

Quality Frameworks and ISO-9126

Overview

- Quality Frameworks and ISO-9126

Quality Frameworks

- Definitions of software quality are not sufficient in practice
- Thus various models or frameworks have been proposed to:
 - accommodate these different quality views and expectations, and
 - define quality and related attributes, features, characteristics, and measurements
- causal relationship from intangible quality views to tangible software measures

Quality Frameworks

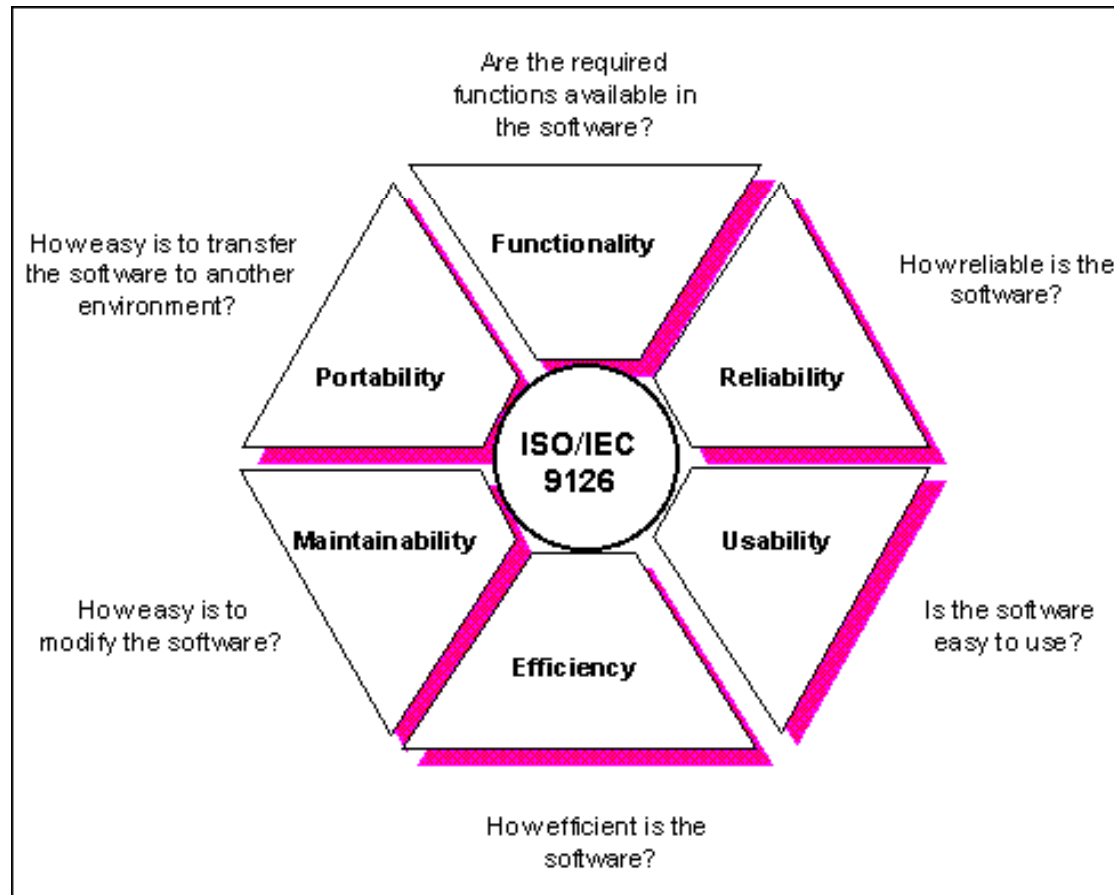
- Two main approaches:
 - Standard Models:
 - ISO/IEC 9126
 - McCall
 - Application or company specific quality models (adaptations of standard models for **specific application** environments)
 - FURPS
 - GQM Approach

ISO-9126

- ISO 9126 is the software product evaluation standard from *International Organization for Standardization* (ISO)
- ISO-9126 is the most influential one in the Software Engineering community
- ISO-9126 provides a hierarchical framework for quality definition, organized into quality *characteristics* and *sub-characteristic*

ISO-9126

- There are **six top-level** quality characteristics, with each associated with its own exclusive (non-overlapping) **sub-characteristics**



ISO-9126: Quality Characteristics 1/2

- **Functionality:**
 - the 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:**
 - the set of attributes that bear on the capability of software to maintain its level of performance under stated conditions for a stated **period** of time
- **Usability:**
 - the 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 2/2

- **Efficiency:**
 - is the set of attributes that bear on the relationship between the level of performance of the software and the amount of resources used, under stated conditions
- **Maintainability:**
 - is the set of attributes that bear on the effort needed to make specified modifications (correct/improve/adapt)
- **Portability:**
 - is the set of attributes that bear on the ability of software to be transferred from one environment to another

ISO-9126: Quality Sub-Characteristics 1/2

- **Functionality:**
 - Suitability- *to the user's needs*
 - Accuracy- *of results*
 - Interoperability- *with other systems*
 - Security- *against unintended access*
- **Reliability:**
 - Maturity- *frequency of failures*
 - Fault Tolerance- *performance in case of faults*
 - Recoverability- *of functionality and data loss*
- **Usability:**
 - Understandability
 - Learnability
 - Operability
 - Attractiveness

ISO-9126: Quality Sub-Characteristics 2/2

- Efficiency:
 - Time behavior
 - Resource behavior
- Maintainability:
 - Analyzability- *effort for diagnosis*
 - Changeability- *ease of modification*
 - Stability- *after change*
 - Testability- *effort required for testing after change*
- Portability:
 - Adaptability
 - Installability
 - Conformance
 - Replaceability
 - Co-existence

Other Quality Frameworks

- ISO-9126 offers a **comprehensive** framework *to describe many attributes and properties*
- There is a **strict** hierarchy
- However, certain product properties are linked *to multiple quality characteristics or sub-characteristics*
 - *Redundancy can affect both maintainability and efficiency*
- **Consequently**, various alternative quality frameworks have been proposed *to allow for more flexible relations among the different quality attributes*

Adaptations of ISO-9126

- Adapted to application domains
 - For the web-based applications a set of quality attributes has been identified:
 - Reliability, usability, security as **primary** attributes
 - Availability, scalability, maintainability, time to market as **secondary** attributes
- Customized for companies
 - Many companies and communities have adapted and customized existing quality frameworks *to define quality for themselves, taking into consideration their **specific business and market environment***
 - E.g. IBM used **CUPRIMDS** (capability, usability, performance, reliability, installation, maintenance, documentation, service) for their own software products
 - **FURPS** model by HP
 - GQM (Goal, Questions, Metric) Model