Functional Requirements
Quality Attribute Requirements

Requirements can be classified

- We build a system given some requirements
- These requirements can be classified into three kinds
  - Functional Requirements
  - Quality Attribute Requirements
  - Constraints

ISO 25010: Functional Suitability

- “the capability of the software product to provide functions which meet stated and implied needs when the software is used under specified conditions.”

- *Functionality is the ability to provide functions.*
- *Functionality describes what the system does*
- *Quality describes how well the system does its function.*
- *Qualities are attributes of the system and function is the purpose of the system.*

From BCK, Software Architecture in Practice (p. 40)

Some Definitions of NFR

- “Requirements which are not specifically concerned with the functionality of a system. They place restrictions on the product being developed and the development process, and they specify external constraints that the product must meet.” Kotonya and Sommerville (1998)
- “... global requirements on its development or operational cost, performance, reliability, maintainability, portability, robustness, and the like. ….” Mylopoulos et al.(1992)

Ashish Agarwal(IITK, 2012)

- Among ALL possible architectures for a given set of requirements,
    - Features which do not change in all architectures: Functional requirement
    - Features which do change in any two architectures: Non-functional requirement.
- It means that NFRs always have design choices associated with them.

Bass, Clements, Kazman

Quality Attributes

- Availability
- Deployability
- Energy Efficiency
- Integrability
- Modifiability
- Performance
- Safety
- Security
- Testability
- Usability

Also

- Buildability
- Conceptual Integrity
- Marketability

ISO 25010

- “Systems and software engineering System and software quality models”

