

Federal University of Rio de Janeiro

Software Testing and Non-Functional Requirements Literature Review

**LITERATURE REVIEW PROTOCOL:
SEARCHING SOFTWARE TESTING TECHNIQUES TO NON-FUNCTIONAL
REQUIREMENTS**

INICIAL LITERATURE REVIEW

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(On going document)

March, 2016

Review History

Date	Version	Description	Author(s)
-	0.1	Define inicial string (114 papers and 37 included)	Victor
11/06/2015	0.2	Search String Improvement	Guilherme e Victor
18/06/2015	0.3	Search String improvement (81 returned, 58 included, 10 not found, and 13 excluded)	Guilherme e Victor
01/03/2016	1.0	Updating literature review	Guilherme e Victor
18/04/2016	1.1	Inserting information about include/exclude process e.g. amount of included/excluded paper.	Victor

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1. Main Research Scenario

Software testing aims to reveal inconsistencies between system requirements and implemented system. Thus, inconsistencies revealed can be fixed improving system quality.

However, despite several works emphasize non-functional requirements (NFR) importance, there are an insufficient amount of addressing this type of requirements.

Lack of NFR evaluation may be the cause of low quality systems that do not meet users need. In this way, the overall goal of this work is investigate how NFR can be evaluated by software testing.

This review is a second step to achieve the overall goal and aims to identify what non-functional requirements are covered by software testing and at what level the NFR are covered by software testing.

With the results of this review and review performed to identify important NFR at hand, we can matching results and identify what are important NFR uncovered by software testing.

It is worth mentioning that this is not a systematic literature review, but it follows search string creation methodology by observing another to improve synonyms and criteria to include and exclude papers.

2. Research Protocol

Search String is build to return papers about non-functional requirements software testing using PICO (pai et al., 2004) principle in the way that synonyms are separated by logical connector “OR” and terms that compose the string are separated by “AND”. Thus, the first part of search string is composed by term “Non-Functional Requirements” and it synonyms separated by operator “OR” and second part by “Software Testing” and synonyms separated by operator “OR”.

In the next execution of protocol, it is planned evolve the String to a PICO approach (Pai et al., 2004).

2.1 Question Focus

This study research objective is to identify relevant non-functional requirements.

2.2 Question Quality and Amplitude

- **Problem:** Non-functional requirements were neglected by software testing works. So it is important to identify what are non-functional requirements that don't have proposed software testing procedure or technique.

- **Question:**

Main Question:

What are the approaches used to testing non-functional requirements?

- **First Part:** Software Testing

Keywords: "software test design" OR "software test suite" OR "software test" OR "software testing" OR "system test design" OR "system test suite" OR "system test" OR "system testing" OR "middleware test" OR "middleware testing" OR "property based software test" OR "property based software testing" OR "fault detection" OR "failure detection" OR "GUI test" OR "Graphical User Interfaces test" OR "test set" OR "non-functional testing" OR "model based testing" OR "test case" OR "testing infrastructure" OR "testing approach" OR "testing environment"

- **Second Part:** Non-Functional Requirement

Keywords: "non-functional requirements" OR "non-functional software requirement" OR "non-behavioral requirement" OR "non-functional property" OR "quality attribute" OR "quality requirement" OR "software characteristic"

- **Excluded Keywords:** None

- **Full String:** ("software test design" OR "software test suite" OR "software test" OR "software testing" OR "system test design" OR "system test suite" OR "system test" OR "system testing" OR "middleware test" OR "middleware testing" OR "property based software test" OR "property based software testing" OR "fault detection" OR "failure detection" OR "GUI test" OR "Graphical User Interfaces test" OR "test set" OR "non-functional testing" OR "model based testing" OR "test case" OR "testing infrastructure" OR "testing approach" OR "testing environment") AND ("non-functional requirements" OR "non-functional software requirement" OR "non-behavioral requirement" OR "non-functional property" OR "quality attribute" OR "quality requirement" OR "software characteristic")

2.3 Source Selection

- **Sources Selection Criteria Definition:** Works presented as articles, available on the web.
- **Studies Language:** English.
- **Source Identification**
 - **Source Search Method:** Search through Scopus web search engines.

2.4 Studies Selection

2.4.1 Studies Definition

- **Studies Inclusion and Exclusion Criteria Definition:**

Inclusion Criteria:

- Presents a software testing procedure, technique, or any other type of proposal about non-functional requirements software testing;

Exclusion Criteria:

- Not being available; AND
- Studies in duplicity; AND

2.5 Execution and Results

Table 3: Summarized Results Reading Title and Abstract

Stage	Number of articles
Articles found	331
Included	70
Not found	0
Excluded	261
Total Included	70

Table 4: Summarized Results During Extraction

Stage	Number of articles
Included	70
Excluded	26
Manual Included	3
Total Extracted	48