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Agile Practices in a Small-Scale, Time-Intensive Web Development Project

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Abstract

Agile development has received increasing interest both in industry and academia due to its benefits in developing software quickly, meeting customer needs, and keeping pace with the rapidly changing requirements. However, agile practices and Scrum in particular have been mainly tested in mid- to large-size projects. We present findings from a case study of agile practices in a small-scale, time-intensive web development project at a college-level IT competition. Based on the observation of the development process, the interview of the project team, and the study of relevant documents, we describe how agile practices such as daily Scrums, backlogs, and sprints were successfully adopted to the development.

Agile; Scrum; Web development; Project management

I. INTRODUCTION

Agile development has received increasing interest in both industry and academia due to its benefits in developing software quickly, meeting customer needs, and keeping pace with the rapidly changing requirements. Agile development aims for customer satisfaction through early and continuous delivery of useful software components developed by an interactive process with minimum requirements. Using agile methods helps refine feasibility and supports the process for getting rapid feedback as functionality is introduced. Developers can adjust as they better clarify ambiguous requirements.

Traditional software development methodology such as waterfall is inflexible, expensive, and requires extensive planning and rigid adherence to the sequentially based steps in the process [1]. In contrast, agile methods address the challenge of unpredictable and ever-changing needs and requirements in software development, and deliver value to users as soon as possible [4].

Scrum methodology is one of the primary agile practices. Scrum uses small, self-organizing teams to produce small pieces of deliverable software using sprints (usually 30-day intervals) to achieve an appointed goal, starting with planning and ending with a review. Features to be implemented in the system are registered in a backlog. Then, the product owner decides which backlog items should be developed in the following sprint. Team members coordinate their work in a daily stand-up meeting. One team member, the Scrum master, is in charge of solving problems that stop the team from working effectively [3].

II. CASE STUDY

A. Research Method

Case study method is widely used in Software Engineering and Information Systems (IS) research [2]. We describe a case study of agile practices in a group-based, small-scale, time-intensive web development project at a college-level IT competition here. The purpose of the case study is to explore the particular agile practices applied by the project team in a small-scale, time-intensive web development project and the manner in which they were used. Data was collected using a qualitative, interpretive approach, including observation, interview, and documentation.

B. The IT Competition Project

This case study focuses on a project in the Web Application Development category at a college-level Information Technology Competition (ITC). Teams of 3-5 students are given an assignment of developing a community-based code review web site to work on within a two-week time period. Their work is then analyzed, judged and critiqued by industry professionals in terms of visual design, functionality, usability, creativity and engineering.

Team composition in an agile project is usually self-organizing and cross-functional. Four college students majoring in Information Systems volunteered, formed the project team, and represented their university in the competition. Due to the fact that the project had a limited timeframe of two weeks to complete a final working product from a case requirement document, the project team decided to adopt agile practices, Scrum methodology, in particular, was used because of its proficiency developing in small, self-organizing and cross-functional groups, as well as its best practices for rapid delivery of high-quality software.

C. Implementing Effective Scrum Practices

1. Daily Scrum - Daily Scrum was used for the purpose of coordination and communication. Skype was chosen as the daily Scrum media because it allowed team members to meet online regardless of their physical location, and to easily collaborate via instant messaging, voice and video conference calls, and file transfer - all free of charge. Every day at a specific time (usually 10:30pm) the team met on

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Skype for a short period of time (15 - 30 min) and discussed the project status.

2. Backlogs - The Scrum method uses two types of backlogs to keep a record of the list of work throughout the entire project life cycle. The Product backlog is a high-level, master list of all functionality desired in the working product. In this case study, while the content of the Product backlog, and business value of each listed item were derived from the project case requirement document provided by the ITC organizer (written by the product owner) and maintained and updated by the team leader, the associated development effort is set by the team as a whole. The Sprint Backlogs on the other hand prioritize and expand each Product backlog item into one or more detailed tasks that the team can effectively share and commit to completing within the sprint iteration. In this case study, the project team leader (also the Scrum master) maintained the backlog and updated it to reflect the task status and progress (e.g., complete, testing, or implemented). The team added or removed tasks during the iteration when necessary.

3. Sprints - A sprint is a basic unit in the Scrum development methodology and other agile development methodologies. Sprints usually last one week to one month, and are restricted to a specific duration of a constant length. In this case study, due to the 2-week time constraint, each sprint had duration of only 3-5 days. There are usually two types of sprint meetings. Sprint planning meetings are usually held at the beginning of each sprint to decide desired outcome (a commitment to set of features to be developed) in the iteration. Sprint review meetings are usually held after each sprint, when newly developed functionality is presented/demonstrated and reviewed. Modifications are noted and added to the future Sprint backlog. In this case study, both sprint planning and review meetings are held via face-to-face meetings. The team also tried to clarify as many issues as possible via Email before the meeting to keep it short and concise. The team used Microsoft Project as the project management tool to maintain the sprint backlogs and to facilitate sprint planning, monitoring and reviewing.

III. DISCUSSION

The project team successfully delivered a working software product (i.e., Java Sniper) at the end of the 2-week time frame. The team demonstrated the final product to the judges (industry professionals), and placed the second in the web development category. The team also compared the efficiency of their product with other popular code review systems on the market (e.g., CodeStriker and Reviewboard) by conducting three different types of testing – installation, code submission, and code review tests. And the testing results show that their product (Java Sniper) is the most efficient of all three systems in terms of installation, code submission, and code review.

During both project presentation and interview, the team affirmed that the agile practices employed were a critical success factor for them to achieve the goal of developing a good quality software product that satisfied the case requirements within the limited time frame; the product would have been completed with fewer features or less quality otherwise. The team stated that the agile practices benefited the project in the following aspects:

1. Increased quality of the deliverables.
2. Better change management.
3. More efficient workflow.
4. Increased innovation.

IV. CONCLUSION

We present findings from a case study on agile practices in a small-scale, time-intensive web development project at a college-level IT competition. Based on the observation of the development process, the interview of project team members and the study of relevant documents, we described how agile practices, such as daily Scrums, backlogs, and sprints were successfully adopted to the project development. Our study found that agile practices were a success in this case study, which confirms that agile methodology is suitable for voluntary, self-organized, cross-functional teams developing small-scale, time-intensive software development projects.

The Java Sniper project described in this case study is a reasonably representative of a class of small-scale, time-intensive software development projects in computer science or software engineering courses (with similar number of developers, developers' background and experience, time and project scope). However, such group projects can still differ in terms of: size (software requirements, the number of lines of code), design pattern, type of software developed, language used, etc. It would be interesting to analyze the degree to which agile practices in projects that differ along these dimensions resemble our findings.

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