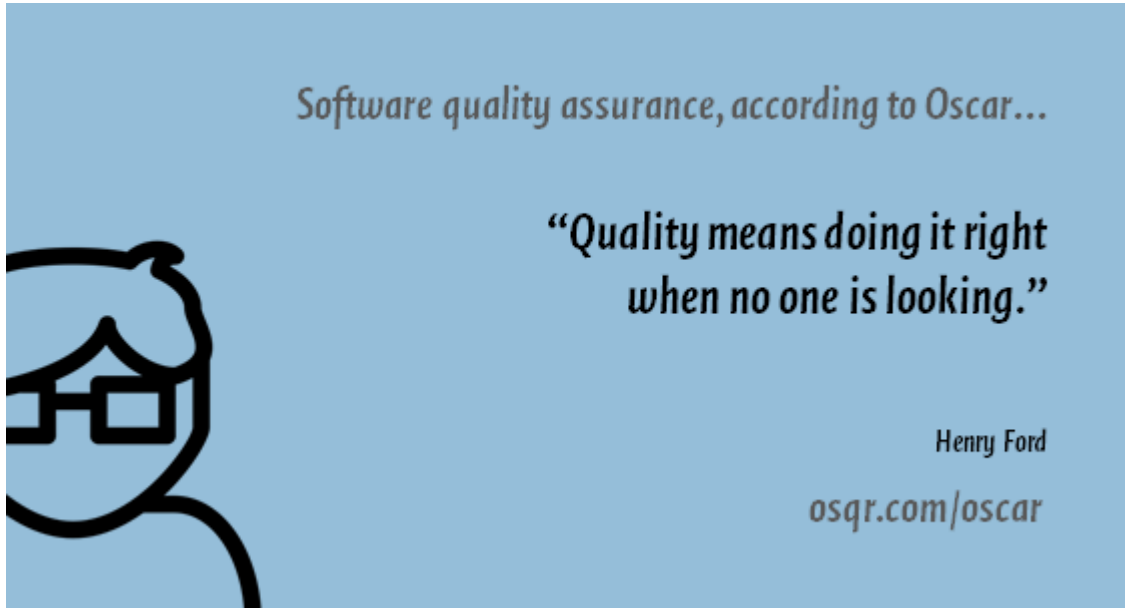
Topics to Cover

- **Quality**
- **Quality Types**
- **Quality Control**
- **Different views of Quality**
- **Quality Models**

Quality

- **Quality means::**
  - **meeting the customer's requirements, at the agreed cost, within the agreed timescales.**
  - **"Fitness for purpose" [Joseph M Juran]**
  - **Customer satisfaction**



Quality Definitions

- There are many quality definitions some of them are listed below:
  - The American Heritage dictionary defines quality as **„a characteristic or attribute of something".**
  - **IEEE Glossary: Degree to which a system, component, or process meets (1) specified requirements, and (2) customer or user needs or expectations**
  - **ISO 8402:The totality of features and characteristics of a product or service that bear on its ability to satisfy specified or implied needs**
  - Another definition, coined by **Gerald Weinberg** in *Quality Software Management: Systems Thinking*, is **"Quality is value to some person."** This definition stresses that **quality is inherently subjective** - different people will experience the quality of the same software very differently.

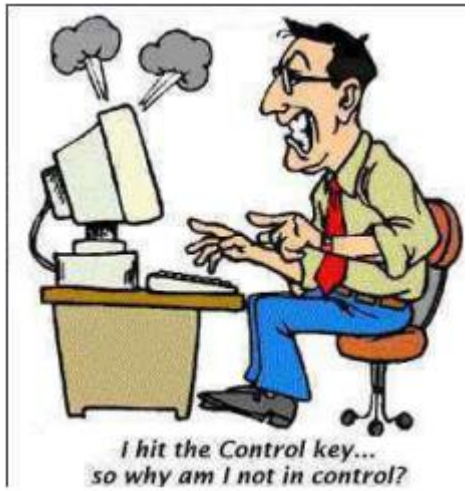
Software Quality

- Software Quality can be defined as,
  - "**Conformance to explicitly stated functional and performance requirements, explicitly documented development standards, and implicit characteristics that are expected of all professionally developed software**" [Roger Pressman. Software Engineering: A Practitioner's Approach McGraw Hill 6 ed. 2004]

- This definition emphasizes three important points:
  - **Software requirements are the foundation from which quality is measured. Lack of conformance to requirements is lack of quality**
  - **Specified standards define a set of development criteria that guide the way in which software is engineered. If the criteria are not followed, lack of quality will almost surely result.**
  - **If a software conforms to its explicit requirements but fails to meet implicit requirements, software quality is suspect.**

