Large Scale Systems Design
G52LSS

Lecture 10 – Requirements Analysis

- System Requirements
- Defining Adequate Requirements
- Requirements Analysis Techniques

Learning outcomes: Understand and identify system functional and non-functional requirements; describe the characteristics of adequate systems requirements; understand the purpose of the different requirement analysis techniques.

From Planning
- System Request (precise business requirements)

To Analysis
- Develop Analysis Strategy
- Define Requirements (precise system requirements)
- Use Cases, Process Model, Data Model

System Proposal

A requirement is a simple statement of what the system should do or what characteristics it should have.

Users and system analysts should work in co-operation in order to determine the system requirements.

Analysis Strategy
- Requirements Analysis Techniques
- Requirements Gathering Techniques

System Requirements
- Functional
- Non-functional

Functional Requirements
- Processes that the system has to perform and information it has to contain

Non-functional Requirements
- Behaviour of the systems is various aspects: operational, performance, security, cultural and political

The requirements definition report defines the scope of the system.

Defining system requirements is an iterative and continuously evolving process but should be managed carefully to avoid endless addition of new requirements.
Example 10.1 The following list includes some of the functional and non-functional requirements of the Amazon.co.uk website.

**Functional Requirements** include:
- Search - enable user to find item(s) based on variety of item characteristics
- Browse - enable user to look through items
- Shop - enable user to select and purchase items
- Comment - enable user to submit his/her comments on items and read other users' comments on items
- Personalise - enable site to remember user's preferences based on previous use of the site and orders placed
- Registries - enable user to participate in registry (e.g., wedding, baby); enable users to search registries
- Wish Lists - enable user to create and maintain a wish list of desired items; enable users to search a person's wish list for gift ideas

**Non-functional Requirements** include:
- Operational - the system should work on any web browser
- Performance - the system should be available 24/7/365
- Security - the system enables registered customers to review their own accounts
- Cultural - the system exists in versions tailored to global users, e.g., French, Japanese, German, etc.

Exercise 10.1 From (Dennis et al. 2006, chapter 4) Determine which of the following are functional requirements and which ones are non-functional.

- Be accessible to web users
- Include the company logo and colour scheme
- Restrict access to profitability information
- Include actual and budgeted cost information
- Provide management reports
- Include sales information updated at least daily
- Have a 2-seconds maximum response for predefined queries and 10-minute maximum response for ad-hoc queries

Exercise 10.1 (cont.)
- Include information from all company subsidiaries
- Print subsidiary reports in the primary language of the subsidiary
- Provide monthly rankings of salesperson performance
- Remember user's preferences based on previous use of system
- Allow user to search item(s) based on variety of item characteristics
- System should be available 24/7/365
Defining Adequate Requirements

The analysis phase involves:
- Understanding current system
- Identifying improvements
- Define requirements for new system

The purpose of identifying requirements is to provide information to the next steps of the analysis phase.

In identifying requirements, the systems analyst should:
- Be impertinent
- Be impartial
- Relax constraints
- Pay attention to detail
- Be able to reframe

Ten Requirements Traps to Avoid


- Confusion over requirements
- Inadequate customer involvement
- Vague and ambiguous requirements
- Un-prioritised requirements
- Building functionality that no-one uses
- Analysis paralysis
- Scope creep
- Inadequate change process
- Insufficient change impact analysis
- Inadequate version control

Criteria of Good Requirements


- Necessary
  - if the system can meet prioritized real needs without the requirement, it isn’t necessary
- Feasible
  - the requirement is doable and can be accomplished within budget and schedule
- Correct
  - the facts related to the requirement are accurate, and it is technically and legally possible
- Concise
  - the requirement is stated simply
- Unambiguous
  - the requirement can be interpreted in only one way

