

Requirements Engineering

Chapter 4.1-4.2



Based on slides from Software Engineering 9th ed, Sommerville.

Topics

- 1) How are requirements stated for the customer vs for the developer?
- 2) What is the difference between functional and non-functional requirements?

Requirements engineering

- The process of establishing:
 - ..
from a system and
 - ..
and is developed.



2 Types of requirement

- **User** requirements
 - High-level description of..
 - Uses English statements and diagrams.
 - May be basis for bidding on a project.
- **System** requirements (functional specification)
 - Document detailing precisely..
 - Often more formal and technical than the user requirements.
 - May be part of a contract for developing system.

User and system requirements

User requirement definition

Medical health care - patient management system

1. The MHC-PMS shall generate monthly management reports showing the cost of drugs prescribed by each clinic during that month.

System requirements specification

- 1.1 On the last working day of each month, a summary of the drugs prescribed, their cost and the prescribing clinics shall be generated.
- 1.2 The system shall automatically generate the report for printing after 17.30 on the last working day of the month.
- 1.3 A report shall be created for each clinic and shall list the individual drug names, the total number of prescriptions, the number of doses prescribed and the total cost of the prescribed drugs.
- 1.4 If drugs are available in different dose units (e.g. 10mg, 20 mg, etc.) separate reports shall be created for each dose unit.
- 1.5 Access to all cost reports shall be restricted to authorized users listed on a management access control list.

Exercise: User or System Requirement?

- Classify each requirement for slide-presentation software as a (U)ser, or (S)ystem requirement :
 - As user drags a slide while reordering a slide-deck, other slides move out of way with animation effect lasting 0.25s.
 - System supports reordering slides from a thumbnail view via drag-and-drop.
 - User may animate content onto the slide where it is initially hidden and then appears.
 - Animations for current slide displayed in tree view.
 - Animations may be reordered using up and down arrows at bottom of display window.

Functional VS Non-Functional Requirements

Functional and non-functional requirements

- **Functional** requirements
 - - Ex: How the system should react to particular inputs and particular situations.
 - May state what the system should not do.
- **Non-functional** requirements
 - Constraints on the system such as timing, development process, or standards compliance.
 - rather than individual features.

Functional requirements

- Functional user requirements:
 - statements of what the system should do.
- Functional system requirements:
 - describe the system services...
- Problems arise when..
 - Ambiguous requirements may be interpreted differently by developers and users:
 - “Police help dog bite victim”
 - “He fed her cat food”
 - “One morning I shot an elephant in my pyjamas”

Requirements & imprecision

- Functional requirements for the MHC-PMS
 - A user shall be able to search the appointments lists for all clinics.
 - Each staff member shall be uniquely identified by his or her 8-digit employee number.
- Consider the term 'search':
 - User intention:
 - search for a patient across all appointments in all clinics.
 - Developer interpretation:
 - search for a patient in any one specific clinic.

