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Scaling Agile Methods to Process Improvement Projects: A Global Virtual Team Case Study

Completed Research

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Abstract

Agile methods have been embraced by the software development industry. Their effectiveness in streamlining the software process has led organizations to look at the application of agile methods to non-software projects and organizational functions. While a significant body of research exists on agile methods and software development, previous studies on agile methods have not elaborated on their use in global virtual teams (GVTs) engaged in non-software projects. This paper describes one such project, where an organization that had previously adopted agile methods for software development, scaled agile methods to a GVT undertaking a process improvement project. Participant observation was employed to capture a rich description of the tailoring of agile methods for the project. Findings suggest that while agile methods in a GVT context are realizable, adjustments have to be made to allow for the distributed team structure and project type.

Keywords

Project management, agile methods, agile project management, global virtual teams

Introduction

Agile methods have been embraced by the software development industry (Dybå & Dingsøyr, 2009; Campanelli & Parreiras, 2015). With clear benefits such as greater flexibility, productivity and collaboration, it is not surprising that an industry that has, in the past, tended towards more formal documentation-heavy methods for software production would readily migrate to agile practices (Laanti et al., 2011). Use of agile methods for software development continues to grow at a phenomenal rate (Vijayasarathy & Butler, 2016). The migration to agile methods is more often than not a challenging endeavor for organizations, as it requires not just a change in tools and techniques but a change in organizational culture (Dybå & Dingsøyr, 2009). An added complexity for most organizations is the adoption of agile methods in distributed team environments (Herbsleb, 2007). Distributed teams necessitates tailoring of agile methods to fit the virtual team structure (Hossain et al., 2009), given that agile assumes that team members are based in the same geographical location (Sriram & Mathew, 2012). However, overall, organizations are willing to endure some teething pains, as agile methods, when applied effectively, achieve quality, budget controls and continuous delivery of software iterations (Nerur et al., 2005). In addition, the iterative nature of agile methods supports organizational learning and swift application of this knowledge (Nerur & Balijepally, 2007). The success of agile methods for software development has led both researchers and practitioners to explore the possible application of agile to non-software projects (Abrahamsson et al., 2009; Wendler, 2016). As with application to distributed teams, the use of agile for non-software projects necessitates tailoring to the given context as not all aspects of agile are universal. As observed by Wendler (2016), there is a risk that only single software development teams may benefit from the use of agile methods and these benefits may not find their way to other

organizational areas. If an organization wishes to be truly agile, its software teams cannot be islands of agile practice. Rather, the entire organization needs to embrace agility in its processes (Wendler, 2016). While several researchers have called for a more holistic and organizational level study of agility (Abrahamsson et al., 2009; Ågerfalk et al., 2009), relatively few studies have focused on applying agile methods outside of software development projects. In addition, the application of agile project management to non-software projects and industries has been underserved thus far (Conforto et al., 2014). Finally, the impact of distributed teams for such projects merits closer inspection. Therefore, this paper answers the call to explore the application of agile methods to non-software development projects (specifically, financial reporting function) for a distributed team.

This paper presents a case study of one such organization that applied agile methods to a non-software project whose team members were globally distributed. In doing so, this paper seeks to shed light on the practice of agile method tailoring for non-software projects and identify the benefits and drawbacks of this approach. The next section presents the research background for this study.

Background

Agile Methods

The Agile Manifesto (Fowler & Highsmith, 2001) was introduced as an alternative to the more "traditional" methods for software development. The manifesto proposes (i) individuals and interactions over process and tools; (ii) working software over comprehensive documentation; (iii) customer collaboration over contract negotiation; and (iv) responding to change over following a plan (Highsmith & Cockburn, 2001). These principles have led to agile method use increasing year on year (Dybå & Dingsøyr, 2009). Agile methods, in comparison to traditional methods of software development, makes the development process simpler and shorter (Chandra et al., 2009).

The use of agile methods has not been without its challenges (Dybå & Dingsøyr, 2009). For one thing, agile methods such as Extreme Programming (Beck, 2000) and Scrum (Schwaber, 2004) assume that team members will be in close physical proximity and part of one dedicated software development team (Boehm & Turner, 2005; Dikert et al., 2016). This is not always the case and adjustments have to be made accordingly to ensure agile works in the given context, such as global virtual teams.