- Complete
  - all conditions under which the requirement applies are stated, and it expresses a whole idea or statement
- Consistent
  - it is not in conflict with other requirements
- Verifiable
  - implementation of the requirement in the system can be proved
- Traceable
  - the source of the requirement can be traced, and it can be tracked throughout the system (e. g., to the design, code, test, and documentation)
- Allocated
  - the requirement is assigned to a component of the designed system
- Design independent
  - does not pose a specific implementation solution
- Non-redundant
  - it is not a duplicate requirement
- Written in standard construct
  - the requirement is stated as an imperative using shall, should, must, etc.
- Unique identifier
  - each requirement shall have a unique identifying number
- Devoid of escape clauses
  - language should not include such phrases as “if,” “when,” “but,” “except,” “unless,” and “although.” Language should not be speculative or general (i.e., avoid wording such as “usually,” “generally,” “often,” “normally,” and “typically”)

**Requirements Analysis Techniques**

The main **requirements analysis techniques** are the following. Each technique is distinctive with respect to **main focus** and **changes to the organisation**.

**Business process automation (BPA)**

The basic way in which the organisation operates is left unchanged and computer systems are used to automate some of the work.
- Focus on automate processes
- No changes to organisation
- Examples of BPA: problem analysis, root cause analysis

**Business process improvement (BPI)**

Moderate changes to the way in which the organisation operates in order to achieve improvements.
- Focus on improve processes
- Moderate changes to organisation
- Examples of BPI: duration analysis, activity based costing, information benchmarking

**Business process re-engineering (BPR)**

Uses new ideas and technology to make major changes to the way in which the organisation operates.
- Focus on innovation
- Major changes to organisation
- Examples of BPR: outcome analysis, technology analysis, activity elimination

**Problem Analysis – Focus on solutions**

![Problem Analysis Diagram]

**Root Cause Analysis – Focus on problems**

![Root Cause Analysis Diagram]
Duration Analysis – Focus on process timing

- Improve/Integrate Processes

Activity Based Costing – Focus on process cost

- Reduce Costs

Informal Benchmarking – Focus on learning

- Improve Somehow

Outcome Analysis – Focus on value to customers

- Re-design Processes

Technology Analysis – Focus on new technology

- Innovative Applications

Activity Elimination – Focus on reducing operations

- Do Less, But Deliver

Each requirement analysis technique has different impact on a project

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<th>BPI</th>
<th>BPR</th>
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Exercise 10.2 Minicase (Dennis et al. 2006, chapter 4).
The Randall Company is a mid-sized trucking and distribution business that has been experiencing problems with its sales entry and customer support system. The system uses rather old technology, plus it incorporates a number of complex procedures that are cumbersome for the users to complete.

Management has been aware of the need for this system renovation for some time, and has finally committed to investigate a new system. The IS department head has designated Jenny Mills as project manager for the project.

After several conversations with the key managers and users in the sales and support department, Jenny feels some concern about the direction of the project.
Exercise 10.2 (cont)

On the one hand, she has heard numerous strong user complaints that the system should “just be thrown out!”, suggesting a BPR type of project. On the other hand, the managers have repeatedly expressed concern about getting the new system developed quickly without too much expense.

Jenny has also been told by management not to “shake things up too much.” In short, management seems to be taking a very cautious approach to this project. Jenny’s own opinion is that this situation is crying out for a BPR project. The system is antiquated and awkward, and a fresh approach with up-to-date technology could really transform the business.

Do you think Jenny should move ahead with her analysis planning using a BPR strategy? Develop a persuasive argument to support your position.

Exercise 10.2 (cont)

It is tempting in a situation like this to go for the BPR analysis strategy. The business value that could be achieved with a successful BPR project is extremely alluring. Unfortunately, the high failure rate associated with these projects (estimated by some to be as high as 70%) suggests that all factors must be in place to achieve a successful result. Since BPR projects involve high cost, radical change, and high risk, this situation does NOT appear to be good BPR candidate. It does not appear that there is sufficient organisational support for this type of project (especially by management). Jenny should not stick her neck out and try to accomplish too much for this project. She cannot be successful unless she can identify a vocal project champion who can pave a political path to overall management support and enthusiasm for a BPR project.

Additional Reading

Chapter 4 of (Dennis et al., 2006)
