Issues in Internet Design and Development

Course of Instructions on Issues in Internet Design and Development

Week-3 Advance Requirements Collection and Elicitation

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Advanced requirements collection and elicitation

Agenda

- Software Requirements
- Requirements Engineering
- Requirements Elicitation
- Class Room Activity-1
- Requirements Specification
- Class Room Activity-2
- Class Room Activity-3
- Class Room Activity-4
- Class Room Activity-5
- Class Room Activity-6
- Class Room Activity-7
- IEEE 830-1998 Requirements Specification Template
- Class Room Activity-8

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What is a software requirement

- May range from
- a high-level abstract statement of a service
- a statement of a system constraint to a detailed functional specification
- Requirements usage
- a bid for a contract
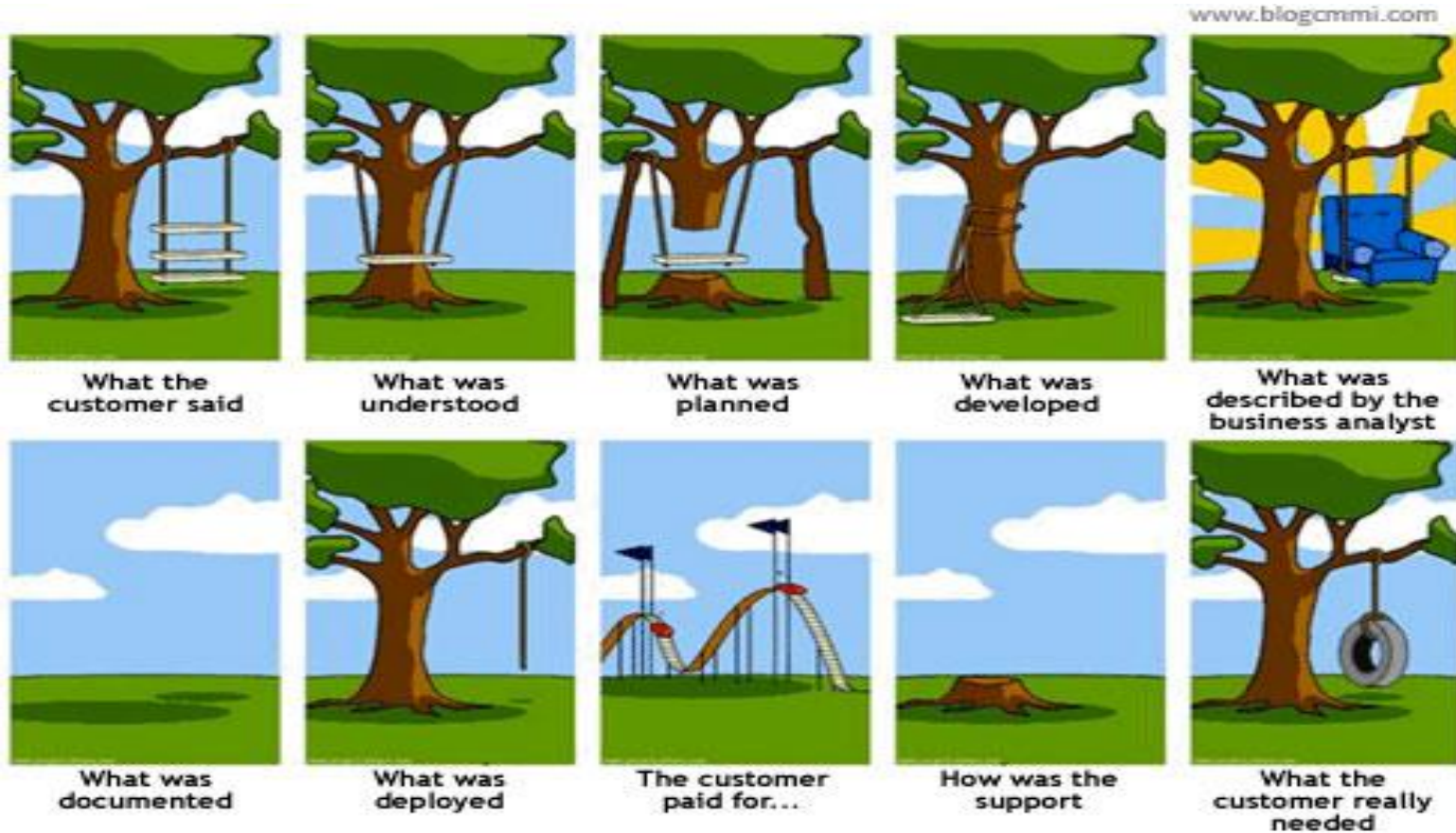- Open to interpretation
- Defined in detail