Agile Methods in Global Virtual Teams

Global virtual teams (GVTs) are increasingly the norm for software development as well as non-software development projects (Nunamaker Jr. et al., 2009; Ramasubbu et al., 2011). With globally distributed teams comes a range of challenges to which collocated teams are not subject (or, at the very least the impact is relatively slight), such as geographical distance, temporal distance, cultural diversity, linguistic differences, knowledge sharing and slow team cohesion (Cummings et al., 2009; Iorio & Taylor, 2014; Kanawattanachai and Yoo, 2007; Maznevski and Chudoba, 2000; Powell et al., 2004; Sarker and Sahay, 2004). As such, GVTs often experience reduced synchronous communication, absence of face-to-face meetings, inconsistent work practices across locations, cultural misunderstandings, coordination overhead and difficulties in communicating complex ideas (Carmel & Agarwal, 2001; Herbsleb & Moitra, 2000; Jarvenpaa & Leidner, 1999). Existing research has explored these distributed issues and potential solutions (Cummings et al., 2009; Daim et al., 2012; Gibson et al., 2015; Malhotra et al., 2001; Sarker & Sahay, 2004). However, agile methods introduce a further complexity to distributed teams. Given the reality of GVTs and the popularity of agile methods, organizations are faced with a puzzle to solve. How to take a method designed for collocated single project teams and scale it to a distributed environment? As noted by Abrahamsson et al. (2002), agile methods such as Scrum are effective because they place development team members in the same physical location. Although agile methods have been applied in distributed team environments (Ramesh et al., 2006), reports vary with respect to the success for their application (Hossain et al., 2011).

Applying Agile Methods to Non-Software Project Distributed Teams

There has been a wealth of research on the topic of agile methods for software development and, to a lesser extent, agile methods in global virtual team environments (Hossain et al., 2011). However, while

there have been calls for research studies (Abrahamsson et al., 2009; Ågerfalk et al., 2009; Conforto et al., 2014; Dikert et al., 2016), the scaling of agile methods to non-software projects in global virtual teams (GVTs) has been underserved from both a theoretical and practice standpoint. As noted by Salo & Abrahamsson (2005), little is known about the relationship between agile projects and organizational capability improvement. Given the increasing pervasiveness of agile methods in organizations and the appetite for finding new application of agile practices, it is timely to look at current industry practice. Often, practice outpaces theory, and therefore, to cultivate an understanding of when and how agile methods should be employed, we look to practitioners to navigate a course.

Research Method

A qualitative, single case study was selected as the most fitting approach for this research. Case studies are well-suited to IS research (Benbasat et al., 1987) as they emphasize the understanding of empirical data in a natural setting (Eisenhardt, 1989). In this instance, a single in-depth case study was deemed to be appropriate as it facilitate close observation of the phenomenon. The case organization was chosen for the study on the basis of its mature status with respect to agile methods and distributed work. Out of several potential projects, one was purposively selected for study as it met several criteria for the study:

- The project employed agile methods
- The project had a non-software focus
- The project was executed by a globally distributed team
- The project tailored agile methods to fit the project and team structure
- The project had already completed several iterations

Data collection was conducted over a six-month time period in 2016. During this time the project underwent four iterations. Multiple data sources were employed (Eisenhardt, 1989): (i) participation observation (Jorgensen, 1989), (ii) project documents, and (iii) artefacts (Myers, 2013). Two of the researchers were participants in the project and, thus, were able to observe first-hand the application of agile methods to a non-software project. Direct observations of the phenomenon in its natural setting (in this case, a globally distributed team engaging agile methods for a non-software project), assist in the development of a deep and realistic understanding (Babbie, 1983). The unit of analysis was the project. The collected project data was examined by all three researchers in order to develop a detailed description of the steps taken to adapt agile methods for the project.

Case Study

Virtus[1] is a global technology organization with over 200,000 employees involved in business units which include IT Services, consulting, hardware and software. The organization is mature with respect to its implementation and use of agile methods for software development projects. A recent goal of Virtus has been to expand the use of agile practices into the area of operations.

In order to assist in the roll-out of agile practices the organization trained a range of people from various backgrounds and departments to become Agile Champions for Operations. Once assigned to a department, the first task for each Agile Champion was to set up a meeting with the department's twenty project managers.

