Cairo University
Faculty of Computers and Artificial Intelligence
Software Engineering Program
Software Evolution and Maintenance

Non-Functional Requirements Quality Attributes According to ISO 25010:2011

Khaled Ibrahim Shawki
k.shawki@stud.fci-cu.edu.eg

1.1 What is ISO 25010

ISO 25010, titled “Systems and software engineering – Systems and software Quality Requirements and Evaluation (SQuaRE) – System and software quality models”, is a software quality standard. It describes the models, consisting of characteristics and sub-characteristics, for both software product quality, and software quality in use together with practical guidance on the use of the quality models.

1.2 What are the ISO 25010 Product Quality Characteristics?

ISO 25010 is made up of eight product quality characteristics and 31 sub-characteristics:

1. Functional Suitability
2. Reliability
3. Performance Efficiency
4. Useability
5. Security
6. Compatibility
7. Maintainability
8. Portability

1.3 Define at least 5 of the quality attributes (aka. non-functional requirements) and mention how each is measured.

1.3.1 Reliability

Reliability refers to how well a system, product, or component performs specified functions under specified conditions.

- **Maturity:** Refers to how well a system, product, or component is able to meet your needs for reliability.
- **Availability:** Refers to whether a system, product, or component is operational and accessible.
- **Fault Tolerance:** Refers to how well a system, product, or component operates despite hardware and/or software faults.
- **Recoverability:** Refers to how well a product or system can recover data in the event of an interruption or failure.

Measurement?

- max number of visitors (**sum**)
- days un-accessible per year (**ratio**)

1.3.2 Performance Efficiency

Performance Efficiency refers to the performance related to the amount of resources used.

- **Time Behavior:** Refers to the response and processing times, and throughput rates of a product or system while it's performing its functions.
- **Resource Utilization:** Refers to the amounts and types of resources used by a product or system while performing its functions.
- **Capacity:** Refers to the maximum limits of a product or system parameter.

Measurement?

- Number of monthly visitors (sum)
- number of pages per visitor (ratio)
- bounce rate or number of visitors who only see one page (ratio)
- duration of visit (sum)

1.3.3 Usability

Usability refers to how well a product or system can be used to achieve specified goals effectively, efficiently, and satisfactorily.

- **Appropriateness Recognizability:** Refers to how well you can recognize whether a product or system is appropriate for your needs.
- **Learnability:** Refers to how easy it is to learn how to use a product or system.
- **Operability:** Refers to whether a product or system has attributes that make it easy to operate and control.
- **User Error Protection:** Refers to how well a system protects users against making errors.
- **User Interface Aesthetics:** Refers to whether a user interface is pleasing.
- **Accessibility:** Refers to how well a product or system can be used with the widest range of characteristics and capabilities.

Measurement?

- Employee performance on it after a certain number of hours of training

1.3.4 Security

Security refers to how well a product or system protects information and data from security vulnerabilities.

- **Confidentiality:** Refers to how well a product or system is able to ensure that data is only accessible to those who have authorized access.
- **Integrity:** Refers to how well a system, product, or component is able to prevent unauthorized access and modification to computer programs and/or data.
- **Non-repudiation:** Refers to how well actions or events can be proven to have taken place.

- **Accountability:** Refers to the actions of an unauthorized user can be traced back to them.
- **Authenticity:** Refers to how well the identity of a subject or resource can be proved.

Measurement?

- The number of serious security problems in the application
- Data confidentiality and protection

1.3.5 Maintainability

Maintainability refers to how well a product or system can be modified to improve, correct, or adapt to changes in the environment as well as requirements.

- **Modularity:** Refers to whether the components of a system or program can be changed with minimal impact on the other components.
- **Reusability:** Refers to how well an asset can be used in more than one system.
- **Analysability:** Refers to the effectiveness of an impact assessment on intended changes. In addition, it also refers to the diagnosis of deficiencies or causes of failures, or to identify parts to be modified.
- **Modifiability:** Refers to how well a product or system can be modified without introducing defects or degrading existing product quality.
- **Testability:** Refers to how effective the test criteria is for a system, product, or component. In addition, it also refers to the tests that can be performed to determine whether the test criteria has been met.