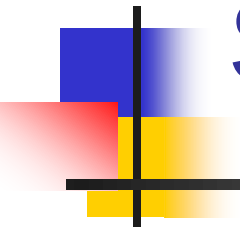
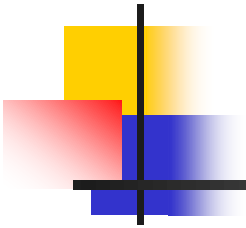


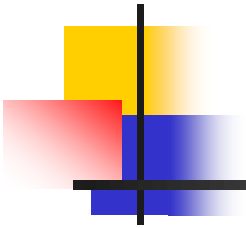
SWE 205 - Introduction to Software Engineering

Lecture 8 - Requirements Engineering



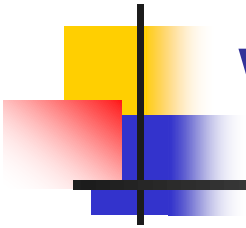
Lecture Objectives

- To introduce the concepts of user and system requirements
- To describe functional and non-functional requirements



Requirements Engineering

- The process of establishing the services that
  - The customer requires from a system; and
  - The constraints under which it operates and is developed.
- The requirements themselves are the descriptions of
  - The system services; and
  - Constraints that are generated during the requirements engineering process.



What is a Requirement?

- It may range from a high-level abstract statement of a service or of a system constraint to a detailed mathematical functional specification.
- This is inevitable as requirements may serve a dual function
  - May be the basis for a bid for a contract - therefore must be open to interpretation;
  - May be the basis for the contract itself - therefore must be defined in detail;

Types of Requirements

- User requirements
  - Statements in natural language plus diagrams of the services the system provides and its operational constraints.
  - Written for customers.
- System requirements
  - A structured document setting out detailed descriptions of the system's functions, services and operational constraints.
  - Defines what should be implemented so may be part of a contract between client and contractor.

Example

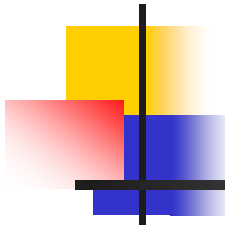
User Requirement Definition

LIB system shall keep track of all data required by copyright licensing agencies In the Kingdom and elsewhere.

System Requirements Specification

- On making a request for a document from LIB system, the requestor shall be presented with a form that records Details of the user and the request made.
- LIB system request forms shall be stored on the system for five years from the date of the request.

Requirements Readers



User Requirements → Client managers, System end-users, System Architects

System Requirements → System end-users, System architects, Software developers

Functional and Non-Functional Requirements

- Functional requirements
  - Statements of services the system should provide,
  - How the system should react to particular inputs;
  - How the system should behave in particular situations.
- Non-functional requirements
  - constraints on the services or functions offered by the system such as timing constraints,
  - constraints on the development process, standards, etc.

Functional and Non-Functional Requirements

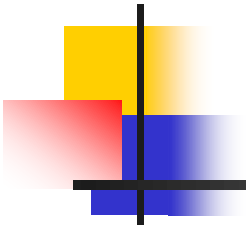
- Domain requirements
  - Requirements that come from the application domain of the system and that reflect characteristics of that domain.
  - They may be functional or non-functional requirements.

In reality, distinctions between different types of Requirements is not clear-cut.

Functional and Non-Functional Requirements

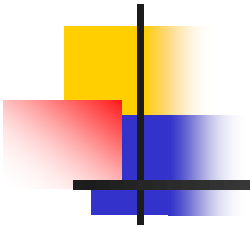
User is concerned with security of the System. (appears as non-functional requirement)

The requirement can be refined as ‘need to include user authentication’ -- Functional Requirement



Functional requirements

- Describe functionality or system services.
  - Expected users and the type of system where the software is used.
- Functional user requirements may be
  - High-level statements of what the system should do
  - Functional system requirements should describe the system services in detail.

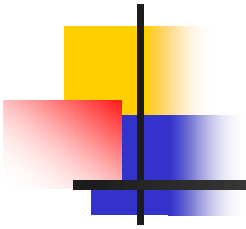


Example

- A library system that provides a single interface to a number of databases of articles in different libraries.
- Users can search for, download and print these articles for personal study.

Examples of functional requirements

- The user shall be able to search either all of the initial set of databases or select a subset from it.
- The system shall provide appropriate viewers for the user to read documents in the document store.
- Every order shall be allocated a unique identifier (ORDER_ID) which the user shall be able to copy to the account's permanent storage area.



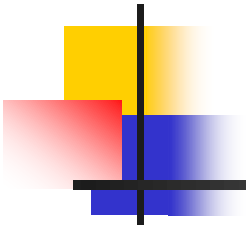
Requirements imprecision

- Problems arise when requirements are not precisely stated. (Ambiguous Requirements)
- For example, the term ‘appropriate viewers’
  - User intention - special purpose viewer for each different document type;
  - Developer interpretation - Provide a text viewer that shows the contents of the document.

Requirements completeness and consistency

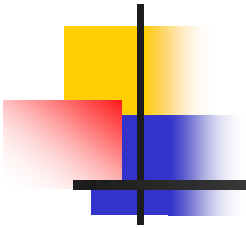
- Complete
  - They should include descriptions of all facilities required.
- Consistent
  - There should be no conflicts or contradictions in the descriptions of the system facilities.

In practice, it is impossible to produce a complete and consistent requirements document.



Non-functional requirements

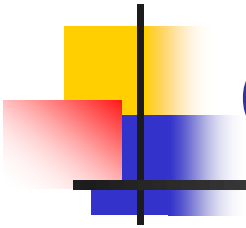
- These define system properties and constraints e.g.
  - reliability,
  - response time and storage requirements.
  - Constraints are I/O device capability,
  - system representations, etc.
- Non-functional requirements may be more critical than functional requirements.



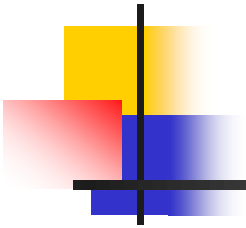
Non-functional classifications

- Product requirements - system must behave in a particular way e.g.
  - execution speed, reliability, etc.
- Organisational requirements - result of organisational policies e.g.
  - process standards used, implementation requirements, etc.
- External requirements - factors which are external to the system e.g.
  - interoperability requirements, legislative requirements, etc.

Non-functional requirements examples

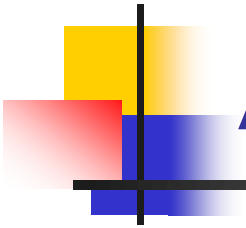


- Product requirement
  - The user interface for LIBSYS shall be implemented as simple HTML without frames or Java applets.
- Organisational requirement
  - The system development process and deliverable documents shall conform to the process and deliverables defined in XYZCo-SP-STAN-95.
- External requirement
  - The system shall not disclose any personal information about customers apart from their name and reference number.



Key Points

- Requirements set out what the system should do and define constraints on its operation and implementation.
- Functional requirements set out services the system should provide.
- Non-functional requirements constrain the system being developed or the development process.



Announcement

- Quiz 2 on Wednesday 29/10/2008. (as per our initial schedule)
- Material
  - Lec 6, Lec 7 & Lec 8.