Participating project managers had various levels of seniority and experience; and were part of a globally distributed, virtual team with several locations (USA, Argentina, Costa Rica, Ireland, Poland, India, and Malaysia). Due to the range of geographical locations, the team exhibited temporal, cultural and linguistic differences. These differences led the Agile Champions and project managers to identify platforms that

[1] For reasons of anonymity, the case organization will use the alias "Virtus".

could mitigate these differences and enable team members to fully engage in the agile process improvement initiative.

The meeting (of the Agile Champion and project managers) objective was to provide a platform whereby project managers could identify their operational pain points i.e. what was time consuming or what tasks were especially difficult to complete successfully. Given the potential sensitivity of these pain points, a tool was used to ensure operational issues could be identified anonymously by all virtual team members. Once pain points were identified, the Agile Champion organized the pain points into logical groupings, presented them back to the project managers and, after a discussion, project managers voted 1 – N (anonymously) to rank the reported pain point groupings. The result of this initiative was the identification of the top operational pain point groupings of quarter-end financials.

Quarter-end financial entails the project managers from the team recovering in excess of $2M, on average, from internal/external projects where IT Services were provided. The financial pain points identified were (i) lack of process, (ii) education, (iii) reporting and, (iv) automation resulting in invalid and incomplete financial submissions. This resulted in a loss of approximately 16% cost recovery per quarter.

Description of the agile process improvement project

The following section provides a description of the overall project lifecycle. The project commenced, with the Agile Champion assigning a Product Owner to set up a team to work on the quarter-end finance agile project.

1. The Product Owner requested volunteers from the project management group that had originally identified the pain points to participate in the agile team to devise a solution. This ensured the correct mix of experience and knowledge levels among project members. The team consisted of nine members (six project managers, two operations managers and one accountant) from the USA, Ireland, India, Brazil and Argentina.
2. The Product Owner, with support from the Agile Champion, held a kick-off workshop that covered the following steps:
    a. Explained the agile approach and agile project roles. While all team members had knowledge of agile methods, several team members did not have practical experience of working in an agile environment. As such, it was important to establish a shared understanding of the agile approach adopted for the project amongst team members.
    b. Reviewed pain points related to quarter-end financials. Subsequently, the team performed a Root Cause Analysis to identify the source(s) of pain points and created a product backlog.
    c. Performed Value Stream Mapping to identify product backlog prioritization. Value Stream Mapping is a lean enterprise technique that documents the flow of information required to produce a product or service. The technique also identifies any waste in a given value stream.
        i. This step entailed:
            - Identifying the high level process, steps and stakeholders involved in quarter-end financials and time/cost in order to set a baseline to determine improvement.
            - Estimating the average Activity Time per step (AT) and Wait Time (WT) between steps in minutes and calculated the Process Efficiency (PE) percent. Total Cycle Time (TCT) = AT + WT; PE% = (AT/TCT) x100
3. After discussing team member availability at the workshop and team members proposing the time per week they could devote to the project, the Product Owner negotiated 15% weekly availability from agile team members.
4. The Product Owner set up weekly stand-up meetings. These meetings were conducted via virtual conferencing due to distributed nature of the team. The team agreed on agile tools such as Mural (http://mural.co) and Box (http://www.box.com) to collaborate, track and report on project progress. Mural ensured that all worldwide team members had access to a consistent visual

representation of product backlog, tasks and their progress to completion. All team members were able to contribute updates at any time. Box provided a version controlled collaborative documentation system that permitted all team members to work simultaneously on process deliverables. The team also agreed on a social contract. The social contract was a critical step in establishing norms for communication in the team.

5. Using the product backlog, the team estimated and planned the first two iterations which consisted of parallel activities assigned to team members. Each iteration included requirements, development, testing, documentation and education tasks (Figure 1).

