REQUIREMENTS

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Recap Lecture 1

- Why Web Engineering?
- What is Web Engineering?
- Difference between Web Engineering and Web Applications?
- Web Applications
  - Layers
  - Technologies
  - Categories
  - Types

Recap Lecture1

- Old Web Application problems?
- How Web Engineering solves them?
- Another definition of Web Engineering?
- Why Agility?
- What is Agile?
- WebE Framework? Activities?

Agenda

- Introduction to Requirements
- Requirements Categories
- Requirements in Web Engineering
- Guidelines for Web Application Requirements

Introduction to Requirements

- A **requirement** describes a property to be met or a service to be provided by a system.
- IEEE 610.12 defines a requirement as
  1. a condition or capability needed by a user to solve a problem or achieve an objective
  2. a condition or capability that must be met or possessed by a system or system component to satisfy a contract, standard, specification, or other formally imposed documents
  3. a documented representation of a condition or capability as in (1) or (2)
- Requirements are typically categorized as functional requirements, non-functional requirements, and domain requirements
  - Functional requirements define a system's capabilities and services
  - non-functional requirements describe constraints
  - Domain requirements describe organization requirements

Introduction to Requirements

- A requirements document summarizes all requirements and constraints agreed between the contractor and the customer
- Requirements Engineering Activities are:
  - Requirements Elicitation and Negotiation
  - Requirements Documentation
  - Requirements Verification and Validation
  - Requirements Management

Functional Requirements

- Describe functionality or system services.
- Depend on the type of software, 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.

Function Requirements (Personal Medical System)

- A user shall be able to search the appointments lists for all clinics.
- The system shall generate each day, for each clinic, a list of patients who are expected to attend appointments that day.
- Each staff member using the system shall be uniquely identified by his or her 8-digit employee number.

Functional Requirements Representation

- System Requirements
- User Requirements

Requirements Imprecision

- **Problems** arise when requirements are not precisely stated.
- **Ambiguous requirements** may be interpreted in different ways by developers and users.
- Example?
- The system shall be able to give functionality of recovering password

Requirements completeness and consistency

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

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.
- Process requirements may also be specified mandating a particular IDE, programming language or development method.
- Non-functional requirements may be more critical than functional requirements. If these are not met, the system may be useless.

Non-functional classifications

Product requirements

Requirements which specify that the delivered product must behave in a particular way e.g. execution speed, reliability, etc.

Organisational requirements

Requirements which are a consequence of organisational policies and procedures e.g. process standards used, implementation requirements, etc.

External requirements

Requirements which arise from factors which are external to the system and its development process e.g. interoperability requirements, legislative requirements, etc.

Example of non-function requirements (PMS)

Product requirement

- The PMS shall be available to all clinics during normal working hours (Mon–Fri, 0830–17.30). Downtime within normal working hours shall not exceed five seconds in any one day.

Organizational requirement

- Users of the PMS system shall authenticate themselves using their health authority identity card.

External requirement

- The system shall implement patient privacy provisions as set out in 2006-privacy-law.

Goals and Requirements

- Non-functional requirements may be very difficult to state precisely and imprecise requirements may be difficult to verify.

Goal

- A general intention of the user such as ease of use.

Verifiable non-functional requirement

- A statement using some measure that can be objectively tested.
- Goals are helpful to developers as they convey the intentions of the system users.

Usability Requirements

- The system should be easy to use by medical staff and should be organized in such a way that user errors are minimized. (**Goal**)
- Medical staff **shall** be able to use all the system functions after four hours of training. After this training, the average number of errors made by experienced users **shall** not exceed two per hour of system use. (**Testable non-functional requirement**)

Domain Requirements

- The system's operational domain imposes requirements on the system.
- For example, a train control system has to take into account for the braking characteristics in different weather conditions.
- Domain requirements can be new functional requirements, constraints on existing requirements or define specific computations.
- If domain requirements are not satisfied, the system may be unworkable.

Domain Requirements Problems

Understand ability

- Requirements are expressed in the language of the application domain;
- This is often not understood by software engineers developing the system.

Implicitness

- Domain specialists understand the area so well that they do not think of making the domain requirements explicit.

Class Activity Max Time: 20mins

You have been asked to design a commercial music web-service. Users will be able to browse or search for music and then download it to their hard disk or any associated device, (such as MP3 players, Smartphones etc.), in the format of their choice (such as Mp3, Mp4 etc.). The web-service allows the users to create and maintain their profile and personal albums. It also provides the facility to the users to give comments / reviews about the music quality and overall features of the web-site.

- Write Two Requirements in NL!
  - User Requirements
  - System Requirements
  - Domain Requirements
  - Non functional Requirements (Goal)
  - Non functional Requirements (Verifiable Non functional Requirement)
- List down the categories of End-users!

Requirements in Web Engineering

- Multidisciplinary: Requires the participation of experts from different disciplines e.g. multimedia experts, content authors, software architects, usability experts, database specialists, or domain experts.

Common Problems Faced

- Unavailability of Stakeholders
- Volatility of Requirements and Constraints
- Unpredictable Operational Environment
- Impact of Legacy Systems

Requirements in Web Engineering

- Web engineering RE has to address unavailable stakeholders, volatile requirements and constraints, unpredictable operational environments, experience with Web technologies
  - Adds more web engineering principles to be followed

- Where Do Requirements Come From?
  - **Stakeholders** are people or organizations that have direct or indirect influence on the requirements
  - The identification and involvement of stakeholders are central tasks

Guidelines for Web Application Requirements

- Following are the major steps that will help in gathering requirements for a web application:
  - Identify the stakeholders and their broader requirements and experiences.
  - Identify the functions the Web site needs to provide (immediately, and in the short, medium, and long term).
  - Establish what information needs to be on the Web site, how to get this information, and how often this information may change.
  - Identify the corporate requirements in relation to look and feel, performance, security, and governance.
  - Get a feel of the number of users (typical and peak) and anticipated demands on the system.
  - Study similar (competitive) Web sites to gain an understanding of their functionalities, strengths, and limitations.

How to fulfil Web App Requirements

Requirement	Means of Fulfilment
Uniform look and feel across all Web pages that can easily be modified	Creation of Web pages using templates and style sheets
Consistency of information that may appear in different places or pages	Storing information in a single place (such as in a database or as an XML file), without duplication of information in different places or databases, and retrieving the required information for presentation where and when needed
Ease of information update and maintenance	Provision of a back-end system to edit information in a data repository; could have Web interface for easy access from anywhere
Ability to add new Web pages easily	Dynamic generation of navigational links, rather than predetermined static navigational links
Decentralised system administration	Provision of a multi-user login system to access back-end systems and inclusion of a "user administration system" that can assign specific functions and data sets to content managers and other developers/administrators
Mechanisms for quality control and assessing the relevance of information	Inclusion of metadata for Web pages; use of a Web robot for gathering salient information, processing the information gathered and taking appropriate action(s) for ensuring quality or relevance of information presented.
Increased probability of being found through search engines	Using meta tags and registering with search engines

Thanks. Any Questions?