Lecture # 22

Writing Requirements

NED LMS

Writing Requirements - 1

- Requirements specification should establish an understanding between customers and suppliers about what a system is supposed to do, and provide a basis for validation and verification

Writing Requirements - 2

- Typically, requirements documents are written in natural languages (like, English, Japanese, French, etc.)
- Natural languages, by their nature, are ambiguous
- Structured languages can be used with the natural languages to specify requirements

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Problems with Natural Languages - 1

- Natural language understanding relies on the specification readers and writers using the same words for same concept

- A natural language requirements specification is over-flexible. You can say the same thing in completely different ways

Problems with Natural Languages - 2

- It is not possible to modularize natural language requirements. It may be difficult to find all related requirements
  - › To discover the impact of a change, every requirement have to be examined

Problems with Requirements - 1

- The requirements are written using complex conditional clauses (if A then B then C…), which are confusing
- Terminology is used in a sloppy and inconsistent way

Problems with Requirements - 2

- The writers of the requirement assume that the reader has a specific knowledge of the domain or the system and they leave essential information out of the requirements document

Impact of These Problems

- Difficult to check the requirements for errors and omissions

- Different interpretations of the requirements may lead to contractual disagreements between customer and the system developer

Structured Language Specifications

- Structured natural language
- Design description languages
- Graphical notations
- Mathematical notations

Comments on Special-Purpose Languages

- These languages cannot completely define requirements
- They are not understandable by all stakeholders
- Therefore, there is always a need for well-written, natural language statements of requirements

Essentials for Writing Requirements - 1

- Requirements are read more often than they are written. Investing effort in writing requirements, which are easy to read and understand is almost always cost-effective

Essentials for Writing Requirements - 2

- Readers of requirements come from diverse backgrounds. If you are requirements writer, you should not assume that readers have the same background and knowledge as you
- Recollect our discussion on cultural issues in requirements engineering

Essentials for Writing Requirements - 3

- Writing clearly and concisely is not easy. If you don't allow sufficient time for requirements descriptions to be drafted, reviewed and improved, you will inevitably end up with poorly written requirements

Essentials for Writing Requirements - 4

- Different organizations write requirements at different levels of abstraction from deliberately vague product specifications to detailed and precise descriptions of all aspects of a system

Essentials for Writing Requirements - 5

- Level of detail needed is dependent on
    - Type of requirements (stakeholder or process requirements)
    - Customer expectations
    - Organizational procedures
    - External standards or regulations

Essentials for Writing Requirements - 6

- Writing good requirements requires a lot of analytic thought

- Specifying rationale of requirement is one way to encourage such thought

Guidelines for Writing Requirements - 1

- Define standard templates for describing requirements
- Use language simply, consistently, and concisely
- Use diagrams appropriately

Use of Standard Templates

- Define a set of standard format for different types of requirements and ensure that all requirement definitions adhere to that format

- Standardization means that omissions are less likely and makes requirements easier to read and check

Using Simple Language - 1

- Use language consistently. In particular, distinguish between mandatory and desirable requirements. It is usual practice to define mandatory requirements using '*shall*' and desirable requirements using '*should*'. Use '*will*' to state facts or declare purpose

Using Simple Language - 2

- Use short sentences and paragraphs, using lists and table
- Use text highlighting to pick out key parts of the requirements

Using Appropriate Diagrams

- Use diagrams to present broad overviews and show relationships between entities
- Avoid complex diagrams

Guidelines for Writing Requirements - 2

- Supplement natural language with other descriptions of requirements
- Specify requirements quantitatively

Using Other Descriptions of Requirements

- If readers are familiar with other types of descriptions of requirements (like equations, etc.) then use those
- Particularly applicable to scientific and engineering domains
- Don't try to write everything in natural language

Specify Requirements Quantitatively

- Specify requirements quantitatively wherever possible
- This is applicable to properties of system, such as reliability or performance
- Recollect our discussion on metrics for non-functional requirements

Additional Guidelines for Writing Requirements - 1

- State only one requirement per requirement statement
- State requirements as active sentences
- Always use a noun or a definite pronoun when referring to a thing
- Do not use more than one conjunction when writing requirements statements

Additional Guidelines for Writing Requirements - 2

- Avoid using weak words and phrases. Such words and phrases re generally imprecise and allow the expansion or contraction of requirements beyond their intent

Examples of Words to be Avoided

- About, adequate, and/or, appropriate, as applicable, as appropriate, desirable, efficient, etc., if practical, suitable, timely, typical, when necessary

Additional Guidelines for Writing Requirements - 3

- State the needed requirements without specifying how to fulfill them
- Write complete statements
- Write statements that clearly convey intent

Summary

- We have discussed the intent of writing requirements.
- Writing requirements and different aspects of writing requirements
- We also discussed some problems in the requirements writing activities.