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Outlines

- **ISO 9126 Quality Characteristics**
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ISO 9126 Quality Characteristics

- There has been international collaboration among experts to define a general framework for software quality. An expert group, under the aegis of the ISO, standardized a software quality document, namely, ISO9126, which defines six broad, independent categories of quality characteristics as follows:
  - ▫ Functionality
  - ▫ Reliability
  - ▫ Usability
  - ▫ Efficiency
  - ▫ Maintainability
  - ▫ Portability

ISO 9126 Quality Characteristics

- **Functionality**
  - A set of attributes that bear on the existence of a set of functions and their specified properties. The functions are those that satisfy stated or implied needs.

- **Reliability**
  - A set of attributes that bear on the capability of software to maintain its performance level under stated conditions for a stated period of time.

- **•Usability**
  - A set of attributes that bear on the effort needed for use and on the individual assessment of such use by a stated or implied set of users.

ISO 9126 Quality Characteristics

- **Efficiency**
  - A set of attributes that bear on the relationship between the software's performance and the amount of resource used under stated conditions.

- **Maintainability**
  - A set of attributes that bear on the effort needed to make specified modifications (which may include corrections, improvements, or adaptations of software to environmental changes and changes in the requirements and functional specifications).

- **Portability**
  - A set of attributes that bear on the ability of software to be transferred from one environment to another (this includes the organizational, hardware or, software environment).

ISO 9126 Quality Sub-Characteristics

- **Functionality**
  - *Suitability:*
    - *The capability of the software to provide an adequate set of* functions for specified tasks and user objectives.
  - *Accuracy:*
    - *The capability of the software to provide the right or agreed-upon* results or effects.
  - *Interoperability:*
    - *The capability of the software to interact with one or more* specified systems.
  - *Security:*
    - *The capability of the software to prevent unintended access and* resist deliberate attacks intended to gain unauthorized access to confidential information or to make unauthorized modifications to information or to the program so as to provide the attacker with some advantage or so as to deny service to legitimate users.

ISO 9126 Quality Sub-Characteristics

- **Reliability**
  - *Maturity:*
    - *The capability of the software to avoid failure as a result of faults in* the software.
  - *Fault Tolerance:*
    - *The capability of the software to maintain a specified level* of performance in case of software faults or of infringement of its specified interface.
  - *Recoverability:*
    - *The capability of the software to reestablish its level of performance* and recover the data directly affected in the case of a failure.

ISO 9126 Quality Sub-Characteristics

- **Usability**
  - **Understandability:**
    - The capability of the software product to enable the user to understand whether the software is suitable, and how it can be used for particular tasks and conditions of use.
  - **Learnability:**
    - The capability of the software product to enable the user to learn its applications.
  - **Operability:**
    - The capability of the software product to enable the user to operate and control it.
  - **Attractiveness:**
    - *The capability of the software product to be liked by the user.*

ISO 9126 Quality Sub-Characteristics

- **Efficiency**
  - **Time Behavior*:***
    - *The capability of the software to provide appropriate* response and processing times and throughput rates when performing its function under stated conditions.
  - **Resource Utilization*:***
    - *The capability of the software to use appropriate* resources in an appropriate time when the software performs its function under stated condition.

ISO 9126 Quality Sub-Characteristics

- **Maintainability**
  - **Analyzability***:*
    - *The capability of the software product to be diagnosed for* deficiencies or causes of failures in the software or for the parts to be modified to be identified.
  - **Changeability***:*
    - The capability of the software product to enable a specified modification to be implemented.
  - **Stability***:*
    - The capability of the software to minimize unexpected effects from modifications of the software.
  - **Testability***:*
    - The capability of the software product to enable modified software to be validated.

ISO 9126 Quality Sub-Characteristics

- **Portability**
  - **Adaptability***:*
    - The capability of the software to be modified for different specified environments without applying actions or means other than those provided for this purpose for the software considered.
  - **Install ability***:*
    - The capability of the software to be installed in a specified environment.
  - **Coexistence***:*
    - The capability of the software to coexist with other independent software in a common environment sharing common resources.
  - **Replace ability***:*
    - The capability of the software to be used in place of other specified software in the environment of that software.

ISO 9000:2000 Software Quality Standard

- The ISO 9000 standards are generally applicable to all tangible products manufactured with human endeavor, say, from spices to software—Even some brands of spice and rice used in everyday cooking are claimed to be ISO9000 certified.

- The ISO 9000 standards are reviewed and updated from time to time, once every 5-8 years. The latest ISO 9000 standards released in the year 2000 are referred to as ISO 9000:2000.

ISO 9000:2000 Software Quality Standard

- There are three components of the ISO 9000:2000 standard as follows:
  - *ISO 9000* : Fundamentals and vocabulary
  - *ISO 9001 : Requirements*
  - *ISO 9004 : Guidelines for performance improvements*

ISO 9000:2000 Fundamentals

- **Principle 1. Customer Focus**
  - Success of an organization is highly dependent on satisfying the customers. Understanding the customers helps in understanding and meeting their requirements. It is not enough to just meet customer requirements. By accurately understating how customers are going to use a system, one can produce a better *user profile*.

ISO 9000:2000 Fundamentals

- **Principle 2. Leadership**
  - Leaders set the direction their organization should take, and they must effectively communicate this to all the people involved in the process.
  - Employee contribution should be recognized by the leaders. Leaders create a positive environment and provide support for the employees to collectively realize the organizational goal.

ISO 9000:2000 Fundamentals

- **Principle 3. Involvement of People**
  - People are informed of the organizational direction, and they are involved at all levels of decision making. People are given an opportunity to develop their strength and use their abilities. People are encouraged to be creative in performing their tasks.

ISO 9000:2000 Fundamentals

- **Principle 4. Process Approach**
  - A process is a sequence of activities that transform inputs to outputs. Organizations can prepare a plan in the form of allocating resources and scheduling the activities by making the process defined, repeatable, and measurable.
  - Continuous improvement in processes leads to improvement in efficiency and effectiveness

ISO 9000:2000 Fundamentals

- **Principle 5. System Approach to Management**
  - A whole organization can be viewed as a *system* of processes.
  - For example, gathering customer requirements for a project is a distinct process involving specialized skills. Similarly, designing a functional specification by taking the requirements as input is another distinct process.
  - For an organization as a whole to succeed in terms of effectiveness and efficiency, the interactions among processes must be identified and analyzed.

ISO 9000:2000 Fundamentals

- **Principle 6. Continual Improvement**
  - Continual improvement means that the processes involved in developing, say, software products are reviewed on a periodic basis to identify where and how further improvements in the processes can be effected.
  - Continual process improvements result in lower cost of production and maintenance
  - Organizations need to develop their own policies regarding when to start a process review and identify the goals of the review.

ISO 9000:2000 Fundamentals

- **Principle 7. Factual Approach to Decision Making**
  - Decisions may be made based on facts, experience, and intuition. Facts can be gathered by using a sound measurement process.
  - Identification and quantification of parameters are central to measurement.
  - A quantitative measurement program helps organizations know how much improvement has been achieved due to a process improvement

ISO 9000:2000 Fundamentals

- **Principle 8. Mutually Beneficial Supplier Relationships**
  - ▫ Organizations rarely make all the components they use in their products. It is a common practice for organizations to procure components and subsystems from third parties.
  - ▫ A mutually beneficial, cooperative relationship should be maintained with the suppliers.