Agile and Lean: Organizations, Products, and Development

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Abstract

Over the past two decades, research in the area of agile and lean software development has mirrored the strong growth of the use of agile and lean methodologies. Agile and lean management practices (which we define broadly to include Scrum, XP, Lean and other related approaches) roughly triple the success rate of software projects over traditional management approaches. Because software projects contribute so broadly to economic and social improvement, research on agile methods may produce significant productivity gains. Furthermore, use of lean and agile approaches is continuing to gain broader acceptance in a variety of fields beyond software projects. However, much work remains to enable all the benefits of agile and lean concepts to be realized in software development as well as across the full range of other fields that might benefit via the application of lean and agile approaches.

1. Introduction

An agile approach focuses on using a cycle of experimentation, inspection and adaptation to improve production. Agile is most often applied to software development, and there are many papers in this mini-track to discuss software organizations and software engineering practices. However, the concepts also are applicable for other types of organizational "production", such as business intelligence, management initiatives, manufacturing, marketing, sales and finance.

A lean approach focuses rapid experiments by trying to continually reduce waste and minimizing work-in-progress. Lean has recently been popularized as a construct for start-up organizations ("Lean Startup" or "Lean Entrepreneurship"). Advocates claim a lean approach produces greater market satisfaction and customer engagement, earlier discovery of hidden market opportunities, higher revenues and more efficient use of development staff.

These approaches claim superiority in new product development over traditional approaches (such as "waterfall management") that fail to test development and market assumptions in long-range plans.

Agile and lean approaches challenge organizations large and small. People typically conflate small failures (learning) with large failures (organizational threats), assume that innovation means taking long-range untested risk, and establish and protect budgets with many baked-in production and market assumptions. These cultural realities interfere with agility and real innovation.

As a result, companies often invest enormous amounts of money in incomplete or abandoned agile transformations. What can organizations do to improve agile uptake? How do we know that the organization is improving? How can organizations diagnose problems without motivating gaming? What types of people are more likely to thrive in agile and lean organizations, and what roles should they take? What hiring practices result in better candidates? What training programs produce better results? What coaching structures work? How do we measure these activities?

The Agile/Lean mini-track explores these questions – to better understand agile and lean methods and their effects on quality, speed and communication. We solicited research papers and experience reports that explored agile development, lean product management and agile/lean organizations, and that we, as a community, help to ensure relevance and rigor [1].

2. Sessions

At this year's conference, we divide the papers into two loosely related themes. The first theme focuses on exploring and/or integrating multiple different frameworks. The second theme focuses on enhancing the application of agile in software development.

2.1. Integrating Multiple Frameworks

This mini-track starts with "Rocket Mortgage Delivers Twice the Value in Half the Time at Scale", where Sutherland et al, explain how Scaled Agile and Scaled Scrum can work together as well as the benefits that teams can achieve by integrating these two frameworks.

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The next paper, "DevOps Adoption: Challenges & Barriers" by Krey, explores DevOps adoption by identifying, discussing, and summarizing current academic and practitioner DevOps adoption & implementation research.

The next paper in the session, "Achieving Lean Data Science Agility Via Data Driven Scrum", by Saltz et al, expands the use of lean and agile concepts to the data science domain. They first define four principles a team should follow to achieve lean data science as well as describing a new team process framework, called Data Driven Scrum (DDS), which enables lean data science project agility. DDS is similar to Scrum but key differences include that DDS defines capability-based iterations (as compared to Scrum time-based sprints), DDS increases the focus on observing and analyzing the output of each iteration (experiment), and that DDS defines process improvement meetings (e.g. retrospectives iteration reviews) to be held on a frequency the team deems appropriate (as compared to Scrum which defines these meetings to be at the end of each iteration).

In the final paper for this session, "Improving productivity through corporate hackathons: A multiple case study of two large-scale agile organizations" by Moe et al., investigates how to run hackathons and how hackathons impact productivity at the individual as well as the organizational level. They found that hackathons improve developers' satisfaction and well-being, strengthen the company culture, improve performance (as many ideas are tested), increase activity (as the ideas are developed quickly), and improve communication and collaboration (because the social network is strengthened). They also found that hackathons increase efficiency and flow because people learn to complete work and make progress quickly, and they build new competence.

2.2. Case Studies and Surveys
In the first paper for this session, "The Impact of Covid 19 on Agile Software Development: A Systematic Literature Review" by Neumann & Bogdanov note that as agile methods focus on communication and collaboration, the work from home mandates due to the COVID-19 pandemic led to significant challenges in teams that were co-located before the pandemic. Their paper presents a systematic literature review on the impact to agile teams. They discuss insights gained on the changes of the performance of agile software development teams and social effects on agile software development teams during the pandemic.

In another paper exploring distributed agile teams, "Using Objectives and Key Results (OKRs) and Slack: A Case Study of Coordination in Large-Scale Distributed Agile", by Stray et al., focuses on understanding coordination when members are working from home. They conducted a case study where they examined two teams in a large-scale agile project and note that the use of OKRs facilitates knowledge sharing, help the teams align their goals, and provide inter-team insights.

In the next paper, "Psychological Safety in Agile Software Development Teams: Work Design Antecedents and Performance Consequences", Buvik & Tkalich examine how work design characteristics of software development teams (autonomy, task interdependence and role clarity) influence psychological safety and further how psychological safety impacts team performance, either directly or indirectly through team reflexivity.

In the next paper, Huck-Fries & Spitzer's "Why apply agile? - A literature review on work outcomes in agile information systems development" synthesizes the current state of research on agile information systems development (ISD) and work outcomes by a systematic literature review. Overall, they found a trend of a positive relationship of agile ISD on work outcomes.

Finally, in the last paper, "'Primus inter Pares'?—The Perception of Emergent Leadership Behavior in Agile Software Development Teams", Biehler let al., explore self-organization within agile software development (ASD) teams and note how informal emergent leadership may develop within ASD teams by combining knowledge on ASD teams with extant research on emergent leadership.

3. References

[1] Tripp, J., Saltz, J., & Turk, D. (2018). Thoughts on Current and Future Research on Agile and Lean: Ensuring Relevance and Rigor, in *Hawaii International Conference on System Sciences (HICSS)*, 2018.