

Undergraduate Thesis Prospectus

Scrum Project Management: Effective Software Engineering with a Small Team

The Growth of US Tech Startups in the Face of Software Corporations

by

Jacob Lear

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Jacob Lear

Technical advisor: Briana Morrison, Department of Computer Science

STS advisor: Peter Norton, Department of Engineering and Society

General research problem

How have modern styles of software project management, such as Agile and Scrum, changed the software industry landscape?

During the winter of 2001, seventeen software engineers (Beck et al.) gathered at a ski resort in Utah. They discussed a new type of software development different from the many plan-driven strategies of the time: Agile software development. Most software projects at the time were managed under plan-driven development. This generally consisted of extensive planning and documentation, an explicit schedule, and a lot of regulation. Plan-driven development doesn't usually involve returning to previous stages, so it wasn't very adaptable to changing client demands. Agile was a counterbalance to plan-driven methodologies, with a focus on collaboration with clients and adapting to changes during development (Beck et al., 2001). Today, methodologies like Agile and Scrum are used by smaller development teams outside of major software corporations who focus on faster development and responsiveness to client demands. Many of the startups of the last two decades have used Agile, finding success in an industry filled with tech giants like Microsoft. Needless to say, Agile and similar methodologies have changed the approach to problems in the software industry.

Scrum Project Management: Effective Software Engineering with a Small Team

What lesson of lasting professional value did I learn from my internship experience at RevArt?

I'm in the CS department with technical advisor Prof. Briana Morrison working on an individual capstone project. My project is a reflection on my experiences working with RevArt, a small, online art management startup. RevArt is one of the 83% of companies using Scrum

(Petrovah, 2019), a methodology I experienced firsthand. Scrum is usually a part of Agile software development and is focused on continuous assessment of progress, requirements, and current issues (Lutkevich, 2021). From my experience, Scrum's use was effective with the small, remote team at RevArt.

The goal of this project is to provide a reflection of the professional experiences I had at RevArt, especially in regard to management and project organization. There are no unusual constraints since I already worked at RevArt. The current state of the art is the use of Scrum, as 94% of respondents to a survey on Scrum claim they use Scrum either in combination or exclusively in Agile practices. The same survey also reported a 63% success rate in Scrum projects (Allue et al., 2018). I will reevaluate and reflect on my experience at RevArt while researching how others have experienced Scrum to complete this project.

I will have a full report on the professional values I learned at RevArt and my experience compared to others in the industry. It will help document the use of Scrum at startups that could possibly lead to better methods of software project management.

The Growth of US Tech Startups in the Face of Software Corporations

In the US since 2012, how have small software startups found market niches and committed employees despite the market dominance of major software corporations?

How did tech startups like Uber and Amazon find success in a software industry filled with tech giants? According to Uber's CEO, Dara Khosrowshahi, "Uber was born out of a watershed moment in technology. The rise of smartphones, the advent of app stores, and desire for on-demand work supercharged Uber's growth" (2019). Uber found success in finding a specific market for quick car rides through a mobile app. Although Uber found success, most

startups do not ultimately succeed. In fact, about 90% of similar startups fail (Haworth, 2023). However, 10% of startups are able to succeed in the software industry despite the competition from other startups and major software corporations like Microsoft and IBM. How do startups find success despite the competition, lower funding, underdeveloped markets, and uncertainty?

In a paper on software startups reaching stakeholders within large corporations, the successful startups found success in providing business to business (B2B) solutions to corporations mainly by talking to and co-developing with potential users early on (Lim, S. L., Bentley, P. J., & Ishikawa, F., 2020). It is important to note that researchers of the paper focused on requirements elicitation, not other factors that restrict startup success. From the results of a case study, researchers determined that early stage high-tech startups can increase their probability of success in emerging markets by applying the principles of effectuation (Krishna, H. S., & Subrahmanya, M. H., 2014). The study's focus was on how using a conceptual model can help startups respond and evaluate given issues. It doesn't reflect on greatly undesirable factors under the model's framing, and how effective the model is on survival of a startup lacking in resources. The factors that influence startup success in a Spanish study were found to be employees' commercial abilities, having a larger workforce, and strong technical backgrounds given the startup has enough financial support (Díaz-Santamaría & Bulchand-Gidumal, 2021). An important note is that this research observed only Spanish startups, so it may not apply in the same way to US startups.

The participants for this research are software corporations like IBM, successful startups like Uber and Amazon, the trade association Scrum Alliance, and individual developers who have experience in startups.

IBM, the International Business Machines Corporation, is one of the largest computer corporations that has specialized in both computer hardware and software. Their primary objective is to provide services and technology to their customers, like any tech corporation. Their mission on their “About” page is “To lead in creating, developing, and manufacturing the industry’s most advanced information technologies, including computer systems, software, networking systems, storage systems, and microelectronics” (IBM). IBM (2003) is known for developing new devices, a few historical examples being the ThinkPad 401C and an optical microscope.

Uber is a successful startup that provides transportation and food delivery services, primarily through its mobile applications. Drivers at Uber are independent contractors, not employees like traditional taxi drivers. This helped in regard to their success by cutting costs (Frazier, 2016). In their “About us” page with their mission statement, they claim “we are a tech company that connects the physical and digital worlds to help make movement happen at the tap of a button. Because we believe in a world where movement should be accessible” (Uber). They also state that they value sustainability, equality, and diversity in their mission statement.

Amazon was a successful startup that grew into a major tech corporation with products and services varying from e-commerce, streaming, and cloud computing. They managed to find in the e-commerce market fairly early and “In just its four weeks of operation, the company shipped books to customers in all 50 states and more than 45 countries” (Pedersen, 1995). In Amazon’s “Who We Are” statement, they claim “Amazon is guided by four principles: customer obsession rather than competitor focus, passion for invention, commitment to operational excellence, and long-term thinking” (2020). On the matter of competition, Amazon stated “With so many options for customers to choose from, remaining competitive in the retail industry

requires earning the trust of customers every day” (2023). Jeff Bezos, the CEO of Amazon, has also stated that “We have for decades enjoyed an unlevel playing field in areas like space and technology. I’m very nervous that this is changing rapidly” (2021).

Scrum Alliance is a trade association that aims to develop software engineers in the Agile methodology, specifically Scrum. They offer certifications for certain roles in Scrum, groups, gatherings, courses, and various other resources for professional development. Statistics they gathered in their “Financial Benefits of Scrum” showed that “50% of the fortune global 500 employ Scrum Alliance’s members”. Their mission is “To advance real-world agility by equipping and inspiring the changemaker in everyone,” and they “envision a world where an agile way of working is so universal, it’s simply called working” (Together). They also had direct involvement with IBM, designating a section in their “State of Scrum 2017-2018” to the corporation. The paper stated that IBM saved \$300 million and saw a 15% revenue improvement per developer after switching to Agile in 2012 (Allue et al., 2018).

Independent developers with experience in startups give insight into why they would choose riskier ventures over tech corporations. Software engineer Gergely Orosz, who worked at Uber, passed on the words his coworker Willem Spruitjt told him on startups vs. Big Tech (2023). Learning new topics and having a strong personal impact are two major benefits Spruitjt stated. Working in Big Tech tends to give financial stability and better network building. Spruitjt’s focus as a software engineer leaned towards startups, which gave him more control over his work and impact on projects. Like Spruitjt, there are many in the tech industry who value control and impact more than the financial stability of Big Tech jobs.

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