

# Requirements Engineering

## Chapter 4.1-4.2



Based on slides from Software Engineering 9<sup>th</sup> 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 by clicking and holding the up or down arrows to move an animation up or down the animation order. This moves at 1 positions every 0.5s.

Good  
Quiz  
Q.!

Functional  
VS  
Non-Functional  
Requirements

# Functional and non-functional requirements

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



# Functional requirements

- Functional user requirements:
  - statements of what the software should do.
- Functional system requirements:
  - describe the software services...
- Problems arise when..
  - Ambiguous requirements may be interpreted differently by developers and users:
    - “One morning I shot an elephant in my pyjamas”
    - “Kids make nutritious snacks”
    - .. • “Police help dog bite victim”

# 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

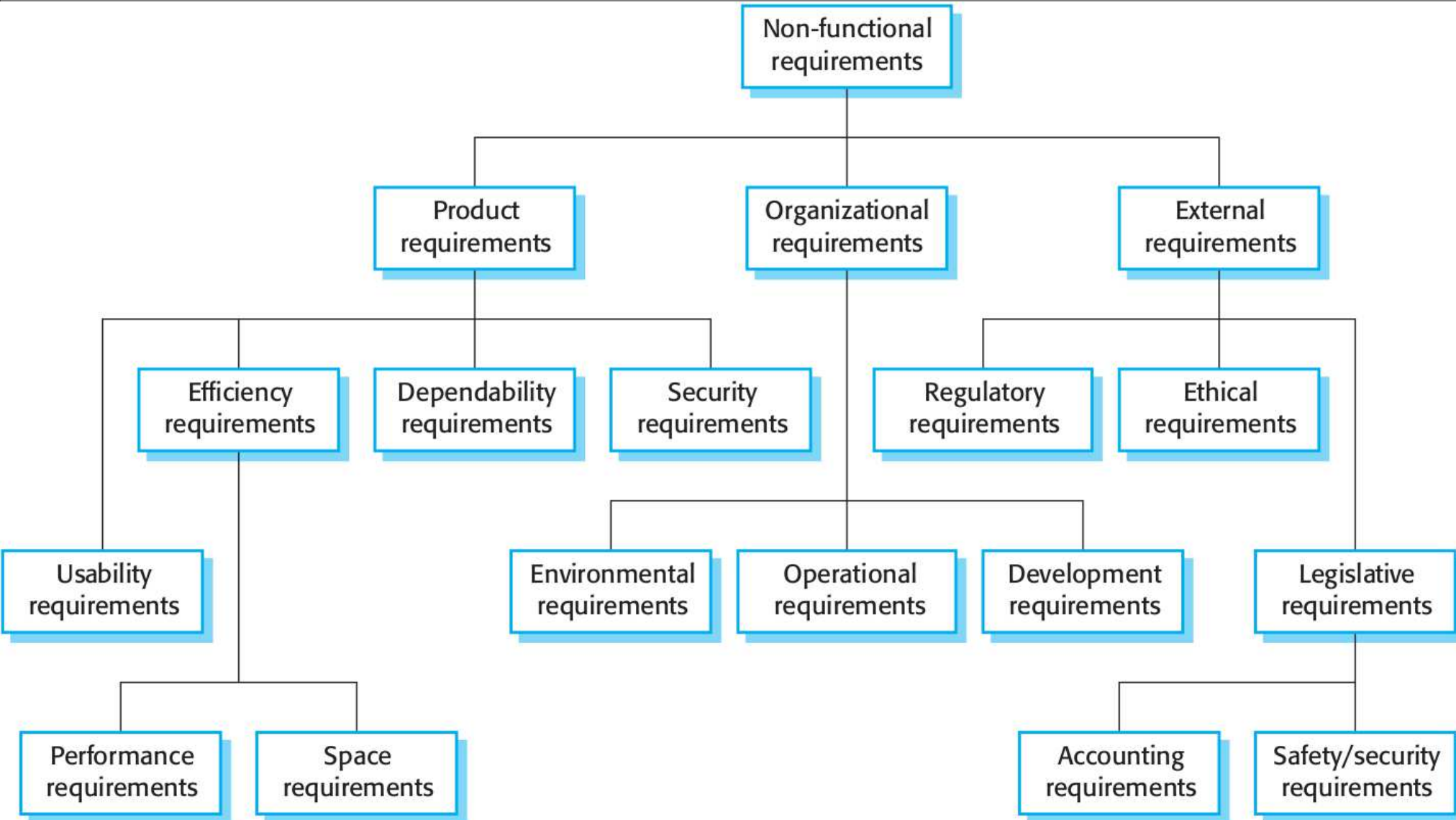
- In principle, requirements should be both **complete** and **consistent**.
  - **Complete:**
  - **Consistent:**

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

Good  
Quiz  
Q.!

- 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.