



WHAT IS THE OPTIMAL SPRINT SIZE IN SCRUM?

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Research Plan

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1 Introduction

In recent years, Agile methodologies have transformed software development and project management, with Scrum emerging as one of the most widely adopted frameworks. Scrum uses the concept of “sprints”, which are short and time-boxed cycles focused on efficiency, forming an iterative approach to product development. During these sprints, teams aim to complete specific work items, adding momentum to the development cycle. The mix of short flexible sprints with specific goals for each sprint allows the development team to adapt to evolving project demands, while also remaining ready for changes. However, determining the ideal length for these sprints remains a challenging question for many Scrum teams. Although The Scrum Guide (Schwaber, K., & Sutherland, J., 2020) suggests sprint lengths of one to four weeks, selecting the optimal duration can vary based on factors such as project type, team composition, and organizational needs.

The sprint size influences many aspects of project success, including team productivity, adaptability to change, and overall stakeholder satisfaction. Shorter sprints, typically lasting one to two weeks, offer frequent feedback loops and enable teams to respond swiftly to changing requirements. However, this high adaptability may come at the cost of increased task switching, which can lower productivity and add stress to the team. Conversely, longer sprints of three to four weeks allow more time for in-depth work and planning, which would enhance predictability but potentially reduce flexibility. These trade-offs highlight the complexity of determining an “optimal” sprint size that balances productivity with adaptability and team morale.

Few studies have directly examined the quantitative and qualitative impacts associated with different sprint lengths. Previous research on agile practices has addressed aspects of team dynamics and productivity, but the specific effect of sprint duration remains under-explored. This study aims to bridge this gap by investigating how sprint length influences key performance indicators in Scrum-based projects. Specifically, this research will address the question: What is the optimal sprint size in Scrum? By combining qualitative and quantitative data from various teams, we seek to provide actionable insights into how sprint size impacts productivity, adaptability, and satisfaction, thereby guiding Scrum teams in selecting an optimal sprint duration based on their unique project contexts.

2 Research Objectives and Questions

The primary objective of this research is to determine the optimal sprint length in Scrum to maximize efficiency, adaptability, and satisfaction within software development teams. By analyzing the relationship between sprint length and team outcomes, this study seeks to link theory with practice for agile practitioners. The study will explore how different sprint lengths affect different aspects of project success, including productivity, adaptability to change, and team morale. By conducting an empirical investigation that combines quantitative and qualitative data, the research aims to provide insights that can guide teams in selecting the ideal sprint length for their specific projects.

This study also seeks to contribute to the broader field of agile methodologies by clarifying the impacts of sprint length on agile team dynamics. Although previous research has addressed general agile practices, there is a gap in literature that specifically addresses sprint length's effects on key performance indicators. By addressing this gap, the research aims to offer a guideline for understanding the tradeoffs involved in choosing different sprint durations and to recommend evidence-based sprint length ranges.

The value of this research extends beyond academic knowledge, as it offers practical and evidence-based recommendations for Scrum practitioners. Optimizing sprint length can enhance not only team productivity but also overall project satisfaction.

This research will focus on the following questions to guide the investigation:

- What sprint length maximizes productivity in a Scrum-based team?

This question aims to determine whether there is an ideal sprint length that enhances task completion rates.

- How does sprint length impact the adaptability of Scrum teams?

This question aims to assess how the frequency of sprint cycles affects a team's ability to respond to changing requirements and whether certain sprint lengths support or worsen responsiveness.

- What is the effect of sprint size on team burnout, predictability, and stakeholder satisfaction?

This question aims to find the influence of sprint length on team well-being, overall project predictability, and stakeholder expectations, aiming to find a balance that minimizes stress while maximizing predictability and satisfaction.

3 Literature Review

Finding the right length for sprints in Scrum is very important for Agile software development because it influences team performance, adaptability, and productivity. The study by Anand et al. (2022) looked at sprint lengths in Agile methods and stresses the need for more specific durations to improve team results. The authors mentioned that the best sprint lengths can greatly influence how efficiently a team works, suggesting a balance between sprinting too short or too long to keep the team motivated and productive. Anand et al. used a quantitative method to evaluate different sprint lengths and recommend specific durations that fit various project complexities and team needs. They highlighted that being flexible in sprint planning can lead to better project results.

Similarly, Nascimento et al. (2023) explored how sprint length affects team dynamics in their work "Is There an Optimal Sprint Length on Agile Software Development Projects?" They analysed how different sprint lengths impact project outcomes, team unity, and morale. Their findings indicated that while shorter sprints can help teams respond quickly to changes, they could also increase stress and lead to burnout if not managed well. On the other hand, longer sprints give teams more time to develop features thoroughly but may reduce their ability to adapt quickly.

4 Research Method

For this study, we have decided to use both qualitative and quantitative research methods. While quantitative metrics provide insights into team performance or financial impacts, they do not explain the reasons behind these outcomes or the emotional well-being of the team. Conversely, qualitative insights, might correlate to factors like job satisfaction and team morale, which are not tied to profit or productivity, can influence long-term success and team sustainability. By combining them, we could ensure a comprehensive understanding of the effects of sprint size in Scrum by examining both numerical and categorical data.