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Software requirement example

- The system shall search for the items in the library such as books.

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Difficulty in understanding the customer requirements

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Requirements Engineering

- **Elicitation**

- **Specification**

- **Analysis & Negotiation**
- Prioritization
- !Selection!

- **Validation** (are the req. correct, are these the correct requirements)

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Requirements Elicitation

"...the process of discovering the requirements for a system by communication with customers, system users and other who have a stake in the system development."

(Ian Sommerville)

"...the process of discovering the requirements for a system by communication with stakeholders and through the observation of them in their domain"

(Tony Gorschek)

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The first step... sources of information...

- **DOMAIN**
  - Understanding it
- Problem (application) domain
  - What's the problem(s) and who can explain it to you?
- History
  - Previous systems / current systems
  - Documentation
  - Old requirements/design etc.
- Competitors
  - Have they solved the problem and how?
- Surrounding environment
  - Other systems, processes which the system should support (and/or processes which the system influences)

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The first step… sources of information…

- ○ **Stakeholders**

  (management, users, future users, system managers, partners, sub contractors, Law and Policy, customer's customers, domain experts, developers etc)

  - Finding them (Stakeholder Identification)
  - Getting access to them (Cost, Politics)

  --STAKEHOLDER ACCESS IS CRITICAL AND SHOULD BE STATED AS SUCH, e.g. in contract or other agreement.

  (true for other resources also, e.g. documentation etc.)--

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The information to elicit

- Domain description (operating environment)
- Business goals pertaining to the system
- Constraints on the system structure and/or behavior by clients (human or not…)

- Problems that need to be solved – WHAT –

  -- Requirements --

  - Attributes, e.g.
    - Title, description…

      …but also…
    - Rationale
    - Source
    - Importance

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Elicitation techniques

- Interviews
  - + Getting to know the present (domain, problems) and ideas for future systems
  - - Hard to see the goals and critical issues, subjective

- Group interviews
  - + Stimulate each other, complete each other
  - - Censorship, domination (some people may not get attention)

- Observation
  - Look at how people actually perform a task (or a combination of tasks) – record and review…
  - + Map current work, practices, processes
  - - Critical issues seldom captured (e.g. you have to be observing when something goes wrong), usability issues seldom captured, time consuming

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Elicitation techniques

- Task demonstrations
  - Ask a user to perform a task and observe and study what is done, ask questions during.
  - + Clarify what is done and how, current work
  - - Your presence and questions may influence the user, critical issues seldom captured, usability problems hard to capture

- Questionnaires
  - + Gather information from many users (statistical indications, views, opinions)
  - - Difficult to construct good questionnaires, questions often interpreted differently, hard to classify answers in open questions and closed questions may be to narrow…

- Brainstorming
  - Gathering of stakeholders and the exchange/gathering of ideas in an open atmosphere where no one risks being ridiculed for their ideas and no ideas are rejected/criticized
  - + Many ideas (none are rejected)
  - - Many ideas (have to be sorted and prioritized), hard to create a good atmosphere, hard to get everybody involved, small groups, time consuming

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Elicitation techniques

- Use cases and Scenarios
  - Description of a particular interaction between the (proposed) system and one or more users (or other terminators, e.g. another system). A user is walked through the selected operations and the way in which they would like to interact with the system is recorded.
  - + Concentration on the specific (rather than the general) which can give greater accuracy
  - - Solution oriented (rather than problem oriented), can result in a premature design of the interface between the problem domain and the solution

- Prototyping
  - + Visualization, stimulate ideas, usability centered, (can be combined with e.g. use cases)
  - - Solution oriented (premature design), "is it already done?!"

