

Measuring Software Engineering

Masanari Doi

Student ID 19313167

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1. Introduction

This essay will assess and analyse some aspects of measurement of software engineering. Firstly the ways of measurement of software engineering are examined with two examples in order to inspect whether they are practical or not. Secondly, the report will focus on the platforms and explain what it is and why it matters. Consequently, an example of algorithms used in a society will be evaluated with advantages and disadvantages. Finally, it can be seen that how can software engineering measurement be associated with ethical problems.

2. How can software engineering be measured?

In this section, this essay will discuss measuring the productivity of software engineering. Regarding the benefits of measuring productivity, according to Steve McConnell(2021), “organisations would need to measure how productive their Software Engineers teams are, in order

- To develop competitive analyses and benchmarks
- To track progress over time
- To reward high performers
- To determine resource allocation
- To identify and spread more productive development processes across the organisation”

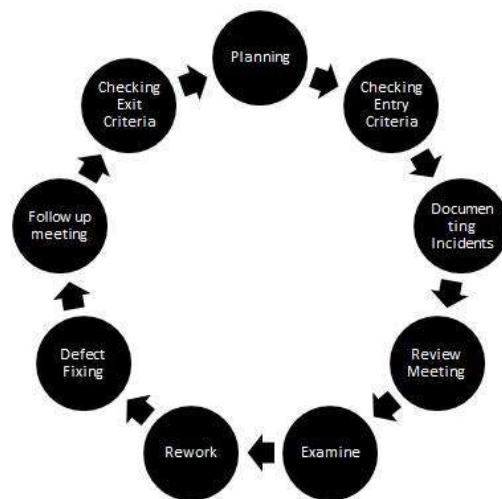
It can be said that the measurement of software engineering is essential to improve the efficiency of the work in the organisation.

2.1 Reviews

One of the examples of software engineering measurement methods is reviewing the work. This is defined as a systematic examination of a code or work by the people in the team for decreasing errors

or bugs in an early stage of the software development life cycle. Documents such as code, requirements, system designs, test plans and test cases are verified by this review method. (tutorialsPoint, no date) By utilising this method, it has been said that the efficiency and productivity of a development team are enhanced and it becomes possible to detect defects in the initial stages, which improves timescales. Moreover, it can be said that, because of enough time conducted in the early stages, testing costs and time are decreased. (tutorialsPoint, no date) Therefore, if the developers appropriately conduct reviewing, find some errors and improve the work, it would be true that the teamwork would be more efficient and productive.

Review Stages - Workflow:



(figure 1, review Stages, tutorialsPoint, no date)

2.2 Lines of code

It is said that for the measurement of software engineering, lines of codes is useful and practical. Employing lines of codes, it would be possible to examine the size of the project, and the lines of the codes is easy to check. Moreover, the code having shorter lines would be thought easy to interpret. (Peipman, 2010) However, for some aspects, it is said that the lines of code is not a useful method to

measure the productivity of the code. For example, some code needed to be read by a teammate who needs to understand how the code is working or where the developmental point is. However, lines of code can not show us these points. Therefore, it would be true that to concentrate on the aspect of easiness of the code is more important than the lines of codes. (Opidi, 2020) Take two JavaScript codes which have else-if statement below for example.

```
const firstNumb = 100;

let secondNumb;

if (firstNumb > 50) {
  secondNumb = "Number is greater than 50";
} else {
  secondNumb = "Number is less than 50";
}
```

```
const firstNumb = 100;

let secondNumb;

const secondNumb = firstNumb > 50 ? "Number is greater than 50" : "Number is less than 50";
```

(Figure 2 & 3 , sample JavaScript Code, Opidi, 2020)

These two codes do the same work but the first one clearly has many more code lines. However, it can be said that the first one is easier to translate than the fewer codes of the second one. It would be needed to make the code readable because making unreadable codes seems to let team members make more effort to understand the code and decrease the efficiency. Therefore, it would be true that the lines of code cannot provide detailed information, such as how easy or complex the code is to read. It can be more practical and important to focus on readability rather than the number of lines of codes. (Opidi, 2020)

Having said that, as an advantage of shorter lines of code, it can be true that if we only need one line for the if-else statement, the code in figure 3 can save time. Moreover, it can be obvious that fewer lines of the codes is more efficient than more lines because longer codes would increase the possibility of causing bugs to delete, and finding them seems much more difficult in a long code. It may be true that fewer lines decline the number of tasks such as decreasing the bug count. Furthermore, the long lines make a huge amount of variables that the developers have to name, which would take a long time and make other developers confused. Therefore, if the code is readable and easy to interpret, shorter lines of code seems preferable. (Opidi, 2020)

However, if it is possible to know the size of the project (even if it has shorter lines), it does not tell us how easy or complicated it is to understand. As it is mentioned, only if the code is easy to read, the lines of code should be taken into account by developers to increase efficiency. It is impossible to determine whether the codes are interpretable only by seeing the number of lines of the code. Hence, the lines of code would not be regarded as a useful method.

