Measurement of the Software Engineering Process

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Introduction

Without measurement there can be no measurable improvement. Proper measurement of productivity and performance of engineers can produce data that can be analysed and aid in the further improvement of productivity. The measurement of the software engineering is evolving and adapting new techniques that analyse more than just the work that engineers produce but also the engineers' personalities and lifestyles. Data on the environment in which engineers work in is also valuable in measuring their performance. Furthermore analysing the environment in which they live could also hold insights into the measurement of their performance. New techniques in the measurement of the engineering process come with ethical concerns. Steps must be taken to prevent the infringement of rights of the engineers and not negatively impact their performance in the search for data on their productivity.

Employees

When measuring the performance of an individual's software engineering performance, many basic techniques come to mind. The number of lines of code a person has written and the amount of commits they have made can be compared to the average of other developers. However, this can become a poor form of measurement when the engineers become aware of the technique. It can lead to some developers altering their coding technique to simply increase the count in lines of code. They may rewrite portions of code to extend over more lines to make it seem to their employer that they are more productive than they actually are. They could also commit too often and when little changes to a project have been made. This can skew the accuracy when measuring the actual performance of the company's engineering process. Peer review may be implemented within a team to prevent engineers doing these things to ensure that it's beneficial to analyse the data. If an engineer knows that one or more of his peers will review the code he has written, they are less likely to try make it look like they are doing more work than they actually are.

A developer who normally meets their deadlines but suddenly starts missing them could have a problem with the project they are working. They could be inadequately trained in the software or language that needs to be used to complete said project. By identifying early on that they are struggling, training can be provided for them to bring their productivity back to their normal levels or beyond. A sudden drop in performance could be the result of many other reasons too. Personal issues could also be the reason for the decline in their productivity. By having data that measures their performance, the human resources manager could hold a meeting with the developer to help resolve the issue and restore their performance at work to a normal level.

Measuring the correlation between work output and non-work related use of company machines can be beneficial in the measurement of software engineering performance. If a developer has below acceptable levels of productivity and they regularly are browsing things that are unrelated to their job, it may be in the interest of the company to restrict access to websites such as Facebook and Reddit in the workplace.

“Research by IDC shows that up to 40% of employee Internet activity is non-work related, costing employees thousands of dollars in lost employee productivity and increased exposure to outside attacks of the corporate network.”
-http://www.currentware.com/should-companies-restrict-web-access/

Implementing a system that blocks websites could lead to lower staff morale which could negatively impact the productivity of an engineer who feels like their bosses don’t trust them. A company could use the system in a trial run over a period of time and analyse the difference in commits made by developers before and after the system was implemented.

Personal Software Process (PSP)

The Personal Software Process (PSP) is a development process that helps engineers understand and improve their performance by tracking their predicted and actual output. Engineers can improve their estimating and planning skills by using the Personal Software Process. This can lead to them meeting more deadlines and increasing the quality of their projects.

Name: Jill Fonson **Program:** Analyze.java

Date	No.	Type	Inject	Remove	Fix time	Fix defect no.	Description
9/2	1	50	Code	Com	1	1	Forgot import
9/3	2	20	Code	Com	1	2	Forgot ;
9/3	3	80	Code	Com	1	3	Void in constructor

Here a developer is keeping track of errors they have made in their program. By recording their errors, they will reduce future occurrences of similar errors. A typical PSP script has four core measurements

- The size measure for the task, such as commits or lines of code
- The effort needed for the task, usually the time taken to complete.
- The quality, measurement of the number of defects in the project.

- The comparison of planned vs actual milestones.

PSP skills can be transferred and used in a Team Software Process (TSP). It follows the same principles of a PSP but is applied to a team environment to measure the performance of a team.

Health Monitoring

The measurement of data relating to employees' health can identify unhealthy habits and lifestyles that could be impacting productivity. It may be considered unethical for a company to collect data on their employees' health. A company is unlikely force employees to let them monitor their health, however, they could implement an opt-in system that monitors things like heart rate, the amount of time spent sitting at a desk and physical activity done that day. The company could provide a fitbit that connects to an app on the developer's phone. It would be at their discretion what information they want to disclose to the company. This would be an ethical way of monitoring the health of engineers within a company. They could also provide exercise facilities on the premise such as a gym which may also benefit employees who do not want to opt-in to having data on their health measured but still want to maintain their health. There are many health problems that developers may encounter if they don't look after themselves since they may sit at a desk with bad posture for long periods of time. The fitbit could be used to monitor inactivity and alert the user to take regular breaks to stretch their legs.

Video Monitoring

One of the most controversial ways of collecting data to measure an engineer's performance is by actually recording video of them. CCTV could be linked with a program that matches facial patterns to identify engineers who regularly leave their workspace for coffee or smoke breaks. Employers might use this data to identify the need to restrict the amount of breaks a developer can take while at work. They might also use the data to identify social groups within the company. This data could be useful when determining groups for projects. Developers who do not normally interact with each other in the workplace could be placed in a team together. This can help promote inclusion in the workplace and could lead to the sharing of knowledge together that can ultimately lead to an increase in productiving in a company. This level of monitoring can give an employer better insight to their engineers' behaviour. However, a system that monitors employees this closely could lead to legal issues or a higher staff turnover if they are uncomfortable being watched this closely.