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Class Room Activity-1

- Select a requirements' elicitation technique to collect the requirements for a library management system.

- Give explanation that why your chosen elicitation technique is appropriate for collecting the requirements of a library management system.

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Common problems in elicitation

- **Stakeholders can't express what they need**

  (or express/exaggerate too much – risk forgetting important problems)
- **Doing it is one thing, explaining it is another…**
- **Stakeholders express solutions instead of demands**

  (e.g. "We want a faster car" when **the need** is to get to the destination faster – could be solved with *better roads* or *better route planning*)
- **Hard to imagine new ways of doing things, as well as consequences thereof…**
- **Different stakeholders have different (sometimes conflicting) views on the same thing**
- **Resistance to change**
- **Political issues, Status, Culture**
- **Requirement change over time**
- **Many requirements**
- **Stakeholder Access**
- **Understanding of why RE is done…**

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Common problems in elicitation

- Different kinds of systems – different considerations
  - Bespoke (customized)
    - Systems (software) designed for a particular customer
    - CUSTOMER - DEVELOPER
    - This category is often the one though of in RE literature…

    …but there are also…
  - Generic products (Market driven)
    - E.g. Word processors, databases etc.
    - Not designed for a certain customer but a generic one (a group or several different ones)
    - Very hard to identify "a customer" – stakeholder ID and stakeholder consultation very hard…
    - Based on market segments etc.
  - Semi-generic products (Market driven)
    - Products that have to comply to a certain set of rules (e.g. conform to a certain operating environment and/or interact with other systems) but also be generic in nature.
    - E.g. Software for mobile phones.
  - Market driven – implies Continuous RE effort…

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Example customer requirements

- "the system should be fast enough for our purposes"
- "its important for the users to feel at home with the system"
- "PCX protocol v.1.3 should be implemented"

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Requirements Specification

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Attributes of a good requirement

- Goal-Design
- Level of detail
- Format for Requirement
- Text, diagrams, tables
- How is the requirement used
- Requirements template

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Level of Detail

- One Sentence
- One Paragraph
- A Figure
- Unstructured or Structured
- A Table or Matrix
- A Legal Document
- A Design Document
- A Formal Specification

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Characteristics of Requirements

- Regardless of how requirements are
- specified, they must be:
- Complete
- Correct
- Feasible
- Necessary
- Prioritized
- Unambiguous
- Verifiable

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Requirements types

- Functional Requirements
- Special Interfaces
- Requirements on Quality Attributes (Also called non-functional requirements)
- Managerial Requirements
- Other Deliverables

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Functional Requirements

- Functional Requirements
- Context Diagrams
- Event Lists
- Feature Requirements
- Screens & Prototypes
- Scenarios
- Task Descriptions
- Standards
- Development Process

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Functional Requirements

- Tables & Decision Tables
- Textual Process
- Descriptions
- State Diagrams
- State Transition Matrices
- Activity Diagrams
- Class Diagrams
- Collaboration Diagrams
- Sequence Diagrams

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Functional Requirements Example

Identifier:	RS11
Title:	Funreq.Gern.User_Logout
Requirement:	The system shall logout the user account and expires the user session at the time of logout
Rationale:	It is an important requirement, as user account must be closed to avoid miss use of a user's account by another user.
Restrictions and risks:	The user should save his settings and close all operations before logout. No risks are associated in implementing this requirement.
Dependencies:	This requirement is dependent on RS10. As, only a already login user can logout the system.

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Class Room Activity2

- Write 2 functional requirements for a library management system.

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Special Interfaces

- Reports (External, For Stakeholders outside domain)
- Specific (Well-defined purposes)
- From Legacy System
- Reports on Demand (User-Defined, Template)
- Platform
- platform for system

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User Interface Example

Identifier:	RS1
Title:	User_interface.Librarian
Requirement:	The system shall provide a separate interface for librarian for performing his operations.
Rationale:	It is an important requirement, as all the functions related to librarian are available within his interface and he can only see his view of the system.
Restrictions and risks:	Librarian should login with his library account within the library premises. No risks are associated in implementing this requirement.
Dependencies:	This requirement is dependent on RS10.

