

# Empirical evaluation of agile practices impact on team productivity

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## 1 Motivation

Agile methods have become more popular since the early 2000s and, in some cases, can offer better results for software development projects when compared to traditional approaches. Agile methods promise to achieve high productivity and to deliver high-quality software, attracting the attention of companies, which demand ever-higher development speed and quality in their products.

The general topic of this PhD thesis is to perform an empirical evaluation of the impact of agile practices on team productivity by means of empirical studies. Regarding the current state of theory and research, more empirical evidence of effectiveness on practices recommended by agile methods are required [1]. Particularly, there are few scientific studies about the impact of agile practices on productivity. In the systematic review conducted by Dybå and Dingsoyr [1], studies just analyse the impact of agile methods on team productivity in terms of lines of code (LOC). However, software development is knowledge work which nature is more complex and harder to evaluate [2]. Measuring productivity with a richer set of metrics would help to deal with this drawback, allowing deeper analysis of the results obtained in the studies. Moreover, agile teams not always collect enough data for a consistent measurement. Therefore, we have to identify the most viable way that best fits the agile spirit in order to measure productivity.

Some recent studies discuss the main software development productivity factors [3]. All include the development method as a factor, but in a very superficial way. None of them discusses how agile methods can influence team productivity. In addition, according to Petersen [4], many studies have been conducted before the year 2000. Thus, productivity factors “need to be re-evaluated in currently operating development organizations”.

## 2 Agile practices impact on team productivity

The goals of my PhD research are expressed by the Research Question 1 (RQ1) and better investigated through the following sub-questions (SQ):

- **RQ1. How do agile practices affect productivity of agile teams?**
- SQ1. What are the agile practices that *most* affect the productivity of teams?

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- SQ2. What are the effects of those agile practices in team productivity? What are the mechanisms behind those practices that enable productivity?
- SQ3. What metrics are appropriate for measuring productivity in agile teams?
- SQ4. Are there possible adaptations to promote productivity in cases where those practices have negative impacts?

To manage productivity effectively, it is important to identify the most relevant practices and develop strategies to get the most out of them. Therefore, we aim to contribute in the field by studying which practices impact on team productivity and how they impact.

We are currently performing an empirical case study [5] inside organizations, within a real environment and with real problems. Qualitative and quantitative data are being collected in Brazilian companies through interviews, direct observation and document analysis. The first objective is to gain and organize knowledge on the most perceived threats to productivity in the agile projects. The second is to identify, without preconceived ideas, which agile practices were more related, in the team's opinion, to their performance. For this reason, we are using some principles of Grounded Theory [6], a methodology for collecting and analyzing qualitative data that permit the collection of meanings, gain understanding and development of empirical knowledge. This step of the project is related to the research sub-questions SQ1 and SQ2. After this first step, we plan to conduct multiple industrial case studies to answer sub-questions SQ3-4. This allow a cross-case analysis [5] that will enable the comparison of multiple cases in many divergent ways. The idea is to use the first case studies to generate hypothesis and the other to test them, ensuring research completeness and consistency. The methodology to test the hypothesis probably will be action research, the type of study where more realistic scenarios for the research are found, which involves the investigation of concrete actions in an industrial environment.

## References

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