The qualitative method helps us understand the personal perceptions and experiences of team members on the effects of sprint length. This could be carried out via interviews or surveys of different stakeholders involved in a project, such as developers, product owners, and Scrum masters. Team members might prefer different sprints to avoid certain obstacles, but their reasons for such choices—such as reduced stress or better focus—can only be understood through interviews or surveys. We can gather valuable insights on how sprint sizes impact team morale, stress level, and adaptability to changing project requirements. A thorough analysis of these insights can point towards a more suitable sprint length.

On the other hand, by also adopting a quantitative method, we can obtain measurable data of team productivity based on a range of metrics, such as goal completion rates, the number of completed backlog items, or defect rates. For example, a high completion rate may indicate efficient processes, but without qualitative data, it might be unclear whether this efficiency is achieved at the expense of team happiness. These metrics allow us to compare different sprint sizes using statistical techniques and generate findings that could be generalized to many scenarios.

5 Hypotheses

Previous research on Agile methodologies has shown that sprint length is a crucial factor in determining team satisfaction, adaptability, and productivity. Reifer, Maurer, and Erdogmus (2003) confirmed that although shorter sprints can increase adaptability and responsiveness to changing requirements, they might bring down performance and satisfaction. Based on their findings, we propose the following hypotheses:

- Short sprints of 1-2 weeks are better at enhancing team adaptability and responsiveness since there are common feedback loops and task adjustments to new requirements. However, this approach could lead to a stagnation in team morale and increased stress due to frequent task switching.
- Long sprints of 3-4 weeks offer better predictability because project stakeholders have more time to plan and design tasks and requirements in greater details before each cycle. However, this practice would reduce flexibility and delay progress since major alterations to requirements might need to wait until the next sprint to be adopted.

6 Research Phases

We will conduct this research in five structured stages. These phases include the initial groundwork, data collection, data analysis, and drawing conclusions.

The first phase is Literature Review, carried out during the first month of the research. We will examine the existing studies and research on Agile methodologies, with a primary focus on how sprint lengths in Scrum affect the outcome of a project. This step will help us to identify potential research gaps and provide a theoretical framework for our study.

The second phase is Data Collection Design, which lasts for the entire second month of the research. We will design our interview and survey questionnaire and choose metrics to be tracked to study team performance, adaptability, and satisfaction. Scrum teams from various industries will also be identified and invited to participate in this study. This step will help

us to ensure our data collection methods remain robust and accurate, capable of capturing both qualitative and quantitative data.

The third phase is Data Collection, scheduled for the third and fourth months of the research. We will gather data from selected teams via project management tools, interviews, and surveys via emails.

The fourth phase is Data Analysis, which will occur in the fifth month of the research. In this phase, we will analyze data collected in the Data Collection phase using thematic analysis for qualitative responses and statistical methods for quantitative data. This step will produce valuable insights into how different sprint sizes affect the general success of a project and help us to draw conclusions on the optimal value for sprint length.

Finally, the Reporting and Publication phase is scheduled for the sixth month. We will compile our findings into academic reports, presenting the results in a clear format. Our findings then could be distributed, enabling teams to select the ideal sprint size for their projects.

7 Resources Required

We will use a variety of different resources to collect and analyze data for this research. Firstly, access to project management tools used by teams (e.g., Jira or Trello) is needed to capture metrics necessary for quantitative methods. Furthermore, we need a data analysis tool such as R or SPSS to process and analyze data to produce meaningful insights. On top of that, Scrum teams from different industries are crucial to provide diverse perspectives and ensure that the findings are applicable across various contexts.

8 Outcomes of the Research

We expect to produce three scientific papers based on the findings of this research. The first paper will focus on the effects of sprint length on team productivity, based on quantitative metrics gathered across multiple teams in various industries. The second paper concerns team adaptability and satisfaction in response to different sprint sizes. The third paper is a practical guide for Scrum teams on how to choose an optimal sprint length, offering evidence-based recommendations using team size, project type, and organizational needs.

In addition to these publications, we also aim to provide other insights that benefit the Agile community as a whole. One anticipated outcome is a detailed checklist resulted from the third paper, which helps teams determine the most effective sprint length for their specific context, such as project complexity and organizational budgets. This tool, along with the study's findings, will provide practical guidance for Scrum teams seeking to optimize their workflow.

9 Risks and Limitations

We have identified several factors that could hamper the applicability of this research. One significant risk is participant attrition, where selected teams may withdraw from the study before its completion. This could reduce the sample size and affect the generalizability of the findings. Additionally, the study faces the risk of biases in interviews and surveys. Participants may have personal preferences regarding sprint lengths, which could influence their responses during qualitative data collection. Another risk is variability in team experience levels, project types, and organizational contexts, which may make it difficult to compare different sprint lengths objectively.

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