Requirements Engineering: Specification & Validation

Software Requirements and Design
CITS4401
Lecture 8 part 2

Key ideas (this week)

1. Testing requirements
   Convince me!
2. Prototyping requirements
   Show me!
3. Requirements Specification Document
   Tell me!
4. Managing requirements
   Maintain me!

Requirements: Analysis vs Validation

- **Analysis** works with raw requirements as elicited from the system stakeholders
  - "Have we got the right requirements" is the key question to be answered at this stage

- **Validation** works with a final draft of the requirements document i.e. with negotiated and agreed requirements
  - "Have we got the requirements right" is the key question to be answered at this stage

Validation inputs

- Requirements document
  - Complete, formatted and organised according to organisational standards
- Organisational knowledge
  - Knowledge, often implicit, of the organisation; used to judge the realism of the requirements
- Organisational standards
  - Local standards e.g. for the organisation of the requirements document

Input: IEEE Standard

Still the standard...

IEEE Recommended Practice for Software Requirements Specifications

Sponsor

Software Engineering Standards Committee of the IEEE Computer Society

Approved 25 June 1998

IEEE-SA Standards Board

1. Introduction
   - 1.1 Purpose
   - 1.2 Scope
   - 1.3 Definitions, acronyms & abbreviations
   - 1.4 References
   - 1.5 Overview
2. Overall description
   - 2.1 Product perspective
   - 2.2 Product functions
   - 2.3 User characteristics
   - 2.4 Constraints
   - 2.5 Assumptions and dependencies
3. Specific requirements

Appendixes

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Abstract: The content and qualities of a good software requirements specification (SRS) are described and several sample SRS outlines are presented. This recommended practice is aimed at specifying requirements of software to be developed but also can be applied to assist in the selection of in-house and commercial software products. Guidelines for compliance with IEEE/EIA 12207.1-1997 are also provided.

Keywords: contract, customer, prototyping, software requirements specification, supplier, system requirements specifications

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Or input: PEGS books

In a nutshell (2): Four books of requirements

Project Book P

P.1 Roles
P.2 Personnel characteristics and constraints
P.3 Imposed technical choices
P.4 Schedule and milestones
P.5 Tasks and deliverables
P.6 Risks and mitigation analysis
P.7 Requirements process and report

Goals Book G

G.1 Overal context & goals
G.2 Current situation
G.3 Expected benefits
G.4 System overview
G.5 Limitations and exclusions
G.6 Stakeholders
G.7 Requirements sources

Environment Book E

E.1 Glossary
E.2 Components
E.3 Constraints
E.4 Assumptions
E.5 Effects
E.5 Invariants

System book S

S.1 Components
S.2 Functionality
S.3 Interfaces
S.4 Scenarios (use cases, user stories)
S.5 Prioritization
S.6 Verification and acceptance criteria

Validation outputs

- Problem list
  - List of discovered problems in the requirements document
- Agreed actions
  - List of agreed actions in response to requirements problems. Some problems may have several corrective actions; some problems may have no associated actions

- Management tools for this
  - Requirements document with version tracking
  - Issue tracking support

Requirements reviews

A group of people read and analyse the requirements, look for problems, meet and discuss the problems and agree on actions to address these problems

Review checklists (1)

- Understandability
  - Can readers of the document understand what the requirements mean?

- Redundancy
  - Is information unnecessarily repeated in the requirements document?

Review checklists (2)

- Consistency
  - Do the descriptions of different requirements include contradictions? Are there contradictions between individual requirements and overall system requirements?

- Organisation
  - Is the document structured in a sensible way? Are the descriptions of requirements organised so that related requirements are grouped?

Review checklists (3)

- Conformance to standards
  - Does the requirements document and individual requirements conform to defined standards? Are departures from the standards, justified?

- Traceability
  - Are requirements unambiguously identified, include links to related requirements and to the reasons why these requirements have been included?

Checklist questions

- Is each requirement uniquely identified?
- Are specialised terms defined in the glossary
- Does a requirement stand on its own or do you have to examine other requirements to understand what it means?
- Do individual requirements use the terms consistently
- Is the same service requested in different requirements? Are there any contradictions in these requests?
- If a requirement makes reference to some other facilities, are these described elsewhere in the document?
- Are related requirements grouped together? If not, do they refer to each other?

Ten Tests for Requirements

Reading: https://www.volere.org/ten-tests-for-requirements/

1. Does each requirement have a fit criterion that can be used to test whether a solution meets the requirement?
2. Is every requirement in the specification relevant to this system?
3. Does the specification contain a definition of the meaning of essential terms within the specification?
4. Is every reference to a defined term consistent with its definition?
5. Is the context of the requirements study wide enough to cover everything we need to understand?
6. Does the requirement contain a rationale?
7. Have we asked the stakeholders about conscious, unconscious and undreamed of requirements?
8. Does the specification contain solutions posturing as requirements?
9. Is the stakeholder value defined for each requirement?
10. Is each requirement uniquely identifiable?

Summary

- **Requirements validation** should focus on checking the final draft of the requirements document for conflicts, omissions and deviations from standards.
- **Reviews** involve a group of people making a detailed analysis of the requirements.
- **Checklists** can support validation tasks

Dilbert and Validation