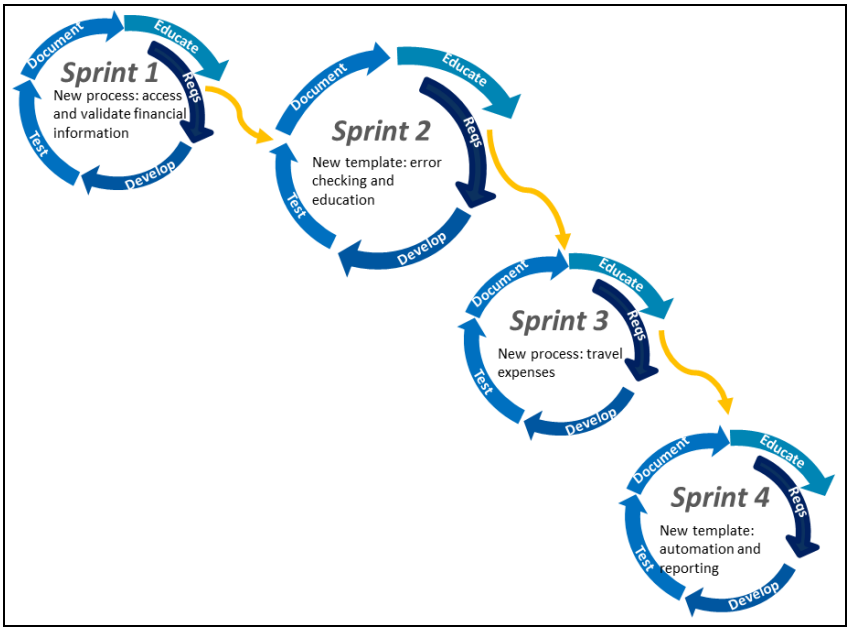


Figure 1 Virtus Project Sprints

Iteration 1: Developed new process to access and validate financial information, delivered education and deployed this, ensuring that all project managers had the correct information required for successful end of quarter financial recoveries.

Iteration 2: Developed a new template with valid set and error checking to ensure financial recovery information was consistently submitted in a controlled manner. To ensure execution consistency, a new submission process was developed and education delivered prior to deployment. This iteration also addressed Iteration 1 feedback.

6. Between iterations 2 and 3, a survey was distributed to stakeholders to quantify the impacts and benefits of the agile deliverables.

Iteration 3: Developed new process and education to ensure that travel expenses were successfully identified and incorporated into end of quarter financial recoveries.

Iteration 4: Built upon the foundation of Iteration 2 template to develop improved automation and reporting, ensuring that all project managers could have clearer visibility on end of quarter financial recoveries gaps versus forecasted recoveries.

7. The team produced a model that illustrated the Virtus quarter-end financial process flow (Figure 2). This was the first time that quarter-end financial process was documented. The model provided project managers with a clear visualization of the steps involved in recovering costs.