- A standard for the quality dimensions of a System Or Software product

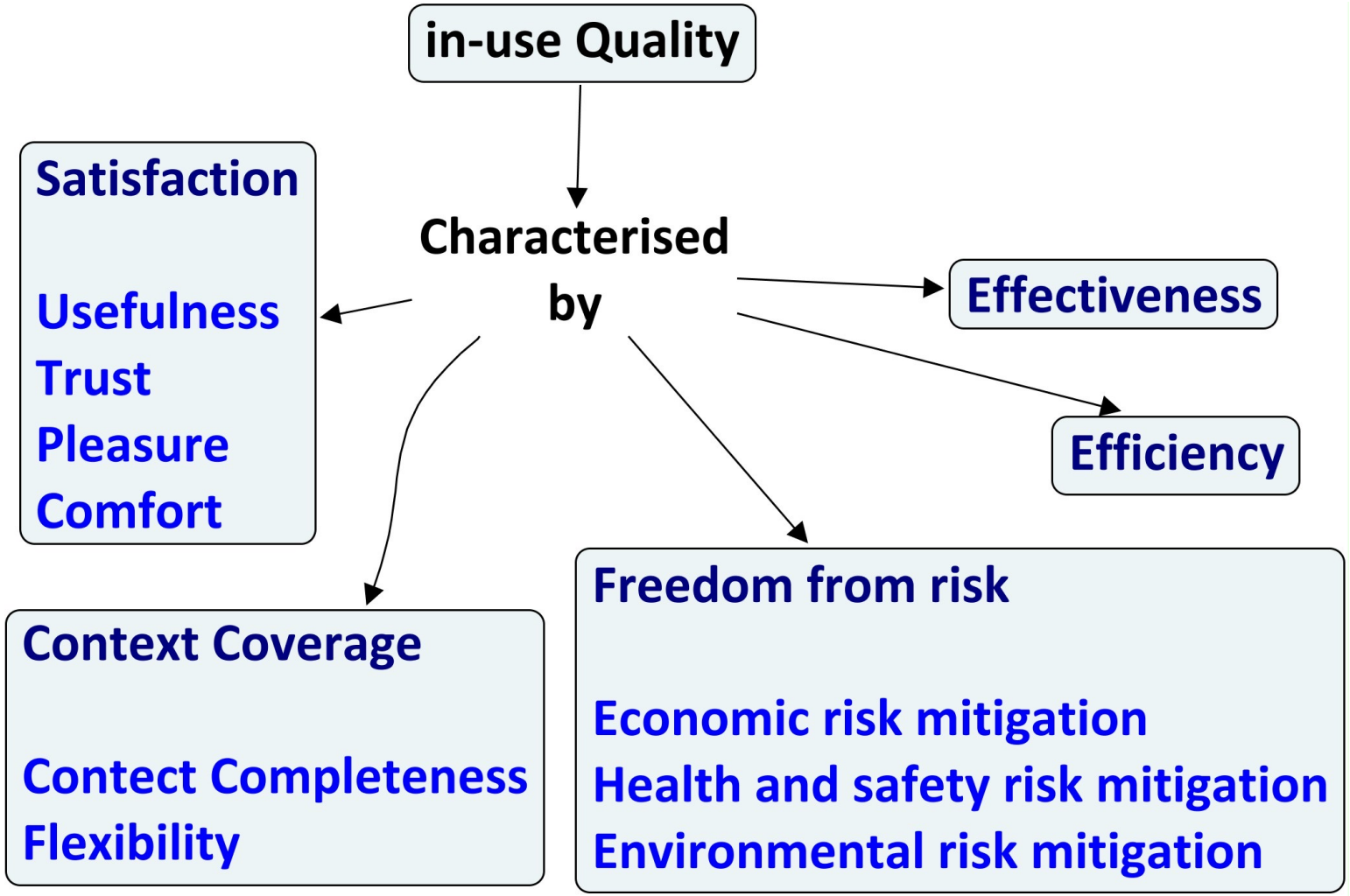
ISO 25010 Quality Models

Quality in Use vs Product Quality

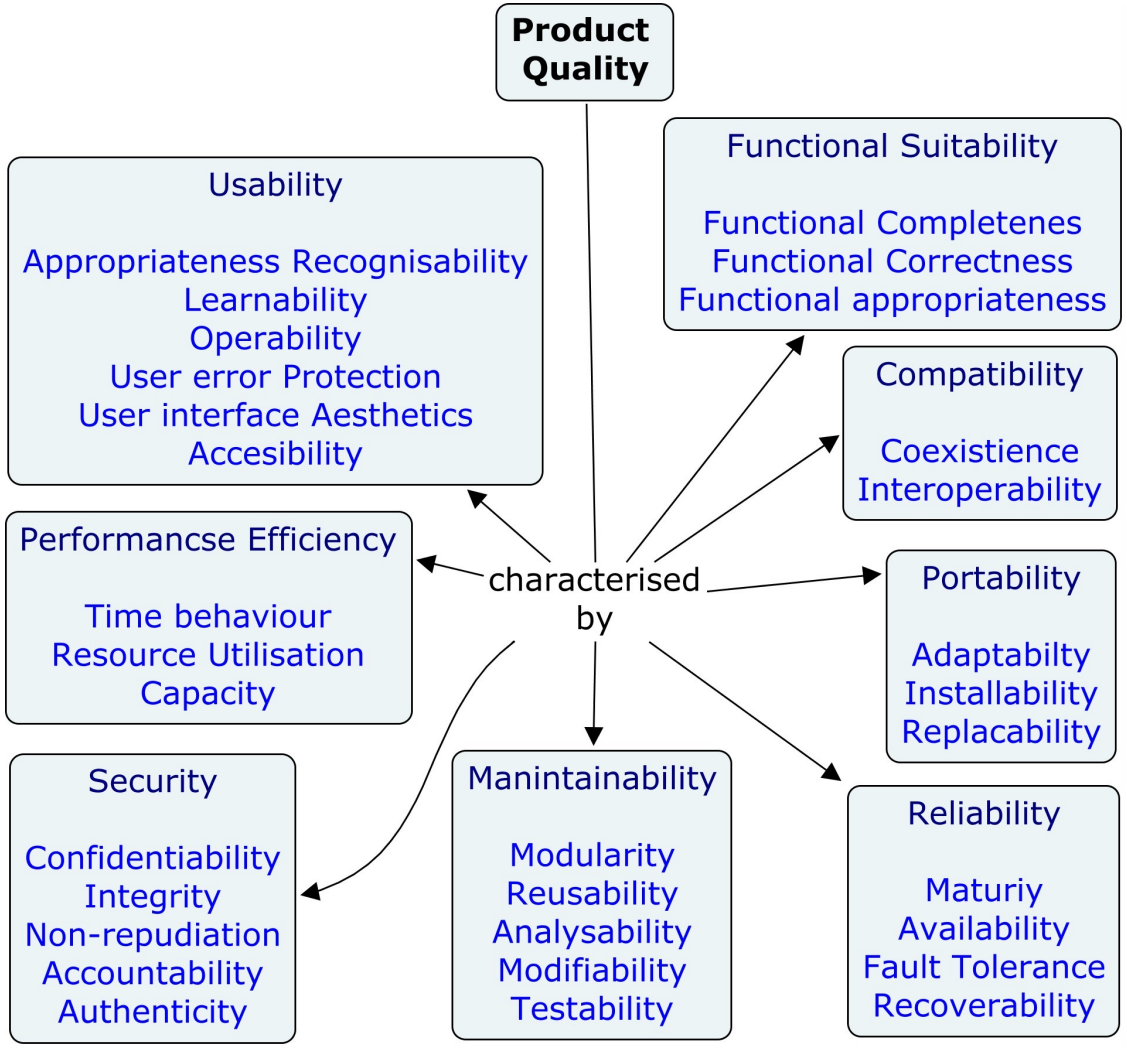
- **quality in use model**
  - relate to the outcome of interaction when a product is used in a particular context of use.
  - composed of five characteristics (and sub-characteristics)
  - Quality in use is the degree to which a product or system can be used by specific users to meet their needs to achieve specific goals with effectiveness, efficiency, freedom from risk and satisfaction in specific contexts of use

- **product quality model**
  - relate to static properties of software and dynamic properties of the computer system
  - composed of eight characteristics (which are further subdivided into sub-characteristics)

ISO 25010


in-use Quality
Characterised by
Satisfaction
Usefulness
Trust
Pleasure
Comfort
Effectiveness
Efficiency
Context Coverage
Contect Completeness
Flexibility
Freedom from risk
Economic risk mitigation
Health and safety risk mitigation
Environmental risk mitigation

ISO 25010


Product Quality
characterised by
Functional Suitability
Functional Completenes
Functional Correctness
Functional appropriateness
Usability
Appropriateness Recognisability
Learnability
Operability
User error Protection
User interface Aesthetics
Accesibility
Compatibility
Coexistience
Interoperability
Performancse Efficiency
Time behaviour
Resource Utilisation
Capacity
Portability
Adaptabilty
Installability
Replacability
Security
Confidentiability
Integrity
Non-repudiation
Accountability
Authenticity
Manintainability
Modularity
Reusability
Analysability
Modifiability
Testability
Reliability
Maturiy
Availability
Fault Tolerance
Recoverability

Home Work

- Practice to examine your computer experience as functional and non-functional

Thank you

ISO 25010

- Missing requirements
  - Functional Requirements
  - Compliance (e.g. with laws, standards)
  - Documentation, Support and Training
  - Project Timing
  - Project Budget