Measuring

Software Engineering

Report

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# Introduction

Software engineering has become one of the most dominant and relevant engineering disciplines of the modern era. Traditional industries such as transportation, communication, entertainment, and hospitality are gradually being transformed or outright disrupted by the software revolution. As software engineering is ingrained into many companies and processes, becoming a vital part of countless businesses and enterprises, a simple but profound question has been raised: can we measure it?

It is the ubiquitous temptation of entrepreneurs, managers, investors, and team-leads alike: can we measure the performance of a team, quantify quality of a product, calculate the efficiency of an employee. The success of the modern business and managerial models are arguably based on the usage of useful and actionable metrics. As software engineering quickly develops and becomes such an important discipline, it is inevitable that the same questions are asked. Even software engineers themselves are usually interested in their own performance.

However, is this possible? Are these useful questions to ask? Can they even be answered with any degree of accuracy or actionability? What are the ethical consequences of measuring software engineers as individuals and teams with the data and methods we have available? What conclusions can we draw from these measurements and how should we act on them? On this report, I will explore these questions and try to spark a discussion on the most important topics of interest.

# Measuring Engineering

In this section I will explore what is meant when talking about measuring software engineering. I will discuss several aspects and dimensions that could be measured, together with the motivation and relevance for such measurements.

## Measuring Code

The first aspect that comes to mind when measuring a process such as software engineering is measuring the outcome or product of the process. This can be thought of in two ways: the end-product that is the software shipped to the client, and the source code which is the raw artifact created by the software engineering process. The multiple ways of measuring the efficiency, impact, and success of a product in the market have been thoroughly researched and discussed in literature. I will not dwell in them since they are also dependent on extraneous factor such as business planning, product design, marketing, etc. which are outside the scope of this report. The analysis of the source code is of much more interest to the measurement of the software engineering in this case, even if it has many limitations.

When thinking on how to measure software engineering through the source code generated, several metrics quickly come to mind. We could measure things such as lines of code written, or changed by an engineer, quality of the code, idiomaticity, or complexity. Some of these, such as the lines of code per commit, are readily available from version control systems such as git. Others, such as code complexity, can be calculated through certain mathematical methods such as cyclomatic complexity, even if the accuracy is arguable.[[1]](#footnote-1) In general, these metrics are easy to calculate and can give a general picture on the work of a software engineer or team. However, they are rather useless without further context. Different programming languages, because of their syntax and idiomatic practices, are more or less verbose and have different average line counts. These can further vary due to specific company style guides and best practices. Complexity can be difficult to properly quantify, and often depends on a balance between efficiency, readability, and functionality.

Finally, these measures are easy to game. If a developer is being measured by lines of code written, they will write more verbose and possibly inefficient code. If they are being judged by the number of commits, they will just make more micro-commits. In general, using these metrics as a main source of evaluation for software engineers has unexpected and undesired effects, rendering them useless by themselves beyond giving some nice statistics about the work of a developer.

## Measuring Flow

1. <https://www.perforce.com/blog/qac/what-cyclomatic-complexity>, accessed 20/12/2021 [↑](#footnote-ref-1)