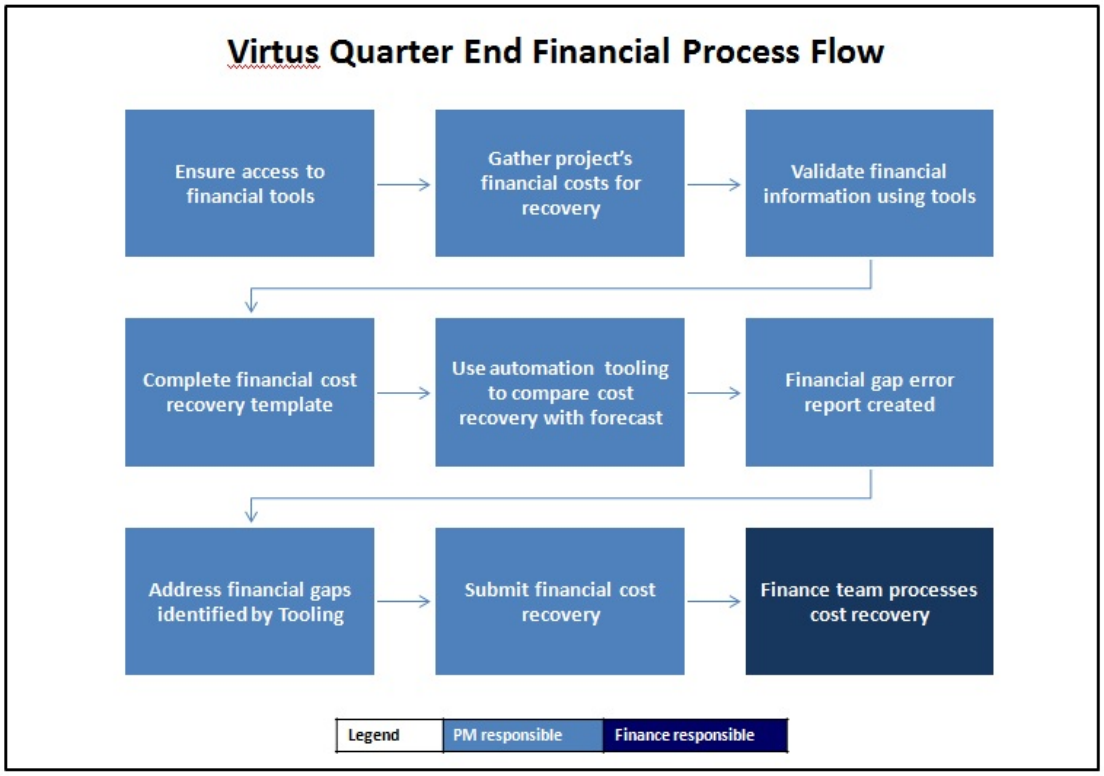


Figure 2 Financial Process Flow

Discussion & Conclusion

The Virtus case describes that organizations first step towards expanding agile methods to outside its traditional home of software development teams. Although the organization is a mature user of agile methods, the majority of its software projects are collocated allowing it to apply agile methods in their intended environment. The process improvement project as both a GVT and agile is therefore a novel endeavor for the organization. The goal of the project was to make the cost recovery agile. The changes ensuing from the project enabled project managers to submit cost recoveries throughout the quarter and not just at the end of the quarter, which resulted in a more agile process.

On reflection, the project has been a successful undertaking for Virtus as an agile GVT. The team was able to circumvent many of the stereotypical virtual team pitfalls (geographical distance, temporal distance, cultural diversity, linguistic differences and knowledge sharing) by careful selection of and heavy use of two online tools for collaborative work (Box and Mural). The ability to share and update project artefacts and seamlessly visualize project planning was critical to keeping a multi-location virtual team engaged. In particular, clever use of Mural ensured that the team shared one common vision of product backlog and progress regardless of location or time zone.

The use of feedback surveys also worked well to capture the value and impact of agile deliverable. The organizational unit for where the process improvement was targeted, recovered an additional $300k (on average) per quarter after implementation of the financial quarter end project. When department project managers were asked to report pain points at the end of 2016, quarter-end financials no longer appeared in the list of issues.

However, the application of agile to the GVT was not simple. The GVT was comprised of members who were multi-teaming (no individual worked on the project 100% of the time) and located across the globe. Daily stand-up meetings were not possible as a consequence. Instead, weekly stand-up meetings were used which served a dual role as a working session for the team. This significantly reduced efficiency and

progress. Given the time pressures assigning agile roles was also a challenge. While project managers were comfortable participating in the team, they were reluctant to take on the role of Iteration Manager, as multiple time zone differences impacted their ability to successfully undertake the tasks required of that role. Therefore, the Product Owner doubled as the Iteration Manager for the project. It was agreed up front by Product Owner and Agile Champion that key roles would be on a voluntary basis in order to ensure participation and buy-in as this was a new initiative in the operations area. This did prove a challenge and a lesson learnt for future agile operations projects is clear assignment of roles is essential.

Team member availability was also problematic. This was attributed to the additional work overhead wrought by the GVT structure. While 25% availability was desired, up to 15% availability was agreed based on an assessment of team members other project commitments. It was recognized that this limited availability would impact efficiency and speed of delivery. As a workaround, the team adjusted iterations from two weeks to every four weeks to cater to team availability. Overall, while the project was able to meet most of the requirements to be considered agile, it progressed at a much slower pace.