3. Platforms

It has been said that many organisations use software platforms as a useful tool to help their teamwork. In this section, this essay will focus on what the platform is, and analyse how it works with examples.

The software platform is defined as hardware and software architecture that behaves as a basis for various applications, processes or technologies. (GeeksforGeeks, 2020) One of the advantages of using platforms is that it enables us to make data readily available in an organisation. Moreover, even

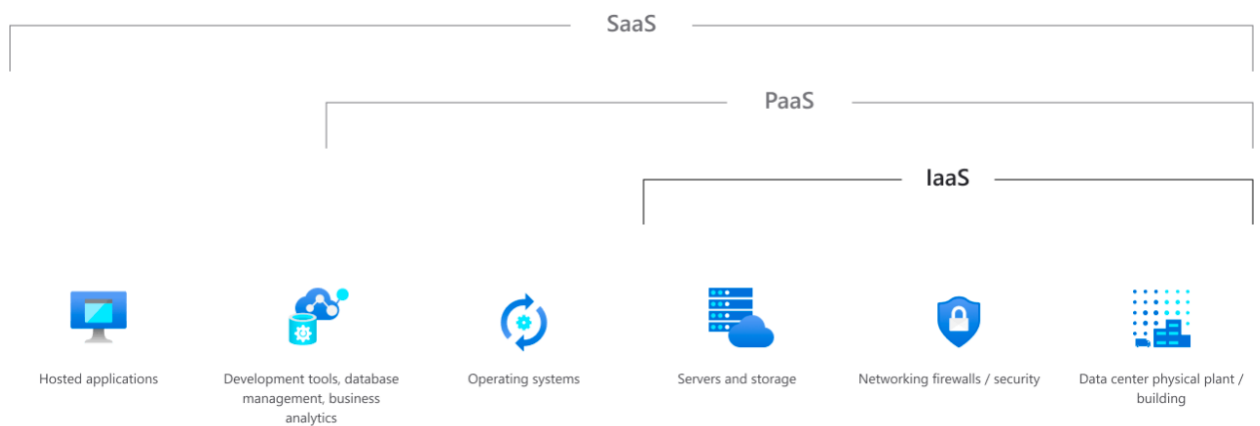
non-developers also can generate and preserve the latest ecosystems of technologies. (Wangen, no date)

3.1 Microsoft Azure

One of the examples of Platforms is Microsoft Azure. It is a cloud platform that allows us to build, deploy and manage services and applications. “Azure lets us add cloud capabilities to our existing network through its platform as a service (PaaS) model, or entrust Microsoft with all of your computing and network needs with Infrastructure as a Service (IaaS).” (Sumo, 2016) One of the examples of the services Microsoft Azure provided us with is virtual machines. It generates Microsoft or Linux virtual machines from various kinds of marketplace templates or from images customers make. By means of these virtual machines, customers’ apps and services can exist in their data centre. (Sumo, 2016)

An infrastructure Microsoft Azure gives us is called Infrastructure as a service (IaaS). It is a type of cloud computing service that needs essential compute, storage and networking resources on demand, on a pay-as-you-go basis. IaaS is a part of several cloud services, such as Software as a service (SaaS), platform as a service (PaaS) and serverless. (Microsoft, no date)

If a certain organisation migrates their infrastructure to the IaaS solution, maintenance of on-premises data centres is decreased, money on hardware costs is reduced and the organisation can get business insights. IaaS can decrease the possibility we face the cost and difficulty of purchasing and controlling physical servers and datacentre infrastructure. Every resource is offered separately, as each of them is an individual service component, which makes it possible to pay for a certain resource we only need. (Microsoft, no date)