Variation Control

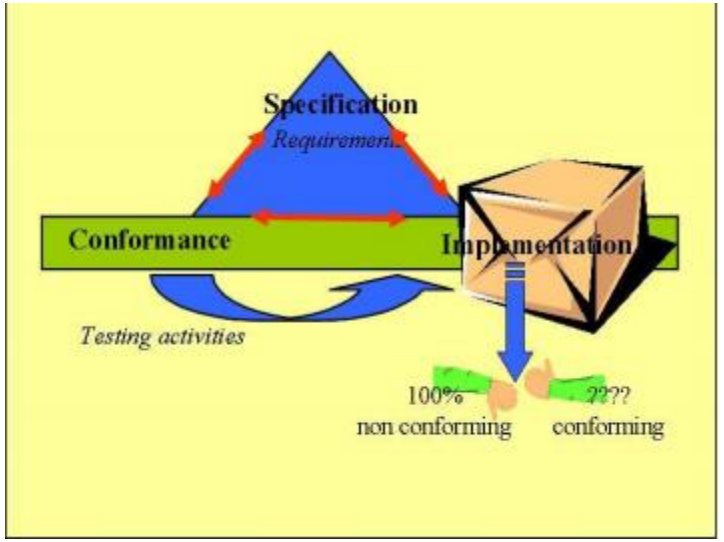
- **Variation is the heart of quality control**
  - We want to minimize the difference between the predict resources needed to complete a project and actual resources used including Staff, equipment and time.



Quality Types

- **Quality of Design**

- **Quality of Conformance**



Quality Types

- **Quality of Design (**how well software is designed **)**

  - measures how valid the design are in creating a worthwhile product
  - **Quality of design** is the quality which the producer or supplier is intending to offer to the customer. When the producer is making the quality of design of the product, he should take into consideration the customer's requirements in order to satisfy them with **fitness for use** of the product.
  - Quality of Design is extremely important, and it is said that design is only 5% of the product cost, but has a 70% influence on quality, manufacturability, serviceability, and general acceptance in the market.
  - Customer focused organizations must continuously work on improving the Quality of Design; and improving the quality of design will also have a positive impact on the Quality of Conformance.

Quality Types

- **Quality of Conformance (**how well the software conforms to that design**)**

  - **Quality of conformance** is the level of the quality of product actually produced and delivered through the production or service process of the organization as per the specifications or design.
  - When the quality of a product entirely conforms to the specification (design), the quality of conformance is deemed excellent.
  - It focuses on implementation based on the design.
  - Specifications are targets and tolerances determined by the designer of a product. Targets are the ideal values for which production is expected to strive; tolerances are acceptable deviations from these ideal values recognizing that it is difficult to meet the exact targets all the time due to variability in material, machine, men and process.

Objective Quality VS Perceived Quality

- Quality might be the most important factor underlying the long-term success of products and firms. The business press routinely cites quality as the cause of firm success and failure.
- ***Objective quality*** is operationalized as a composite of instrument measures and expert ratings on multiple product attributes. For example, a personal computer's objective quality attributes include processing speed, hard disk capacity and features like the modem. Objective quality does not include intangible attributes like aesthetics and brand image or salesperson behavior.
- ***Perceived quality*** is the overall subjective judgment of quality relative to the expectation of quality. These expectations are based on one's own and others' experiences, and on sources including brand reputation, price, and advertising. It is not necessary to use or examine a product to form perceptions of quality.

Objective Quality VS Perceived Quality

- However, it is now well established that it is not the objective quality but rather customers' perceptions of quality that drive preferences and, ultimately, satisfaction, loyalty, sales, and profitability.
- Numerous anecdotes suggest that customer *perceptions* of quality do not reflect objective quality. Companies frequently find that negative perceptions persist even after products perform well in quality tests. For example it took Google three years after its launch to be perceived as the superior search engine.

How does Objective Quality affects Perceived Quality? (Research by Mitra and Golder)

- Debanjan Mitra and Peter N. Golder examine the relationship between objective and perceived quality for 241 products in 46 product categories over a period of 12 years.
- On average, they found that the effect of a change in objective quality is not fully reflected in customer perceptions of quality until after about six years.
- In the first year after a quality change, only about 20% of the total effect over time is realized. These effects are significantly larger and quicker for a decrease in quality relative to an equivalent increase.
- Interestingly, their study suggested that brand reputation has a "double" advantage. High-reputation brands are rewarded three years quicker for an increase in quality and punished one year slower for a decrease in quality compared to low-reputation brands.

Quality Engineering

Quality engineering **is the set of operational, managerial, and engineering activities that a company uses to ensure that the quality characteristics of a product are at the nominal or required levels.**

Quality Control

- **What is quality control?**
  - Quality control is defined as the processes and methods used to monitor work and observe whether requirements are met. It focuses on reviews and removal of defects before shipment of products.
  - It is possible to have the same group that builds the product perform the quality control function, or to establish a quality control group or department within the organizational unit that develops the product.

Quality Control

- **Objective**
  - minimize the produced defects, increase the product quality
- **Implementation approaches**
  - Fully automated
  - Entirely manual
  - Combination of automated tools and human interactions