PROTOCOL

A Systematic Literature Review on the Effect of Code Smells on Non-Functional Attributes of Source Code

1. Background

a) Motivation

- We are interested about how big is the impact of code smells in a project, for understanding if is really worth to work for individuate and refactor code smells or this operation can be neglected.
- During the review of the literature, it was found that there is no systematic review of the influence of the code smells on the NFA of source code. Therefore, we study research using an existing database to reduce research gaps.

b) Goals

- Conduct a systematic analysis of academic articles on "The Effect of Code Smells on Non-Functional Attributes of Source Code".
- Analyze what type of code smells impact the NFA of Source Code.

c) The research questions

1. *RQ1: In which way a Code Smell Impact on NFAs?*
2. *RQ2: How the connection between code smells and NFAs was determined?*
3. *RQ3: Are all code smells impactful on NFAs?*

2. Search Strategy

a) basic strategy: automated search, snowballing;

b) key words: ("Non-functional attributes" OR "NFA" OR "Non-functional requirements") AND ("code-smell" OR "bad smell" OR "code anomalies") AND ("effect" OR "impact" OR "influence") (“Anti patterns” OR “APs” OR “Anti-pattern”);

c) resources: IEEE Xplore Digital Library, ACM Digital Library, SCOPUS, and Elsevier.

3. Selection Criteria

a) Inclusion criteria:

1/ Publications should be “journal” or “conference”;
2/ Publications published from 2010 January;
3/ Works that involve some empirical study or present “lessons learned”;
4/ If several journal articles report the same study, the most recent article should be included.

b) Exclusion criteria:

1/ Publications published before 2010;
2/ Research-based solely on expert advice, without convincing evidence;
3/ Studies that are focused only on code smells or on NFA of source code without any discussion regarding the relationship and/or influence that the first exert on the second;
4/ If several journal articles report the same study, the last study should be excluded.

4. Study Quality Assessment

a) Is there a clear statement of the research objectives?
b) Is the document based on empirical evidence?
c) Are the estimation methods well defined and deliberate?
d) Are methods and tools for determining the effects of code smells described?
e) Have certain types of code smells been analyzed?
f) Have types of NFAs been analyzed?
g) Are the effects of code smells on the NFA determined?
h) Are the limitations of study analyzed explicitly?

5. Data Extraction

a) a design data extraction form in the form of a table, which includes the following information:

☑ identification number;
☑ year;
☑ title;
☑ objectives or aims;
☑ code smells;
☑ analysed projects;
☑ research questions and respective answers;
☑ In which way a Code Smell Impact on NFAs?
☑ How the connection between code smells and NFAs was determined?
☑ Are all code smells impactful on NFAs?

6. Synthesis

a) the form of analysis to be used: narrative, tabulation, meta-analysis;
b) visualization techniques such as line graph, box plots, pie charts and bar charts.

7. Result

The final phase of a systematic review involves writing up the results of the review and circulating the results to potentially interested parties. Results will include answers to research questions.

8. Timetable

Stages	*Completion date*
1. Specify Research Questions	10.04.2020
2. Develop Review Protocol	16.04.2020
3. Identify Relevant Research	22.04.2020
4. Select Primary Studies	30.04.2020
5. Asses Study Quality	12.05.2020
6. Extract Required Data	22.05.2020
7. Synthesize Data	27.05.2020
8. Write Review Report	10.06.2020
9. Validate Report	12.06.2020