Was the effort required in setting up the agile team worth it? Given that the project has been successful in its intention to resolve quarter-end financial pain points and the team member response has been positive (another process pain point will be undertaken in 2017), the answer is yes. However, in order to speed up the progress of such projects, the team will look to minimize the temporal distance among team members in future and a solution for the issue of team member availability will be identified (such as setting aside consolidated blocks of time for project work). This study makes a number of contributions to both agile method literature and project management practice. The study: (i) sheds light on a under-served area of agile method application (agile methods for operations in distributed teams); (ii) outlines an effective agile approach for operations process improvement; (iii) highlights the criticality of managing virtual team temporal distance; and (iv) identifies the impact that multi-teaming has on efficient delivery of agile project goals. It should be noted that this study has several limitations. As a single case, its findings cannot be generalisable to other contexts. In addition, the organization was already a mature user of agile methods (albeit in software development) which likely impacted the speed with which the team was able to implement agile methods across the GVT. The case relies on participant observation which creates a risk of bias with respect to findings presented. However, the third researcher acted as an independent reviewer of the findings to identify any biases and minimize their impact. Future research (i) will revisit the project to reassess its effectiveness in applying agile to GVTs and organizational learning; (ii) study the application of the tailored agile approach to other GVT non-software projects; and (iii) establish a protocol for scaling agile methods for such virtual projects.

REFERENCES

Abrahamsson, P., Conboy, K., and Wang, X. 2009. "'Lots done, more to do': the current state of agile systems development research". European Journal of Information Systems, (18:4), pp. 281.

Ågerfalk, P. J., Fitzgerald, B., and Slaughter, S. A. 2009. "Introduction to the special issue—flexible and distributed information systems development: state of the art and research challenges". Information Systems Research, (20:3), pp. 317-328.

Babbie, E. 1983. The Practice of Social Research, Belmont: Wadsworth Publishing.

Beck, K. 2000. Extreme programming explained: embrace change. Addison-Wesley Professional.

Benbasat, I., Goldstein, D.K., and Mead, M. 1987. "The Case Research Strategy in Studies of Information Systems". MIS Quarterly (11:3), pp. 369–386.

Boehm, B. 2002. "Get ready for agile methods with care". IEEE Computer, (35:1), pp. 64-69.

Boehm, B. and Turner, R. 2005. "Management challenges to implementing agile processes in traditional development organizations". IEEE software, (22:5), pp. 30-39.

Campanelli, A. S. and Parreiras, F. S. 2015. “Agile methods tailoring–A systematic literature review”. Journal of Systems and Software, 110, pp. 85-100.

Cardozo, E. S., Neto, J. B. F. A., Barza, A., França, A. C. C., and da Silva, F. Q. 2010, April. “SCRUM and Productivity in Software Projects: A Systematic Literature Review”. In EASE.

Carmel, E. and Agarwal, R. (2001). "Tactical approaches for alleviating distance in global software development." IEEE Software: 22-29.

Chandra, S., Kumar, V., and Kumar, U. 2009. “Identifying some important success factors in adopting agile software development practices”. The Journal of Systems & Software, (82:11), pp. 1869-1890.

Conforto, E. C., Salum, F., Amaral, D. C., da Silva, S. L., and de Almeida, L. F. M. 2014. “Can agile project management be adopted by industries other than software development?”. Project Management Journal, (45:3), pp. 21-34.

Conforto, E. C., Amaral, D. C., da Silva, S. L., Di Felippo, A., and Kamikawachi, D. S. L. 2016. “The agility construct on project management theory”. International Journal of Project Management, (34:4), pp. 660-674.

Cummings, J. N., Espinosa, J. A., and Pickering, C. K. 2009. “Crossing Spatial and Temporal Boundaries in Globally Distributed Projects”. Information Systems Research, 20, pp. 420-439.

Daim, T.U., Ha, A., Reutiman, S., Hughes, B., Pathak, U., Bynum, W. and Bhatla, A., 2012. “Exploring the communication breakdown in global virtual teams”. International Journal of Project Management, (30:2), pp.199-212.

Dikert, K., Paasivaara, M., and Lassenius, C. 2016. “Challenges and success factors for large-scale agile transformations: A systematic literature review”. Journal of Systems and Software, 119, pp. 87-108.

Dybå, T. and Dingsøyr, T., 2009. “What do we know about agile software development?” Softw. IEEE (26:5), pp. 6–9.

Eisenhardt, K. M. 1989. “Building Theories from Case Study Research”, The Academy of Management Review, (14:4), pp. 532-550.

Fowler, M., and Highsmith, J. 2001. “The agile manifesto”. Software Development, (9:8), pp. 28-35.

Gilson, L.L., Maynard, M.T., Young, N.C.J., Vartiainen, M. and Hakonen, M., 2015. “Virtual teams research 10 years, 10 themes, and 10 opportunities”. Journal of Management, (41:5), pp.1313-1337.

