

# Attitudes, Beliefs, and Development Data Concerning Agile Software Development Practices

Christoph Matthies<sup>1</sup>, Johannes Huegle<sup>2</sup>, Tobias Dürschmid<sup>3</sup>, Ralf Teusner<sup>4</sup>

**Abstract:** This work is a summary of research previously published at the 41st International Conference on Software Engineering: Software Engineering Education and Training in 2019. The perceptions and attitudes of developers impact how software projects are run and which development practices are employed in development teams. Recent Agile methodologies have taken this into account, focusing on collaboration and a shared team culture. In this research, we investigate the perceptions of Agile development practices and their usage in Scrum software development teams. Although perceptions collected through surveys of 42 participating students did not evolve significantly over time, our analyses show that the Scrum role significantly impacted participants' views of employed development practices. We find that using the version control system according to Agile ideas was consistently rated most related to the values of the Agile Manifesto. Furthermore, we investigate how common software development artifacts can be used to gain insights into team behavior and present the development data measurements we employed. We show that we can reliably detect well-defined Agile practices, such Test-Driven Development, in this data and that usage of these practices coincided with participants' self-assessments.

**Keywords:** Agile software development, software engineering

## 1 Research Context

As Software Engineering is an activity conducted by humans, developers' perceptions, beliefs, and attitudes towards software engineering practices significantly impact the development process. In terms of modern software engineering, Agile software development methodologies, such as Scrum, have highlighted the importance of people, collaboration and teamwork. Scrum, currently the most popular Agile software development methodology employed in industry, has been described as a process framework that is designed to manage work on complex products.

Software developers attitudes towards certain Agile development practices stem mainly from applying these practices in software projects. It is these attitudes towards Agile practice application and developers' perceptions of them, that we aim to study. While

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<sup>1</sup> Hasso Plattner Institute, University of Potsdam, christoph.matthies@hpi.de

<sup>2</sup> Hasso Plattner Institute, University of Potsdam, johannes.huegle@hpi.de

<sup>3</sup> Carnegie Mellon University, Pittsburgh, duerschmid@cmu.edu

<sup>4</sup> Hasso Plattner Institute, University of Potsdam, ralf.teusner@hpi.de

human factors are integral to the software development process, the main goal remains to produce a product that serves the intended purpose. To this end, a large variety of primary artifacts, such as executable code and documentation as well as secondary, supportive development artifacts, such as commits in a version control repository or user stories containing requirements, are created. All the data produced by software engineers on a daily basis, as part of regular development activities, is empirical evidence of the way that work is performed and represents a valuable source of actionable information. Combining and contrasting the perceptions of developers with the empirical evidence gathered from project data can yield insights into development teams not possible by relying on only a single one of these aspects.

## 2 Method

In the context of an undergraduate collaborative software engineering course employing Agile methodologies, which has become standard practice in universities, we study the usage and application of Agile practices by developers and other Scrum roles based on the software project data they create and the related perceptions of these practices. We developed a set of survey claims concerning Agile practice application to collect these assessments and present the results of the survey. Furthermore, we developed a set of six development data measures based on non-intrusively collected software development artifacts, which allow insights into team behaviors.

## 3 Results

We show that the concepts of Collective Code Ownership, usage of the version control system in line with Agile ideas, and not working at the last minute, correlated with high self-assessments of Agile value application. We show that measurements regarding Test-Driven-Development and last minute work correlate with corresponding self-assessments. These findings highlight areas where assumptions of project team work were validated as well as those areas where perceptions of Agile practices and measurements diverged. These represent opportunities for further investigation. In line with related research, we consider translating development practices into workable definitions and measures as one of the biggest challenges and opportunities. By sharing our development data measurements and their background in detail we hope to take another step towards this goal.