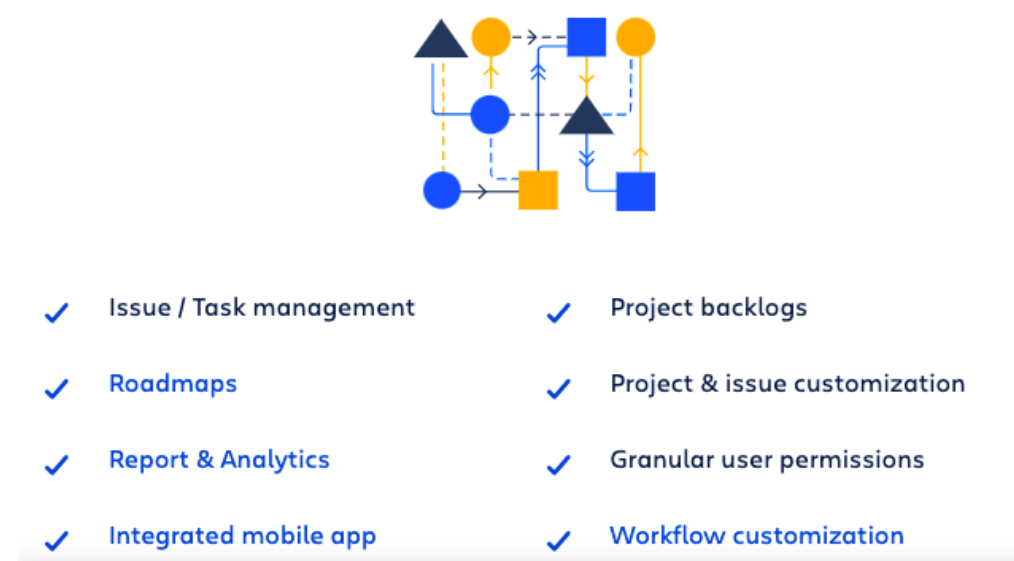


(figure 3, A diagram illustrating a relationship of Saas, Paas and Iaas. Microsoft, no date)

3.2 Jira

Another example of the platform is Jira Software, which is a product designed to help manage teamwork in a way that it detects bugs and errors, and help various kinds of use cases, such as requirements, test case management and agile software development. (ATALASSIAN. No date)

For example, for project management teams, Jira software can make a project outline or template, or help the teams generate their own work through schemes because this software can fit any sort of project. Jira can track the tasks which should be accomplished to complete the entire work. This software can let administrators choose who is able to check how tasks are being performed. Jira can produce the reports as project information to see and evaluate the progress or efficiency of the tasks the team is conducting.



(figure 4, chart of how Jira helps teamwork, ATALASSIAN, no date)

4. Algorithm

One of the examples of computation that could be done over software engineering data, in order to profile the performance of software engineers is Machine learning. This is defined as a branch of artificial intelligence and computer science which tries to learn as a human by concentrating on the usage of data and algorithms, which leads to more accurate and correct data analysis. (IBM, 2020)

In the growing field of data science, machine learning is an essential technology. According to IBM, “Through the use of statistical methods, algorithms are trained to make classifications or predictions, uncovering key insights within data mining projects. These insights subsequently drive decision making within applications and businesses, ideally impacting key growth metrics. ” The market demand for data scientists would be rising because big data keeps expanding and growing.

It would be said that machine learning is used for many aspects in a society. For example, the Financial Services sector, such as banks use machine learning for detecting crucial insights in data and

try to avoid fraud. Another example of this is health care. It uses this technology to check a patient's health status in real-time by using wearable devices and sensors. Furthermore, in order to enhance diagnosis and medical treatment, many doctors or medical experts utilise this technology to evaluate the data.(sas, 2021)

However, it is said that machine learning has some developmental points. One of the examples of this is that it requires time and space. When it works on analysing some data or algorithms, it takes a long time to complete. Moreover, it also consumes a large space of CPU power. It is obvious especially when the data is large and advanced. (TechVidvan, no date) Even if machine learning is a useful technology to get accurate data, taking a long time to analyse large data would be a problem. For example, if medical doctors need urgent data for some symptoms or novel diseases, the slow work of machine learning cannot be reliable. Nonetheless, it can be a trivial weak point because data accuracy machine learning can provide us with is crucial and highly needed in data science. In a medical place or bank, only correct data is prioritised.

5. Ethics

In this section, ethical problems which would be arisen from the use of software engineering measurement will be examined.

One of the examples of this can be caused by Jira. As it is mentioned, it can let administrators determine who can check how the project is progressed in detail. The point is not that administrators can choose who can see the project but that someone can observe each person's work. There would be a belief that if people feel they are monitored anonymously it causes pressure to be forced to do excellent work and maybe unpleasant for their mental health. Furthermore, in terms of observation, the review, I mentioned as the measurement of the work, can also force people to do great work

because they have to show their work. If some teammates cannot meet the criteria, there is a possibility that they feel depressed and stop working. Although it is said that observation, review or some levels of pressure improve and enhance the efficiency of project work, it should be considered that some people have weak hearts and are mentally easily come to be depressed.

6. Conclusion

In conclusion, it can be seen that there are some features of measurement of software engineering. This essay showed in what way the software engineering are measured, and whether they are useful or not depends on the occasion. Moreover, two platforms, Microsoft Azure and Jira were introduced with explanations of why they matter. Consequently, as an example of the algorithms, machine learning was examined and it has pros and cons. Finally, the ethical problems causing mental health issues associated with software engineering are considered.

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