Requirements completeness and consistency

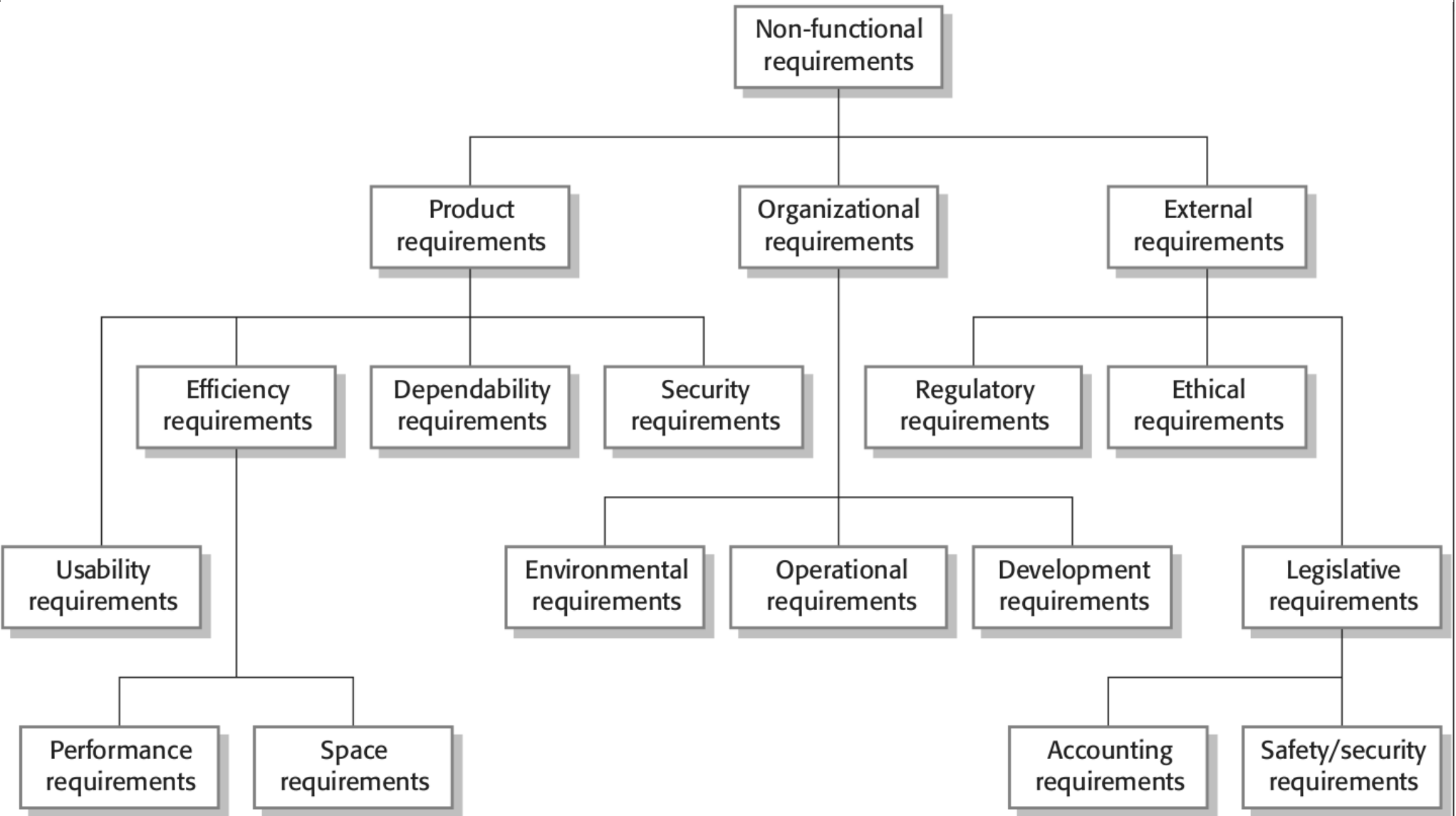
- In principle, requirements should be both complete and consistent.
 - Complete:
 - Consistent:

in the requirements.
- Practically impossible to produce a complete and consistent requirements document.

Non-functional requirements

- Non-Functional requirements:
 - - reliability, response time and storage space.
 - - programming language or development method.
- Non-functional requirements may be more critical than functional requirements.
 - If they are not met, the system may be useless.

Types of nonfunctional requirement



Non-functional requirements implementation

- Non-functional requirements may affect..

(rather than single components).
 - Ex: organize system to minimize communication to meet performance requirements.
- A non-functional requirement may..
 - Ex: security needs may dictate numerous features to meet those needs.

Quantitative Non-Functional Requirements

- Write non-functional requirements quantitatively:
 - User goal:
 - "The system should be easy to use and organized such that user errors are minimized."
 - Verifiable requirement:
 - "After 4 hours of training, average user error shall be less than 2 per hour."

Metrics for specifying nonfunctional requirements

Property	Measure
Speed	User response time
	Screen refresh rate
Ease of use	
Reliability	Mean time between failure
	Rate of failure occurrence
Robustness	Time to restart after failure

Exercise

- Fill in the following grid with example requirements for a mine-sweeper game on the computer.

Functional
Requirement

Non-Functional
Requirement

User
Requirement

System
Requirement

Summary

- Requirements define
 - what the system should do and
 - constraints on its operation and implementation.
- Functional requirements:
 - the services that the system must provide.
- Non-functional requirements:
 - constrain the system or development process.
 - Often relate to emergent properties of the system.
 - Apply to the system as a whole.