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Topic: Maintainability

The review:

The paper describes the importance of considering maintainability in the software development process. It refers to measures and metrics that lead to better maintainability throughout the development process. It covers all phases of development, from project initiation and requirements writing to system use and subsequent maintenance. Assessments are given for each metric, and related research is used to explain when which measures might be useful to use. In addition, the advantages and disadvantages are weighed up for all parties involved, such as the stakeholders.

Major and minor issues that have been identified are listed section by section as follows.
The basic structure of the paper is neat and structured. The title is in two languages, which seems confusing. In addition, the annotations by the author's name seem misleading. The author should edit the header again. The rest of the structure is very clear and enables a simple understanding of the subject matter. In some paragraphs, the tenses are mixed. The author should take care to maintain a consistent tense, mostly present tense or perfect tense.

The **abstract** clearly explains the most important information about the paper and gives a good introduction to the topic.
Throughout the paper, some keywords are capitalized at one point and lowercase at another, which seems inconsistent. Sentence starters are usually worded very similarly and could vary more.
In the **Introduction** the term maintainability is explained very well. Also noticeable is the use of the word "then" in many sentences, which does not sound very formal, as a minor issue. Also, some sentences start with "As well as", “Now” and "And" which is also not very formally written. Here, the author could reformulate the sentence structure a bit to allow for an easier reading flow. Overall, the introduction is well written and addresses the main points.

In the **Methodology**, the relationship between maintainability and maintenance is well stated. It also explains well why metrics should be used and for what they are useful. What was not made clear is what criteria were used to sort out the papers when they were chosen for the selection. Here the author could explain in more detail which criteria were used for the search. In addition to mentioning the name of the authors, it would sometimes be helpful to mention the title of the study or paper in order to have a better overview of the topic area addressed and to be able to better classify the information. A minor spelling issue is in the sentence “And discussion an comparison of those in Section VII-A.”, where the statement is not clear.
All in all, the methodology part provides a good insight into how the author proceeded to get his results.

The **Related Work** part allows well via short summaries, what work has already been done and thus refers to what has already been researched and what the author wants to refer to. In general, the results that have already been researched and the advantages and disadvantages that currently exist could be discussed in more detail. Perhaps the section could be made longer and expanded.
Minor typos, spelling, grammar and phrasing issues in this section are mentioned in the following:
- “And discussion an comparison of those in Section VII-A.”, an?
- “The paper by Riaz et al [1] compares [..]”, point after at all is missing
- “[..] discusses problems with the maintainability index as.”, as?
- ”They then creates a new maintainability model.”, without s
- “The following paper mention other [..]”, mentions
- “In their paper Yongchang et. al. [..]”, without point after et

The **Background** section necessary to understand the paper is briefly and concisely listed.
A minor spelling issue is in the sentence “[..] should be know”, where know should have a n. Some words here are upper case from time to time and sometimes lower case, which is confusing for the reader. for example “Lines of Code Mean Time” and “natural language processing”.

In the part **Measures and Metrics for Maintainability** some metrics are explained. They are not explained in too much detail, which is a good thing, but they are not addressed superficially either. In the system control structure/Complexity part there is mentioned “V(g), Halstead’s E”, that is never mentioned before and therefore leads to confusion. The explanation of the interaction between machine and human is well done and shows the subjectivity that exists despite increasing digitalization. In the last section it is not clear which paper is supposed to show what exactly. The author could possibly mention the names of the papers or authors again, so that no confusion appears.
Minor typos, spelling, grammar and phrasing issues in this section are mentioned in the following:
- “Reuse (The percentage of lines of code of software system hat have been [..]”, the “t” is missing
- The representation of the enumeration changes from colon to round brackets starting with "reuse", which looks inconsistent.
- Figure 2 is written under Figure 1, which is confusing.
- “They then quantify the the maintainability [..]”, too many “the”
- After section VI.A a point is missing
- “Based on Oman et al. [7] [8] [..]”, the presentation of two cited papers should be in the same brackets
- “[..] other new language constructs etc.”, a point is missing at the end
- “with LOC being the lines of code including comments and LOC being [..]”, the second LOC should be LOM
- The table representation is imported as a photo, which might look nicer as its own table. Moreover, the table could be explained in a little more detail, to explain the benefits of showing the table.
- “They also propose guidelines that can be uses to group [..]”, uses should be used

The **Approaches for high maintainability** section is very well introduced in the following content. Other software problems are mentioned, but it is not said which ones are meant. Here the author could explain more precisely what the problems are in this area. The advantages that are mentioned are well explained, but here mainly the faults themselves are talked about and the connection to maintainability is not made clear. Figure 5 illustrates the importance of SCRUM, but the figure is hardly explained. Here the author could go into the content of the figure with a few sentences.
Minor typos, spelling, grammar and phrasing issues in this section are mentioned in the following:
- “The model driven architecture development processes used in the paper is based on figure 4”, process
- “maintenance and development are different process that can not [..]”, should be processes

In the **Discussion** chapter the connection of code and comments is especially well explained. Also, revisiting faults and fault-proneness, which was said once at the beginning, is very good. In addition, the cost savings are very clearly shown and summarized with examples. As a further point, it can be noted that it is well explained in which phases of development maintainability plays an important role.
Minor typos, spelling, grammar and phrasing issues in this section are mentioned in the following:
- “To include these factors, developers or expert have[..]”, experts plural
- “[..] from Rehman et al. [16] 4 can improve [..]”, 4?
- “[..] the requirements have to be change,[..]”, should be changed
- “[..] reductions in development cost for the company.”, should be costs

The **Conclusion** is very short and the author could go back to the content of the introduction and draw a conclusion in a couple of sentences. Also, the author could give the reader one last thought to go along with his paper that stays in mind, just as maintainability should always stay in mind. The structure of the paper is very good throughout the sections, making it easy to read. All in all, the paper was also written in a very understandable way.