3-2016

Requirements Quick Notes

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A short introduction to requirements and their role in system development. Includes industry definition of requirements, overview of basic requirements process including numbering of requirements, ties to testing, and traceability. An introduction to requirements quality attributes (correct, unambiguous, etc.) Includes references to requirements process, numbering, and quality papers.

What is a requirement?

requirement. (From Reference 3)

(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).

Atomic requirements / Numbered requirements

Each individual or atomic requirement represents a single capability of the system. An atomic requirement does not need to be decomposed. A system will either fully satisfy or completely fail to meet an individual atomic requirement (there is no "partial" meeting of the requirement). It is unlikely that a system will "partially" implement an atomic requirement.

Tests tied to atomic requirements will clearly indicate a pass or fail (no middle ground). It may be functional and/or non functional requirement. It may include attributes and constraints.

Requirement number format: Atomic requirements are each given unique numbers. Requirement numbers are not reused if a requirement is removed. Atomic requirements are integer numbers (e.g. Requirement 2). They need not be sequential. Once assigned they never change.

The current total number of atomic requirements is an important software engineering metric.

Requirement numbers are not the same as paragraph numbers in a requirements document (although the two can be linked, e.g. Requirement 7 is in section 3.4.1 of the requirements document).

Quality Attributes

The full requirements document and each individual atomic requirement should be:

1. Correct
2. Unambiguous
3. Complete
4. Consistent
5. Ranked for Importance
6. Verifiable
7. Modifiable
8. Traceable

For more details and definitions see Reference 2, section 4.3. For an expanded list of quality attributes see Reference 1.

Additional Information

Bad and low quality requirements are a very common cause of system failure and lack of development completion.

Natural language is still the most used method for documenting requirements; natural language is ambiguous.

Often a use case is related to one or more atomic requirements; use cases and requirements may be developed together or one after the other.

A glossary of common terms as used in the requirements is useful.

Each atomic requirement should be testable and it should always be clear and obvious if or how the test should pass.

Requirements errors: "Knowledge errors are caused by not knowing what the true requirements are. Specification errors are caused by not knowing how to adequately specify requirements. … There is little excuse for specification errors." (Reference 1)

Requirement should usually not include design or project information (e.g. be available in 3 months, a list of software components).

References

(IEEE Xplore must be accessible, for example from your university library, to access these links)

1. A Davis, et al., Identifying and measuring quality in a software requirements specification. http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=263792

2. IEEE Recommended Practice for Software Requirements Specifications, 830-1998. http://ieeexplore.ieee.org/servlet/opac?punumber=6146377

3. IEEE Standard Glossary of Software Engineering Terminology, IEEE Std 610.12-1990. http://ieeexplore.ieee.org/servlet/opac?punumber=2238

Further Information

Atomic Requirements

http://tynerblain.com/blog/2010/09/14/atomic-requirements/

http://tynerblain.com/blog/2006/06/14/writing-atomic-requirements/

Requirements Numbering

http://www.smartmatix.com/Resources/RQMTipsTraps/NumberingTraps.aspx

RequirementsQuickNotes
v1.0 (original) March 2016
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