Herbsleb, J. D. 2007, May. “Global software engineering: The future of socio-technical coordination”. 2007 Future of Software Engineering (pp. 188-198). IEEE Computer Society.

Herbsleb, J. D., and Moitra, D. 2001. “Global software development”. IEEE software, (18:2), pp. 16-20.

Highsmith, J. and Cockburn, A., 2001. Agile software development: The business of innovation. Computer, 34(9), pp.120-127.

Hossain, E., Babar, M. A., and Paik, H. Y. 2009, July. “Using scrum in global software development: a systematic literature review”. In Global Software Engineering, 2009. ICGSE 2009. Fourth IEEE International Conference on (pp. 175-184).

Hossain, E., Bannerman, P. L., and Jeffery, R. 2011, May. “Towards an understanding of tailoring scrum in global software development: a multi-case study”. In Proceedings of the 2011 International Conference on Software and Systems Process (pp. 110-119). ACM.

Iorio, J. and Taylor, J. E. 2014. “Boundary object efficacy: The mediating role of boundary objects on task conflict in global virtual project networks.” International Journal of Project Management 32, pp. 7-17.

Jarvenpaa, S.L. and Leidner, D.E. 1999. “Communication and Trust in Global Virtual Teams”. Organization Science (10:6), pp. 791-815.

Jorgensen, D. L. 1989. “Participant Observation: A Methodology for Human Studies”. Thousand Oaks, CA: Sage Publications.

Kanawattanachai, P. and Yoo, Y. 2007. "The impact of Knowledge Coordination on Virtual Team Performance over Time". MIS Quarterly (31:4), pp. 783-808.

Laanti, M., Salo, O., and Abrahamsson, P. 2011. "Agile methods rapidly replacing traditional methods at Nokia: A survey of opinions on agile transformation". Information and Software Technology, (53:3), pp. 276-290.

Malhotra, A., Majchrzak, A., Carman, R., and Lott, V. 2001. "Radical innovation without collocation: A case study at Boeing-Rocketdyne". MIS Quarterly, (25:2), pp. 229-249.

Maznevski, M.L. and Chudoba, K.M. 2000. "Bridging Space over Time: Global Virtual Team Dynamics and Effectiveness". Organization Science (11:5), pp. 473-492.

Myers, M.D. 2013. Qualitative Research in Business and Management, 2nd edition, Sage Publications, London.

Nerur, S., and Balijepally, V. 2007. "Theoretical reflections on agile development methodologies". Communications of the ACM, (50:3), pp. 79-83.

Nerur, S., Mahapatra, R., and Mangalaraj, G. 2005. "Challenges of migrating to agile methodologies". Communications of the ACM, (48:5), pp. 72-78.

Nunamaker Jr., J.F., Reinig, B.A. and Briggs, R.O. 2009. "Principles for Effective Virtual Teamwork". Communications of the ACM (52:4), pp. 113-117.

Ramasubbu, N., Cataldo, M., Balan, R. K. and Herbsleb, J. 2011. "Configuring Global Software Teams: A Multi-Company Analysis of Productivity, Quality, and Profits". In Proceedings, International Conference on Software Engineering, Honolulu, HI, pp. 261-270.

Ramesh, B., Cao, L., Mohan, K., and Xu, P. 2006. "Can distributed software development be agile?" Communications of the ACM, (49:10), pp. 41-46.

Salo, O. and Abrahamsson, P. 2005, November. "Integrating agile software development and software process improvement: a longitudinal case study". In Empirical Software Engineering, 2005. 2005 International Symposium on (pp. 10).

Schwaber, K. 2004. "Agile project management with Scrum". Microsoft Press.

Sriram, R. and Mathew, S. K. 2012, June. "Global software development using agile methodologies: A review of literature". In Management of Innovation and Technology (ICMIT), 2012 IEEE International Conference on (pp. 389-393).

Vijayasarathy, L. R. and Butler, C. W. 2016. "Choice of Software Development Methodologies: Do Organizational, Project, and Team Characteristics Matter?". IEEE Software, (33:5), pp. 86-94.

Wendler, R. 2016. "Dimensions of Organizational Agility in the Software and IT Service Industry: Insights from an Empirical Investigation". Communications of the Association for Information Systems, (39:1), pp. 21.