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Class Room Activity-3

- Write a requirement for user interface for a library management system.

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Software Interface Example

Identifier:	RS7
Title:	**Software_interface.Operating_system**
Requirement:	The system shall use windows operating system.
Rationale:	It is an important requirement, as customer demands for windows XP or VISTA due to the general rule of a county in which the library is situated.
Restrictions and risks:	No restrictions are involved and no risks in implementing this requirement.
Dependencies:	It is an independent requirement.

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Class Room Activity-4

- Write a requirement for software interface for a library management system.

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Communication Interface Example

Identifier:	RS9
Title:	**Communication_interface.Sys_internet**
Requirement:	The system shall make interface with the internet to provide facility of system from home or from within library.
Rationale:	It is an important requirement, as customer (library manager) want to provide facility of using library system from home and within to members of the library. It is also important, as library want to give internet facility within library.
Restrictions and risks:	Internet connection should be present. No risks are associated in implementing this requirement.
Dependencies:	It is an independent requirement.

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Class Room Activity-5

- Write a requirement for communication interface for a library management system.

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Non-functional Requirement Example

Identifier:	RS45
Title:	**Sys-attrib.Perf.Respone_time.Access-from_home**
Requirement:	The system shall have a response time of five seconds to handle all the requests from home.
Rationale:	It is an important requirement, as library users not want to wait for the system response after request of operation from home.
Restrictions and risks:	System will be in normal mode of operations. No risks are associated in implementing this requirement.
Dependencies:	It is an independent system requirement.

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Class Room Activity-6

- Write 2 non-functional requirements for a library management system.

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Class Room Activity-7

- Identifying scenarios and drawing use case diagram for the library management system.

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A Requirements Template

- Description
- Rationale
- Number (Vertical)
- Type (Vertical)
- Context/Event/Use Case (Forward)
- Source (Backwards)
- Fit Criteria (Verification)
- Customer Satisfaction / Dissatisfaction (Prioritization)

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Example Requirement

Requirement #: SEARCH.LIST.PRINT

Requirement Type: OUTPUT

Event/Use Case: 6

Description: The user shall be able to print a displayed list of search results by activating a specific triggering mechanism

Rationale: Users want to conduct a search, print the results and then either go find the books in a shelf or ask a librarian for help. Source: Library Customers

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Example Requirement

Source: Library Customers

Fit Criterion: As a user triggers the print function when the system displays a list of search results, the default printer attached to the system shall generate a printout of the same search results.
Customer Satisfaction: 4 (of 5)
Customer Dissatisfaction: 3 (of 5)
Dependencies: SYSTEM.OUTPUT.PRINTER.*
Conflicts: none
Supporting Materials: Specification of PostScript Language
History: Raised by msv, 7th Sept. 2001.

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Requirements Specification Template

- IEEE 830-1993, IEEE 830-1998
- Modifications thereof

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Requirements Specification Template

- Introduction
    1. Purpose
    2. Scope
    3. Definitions, Acronyms and Abbreviations
    4. References
    5. Overview

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Requirements Specification Template

- ○ Overall Description
  - 1. Product Perspective
  - 2. Product Functions
  - 3. User Characteristics
  - 4. Constraints
  - 5. Assumptions and Dependencies

- ○ Specific Requirements
- ○ 4. Appendixes
- ○ 5. Index

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Class Room Activity-8

- Get into the groups.

- Write requirements for a library management system using IEEE-830 requirements specification template.

Recommended Readings

- Sommerville, Ian and Kotonya, Gerald., Requirements engineering: processes and techniques., John Wiley & Sons, Inc. 1998.
- Sommerville, Ian and Sawyer, Pete., Requirements engineering: a good practice guide., John Wiley & Sons, Inc. 1997.
- S. Lauesen, "Software Requirements – Styles and Techniques", Addison Wesley, Harlow UK, 2002.
- IEEE Recommended Practice for Software Requirements Specifications (http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=720574&userType=inst)
- (http://ifs.host.cs.standrews.ac.uk/Books/SE9/Web/Requirements/IEEE-standard.html)