

Title of Paper

Ready for Testing : Determining Requirements Quality

Presenter

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Instructional Level

Introductory Intermediate Advanced

Target Group

Test practitioners and engineers, researchers, software and test managers, QA managers, development managers and other professionals interested in building and delivering better software.

Keywords

- Requirements Based Testing
 - Requirements Quality
 - Consistency of Requirements
 - Testability
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Abstract

The requirements document set is the basis both the development of a software system and a final test of the developed software system. The job of the testers is to understand the (often large volume of) requirements in such a way that they can create test scenarios. A test scenario is a script that describes step by step what a tester should do with a system to reach the desired end result. To achieve such a detailed recipe and to uniquely decide what the desired end result is, the requirement documents must be of high quality. More and more testers are asked to judge the quality of the requirements document set.

Quality in this respect means three things:

1. The requirements documents must be as detailed as possible.
2. The requirements documents must be uniform.
3. The requirements documents must be consistent and complete

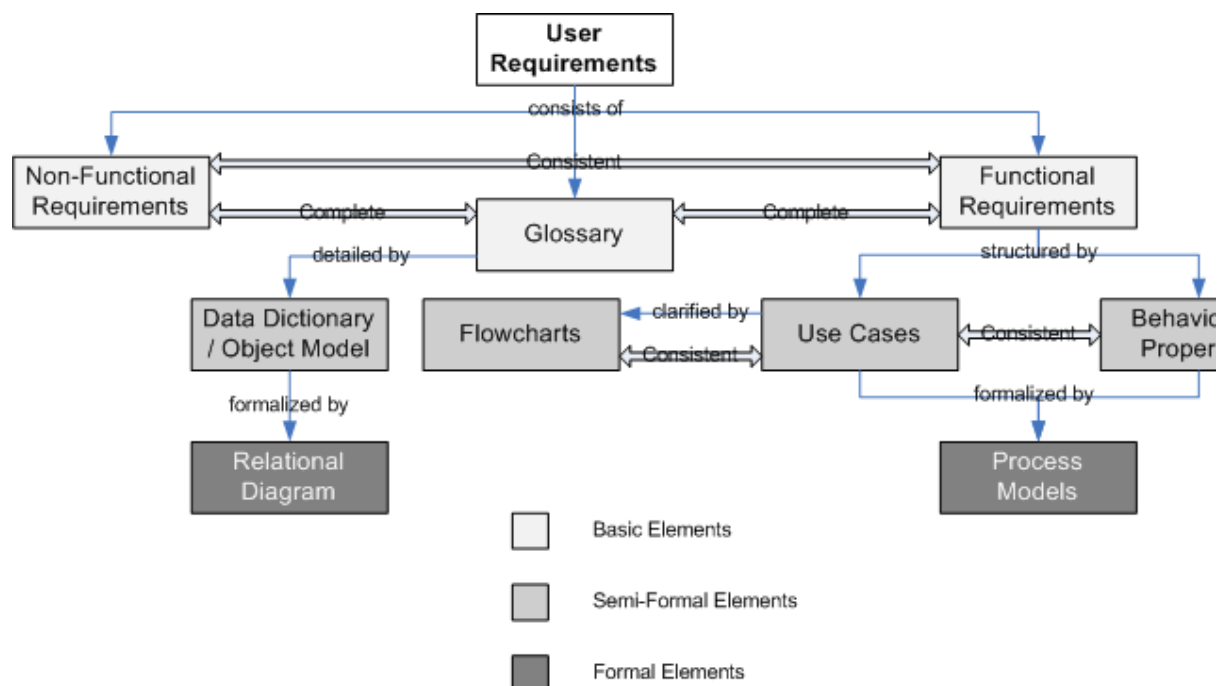
The more detailed the requirements are, the less the testers have to “fill in” themselves. For highly formalized requirements descriptions some scenarios might be automatically derived, which will save the tester work. If the document set is not uniform (e.g. it contains multiple use cases that each use their own template) it is much less readable for the tester. It will take longer to comprehend and understand the requirements. Consistency and completeness is an obvious demand. It must not be possible to interpret the requirements in more than one way and it must not take a lot of time to collect missing information.

If testers are involved in the review process of the requirements they must give a verdict on those requirements. To structure these verdicts LaQuSo has translated the intuitive notion of requirements quality (items 1 till 3 above) into a more structured model, which is part of our overall certification framework. For the three aspects of quality we discern different levels of achievement (see table).

A1	Detailedness*
0	Some elements are missing
1	All basic elements are present
2	Semi-formal elements have been added
3	Formal elements have been added
A2	Uniformity
0	No uniformity
1	Uniform requirements
2	Style complies to a company standard
3	Style complies to an industry standard
A3	Consistency
0	Faults are detected
1	Manual review has not detected any faults
2	Review with tool support has not detected any faults
3	Formal verification has not detected any faults

* See Figure

For each level we have collected a list of specific checks the reviewer must perform on the requirements. If all checks yield a positive answer, the level has been achieved. For a higher level, also all checks of the lower levels must be met.



In the Figure the different elements on the different levels of detailedness are shown. All of these elements have relations with each other and on these relations the checks under Consistency (see table) are done. Examples of such checks on different levels are:

- No two requirements or use cases contradict each other
It is not the case that one requirement describes property P and another requirement describes property Not P. It is not the case that one use case describes an order of steps and another use case describes a different order of steps. Etc.
- No ambiguity
Each ambiguous or unclear term from the requirements is contained in the glossary.
- No useless objects and all objects specified
Each object is mentioned in the requirements and all objects mentioned in the requirements are

contained in the object model.

- Life-cycle coverage of the objects

For each object the create-, read-, update- and delete operations are covered in the requirements or are not applicable.

- The requirements do not contradict the behavioural properties

None of the behavioural properties is rendered impossible by the requirements.

- The functional and non-functional requirements do not contradict

The use cases or functional requirements do not render the non-functional requirements impossible.

These checks may seem rather obvious, but our requirements validation experience in industrial requirements projects has shown many similar violations.

The model and the checks we present are easy to understand and to apply. This will increase the quality of the requirements such that the tester has an easier job to understand the requirements and test against them. The LaQuSo approach can be used by requirements engineers and testers in their daily work, but is also suitable to serve as a certification framework for third parties. As a certification framework it clearly indicates what checks are to be done and for the audited party it is clear what needs to be done to achieve a higher level of requirements quality.

Biography

Ir. Petra Heck is a researcher at the Laboratory for Quality Software (LaQuSo) at the Eindhoven University of Technology. She holds a Master's degree in Computer Science and Technology from the same university. During her former job at the IT department of a large pharmaceutical company, she has worked as a software engineer and project leader. In the projects she was responsible for and participating in all phases including testing. At LaQuSo she now performs case studies: projects for companies in all phases of the software development cycle to demonstrate the practical use of scientific techniques. The case studies are paid for by the companies and are intended to solve their practical problems. At the same time the case study is a means for LaQuSo to test and evolve its scientific techniques and tools. Recent projects were on test management, validation strategies, usability, and requirements verification. She is also researching the topic of software product certification

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