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Skulmoski, Gregory James; Langston, Craig ; Patching, Alan; Ghanbaripour, Amir

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Abstract

Agile project management has evolved from a specialized technique used in the basement by the IT team to become an optional project management approach increasingly used outside of IT projects. Like traditional project management approaches (e.g., waterfall), Agile project management has had uneven success. As the obstacles to Agile project management success become understood, researchers and practitioners can focus their efforts to examine why Agile projects struggle and what actions should be taken to improve Agile project success rates.

The authors of this paper conducted a meta-analysis of Agile project management literature to identify key obstacles and challenges to Agile project success. The Agile barriers were related to Agile team members and the broader Agile team. The skills related to addressing these obstacles are discussed.

The authors conclude that while Agile project management is relatively new, the obstacles and associated mediating skills are well understood. That is, the square pegs of project management waterfall solutions, can fit into the round holes of Agile project challenges. Implications for practitioners are presented and discussed.

Key Words: Agile, Skills, Project Manager, Project Teams, Project Success

Introduction

Traditional project management follows a front-end planning approach, where the project requirements are mostly stable, and fairly-well understood. Planning, design, build and implementation are linear, sequential and can occur over multiple years for large scale projects. Project managers use a command and control type of governance in these traditional "waterfall" projects. The project environment is relatively stable, and teams can use long term horizons for planning and delivery (Haworth, 2017).

Unfortunately, project teams have long struggled to consistently and predictably deliver successful projects evidenced by poor project performance and the early researchers'

response to identify critical success factors (Pinto & Slevin, 1988). The Standish Group long ago studied project success within the IT discipline and reported on the high rate of project failure (e.g., 31.1% of IT projects are terminated before completion) and the costs of failure and missed opportunities (The Standish Group, 1994). Researchers and practitioners responded in multiple ways by conducting more research to understand solutions, offered new graduate programs in project management, published the 1996 PMBOK Guide™, developed project management maturity models, business opened PMOs, and sent their project participants to project management training.

Regrettably, delivering successful projects continues to challenge organizations reflected in less than desirable project success rates. Only 60% of strategic initiatives met their 2017 goals while 28% were deemed failures (Project Management Institute, 2017a). The Standish Group continues to monitor project success and report that out of 50,000 global projects they analyzed, 71% failed to be delivered on time, within budget and to the satisfaction of their stakeholders; this rate increased to 91% for medium to large projects! (Standish Group, 2015). The response to the challenges of traditional project management has been more research, more training and a quest for alternative approaches such as Agile project management.

Agile vs Waterfall Project Delivery

More organizations are introducing alternative delivery methods like Agile project management: up to 71% of organizations have reported they use Agile sometimes or more frequently than in the past (Project Management Institute, 2017b). Agile is an adaptation of traditional project management (waterfall) where project delivery is less linear, and some of the project management tasks are performed by the team rather than the project manager.

First, the Agile approach differs from the waterfall approach (Figure 1). The key difference is that a key goal in Waterfall projects is to identify and prioritize all requirements up front and then to sequentially proceed through the phases to deliver a complete workable solution based on the initial set of approved requirements. In Agile, the goal is to produce working solutions, small pieces at a time, then determine what will be delivered next, plan, build and review. Here, the Agile approach is more iterative and allows for changing requirements and priorities. Therefore, Agile phases not materially different from traditional project

management approaches (e.g., we still plan, design and build in both approaches), rather Agile phases occur in an iterative rather than a sequential order seen in waterfall projects.
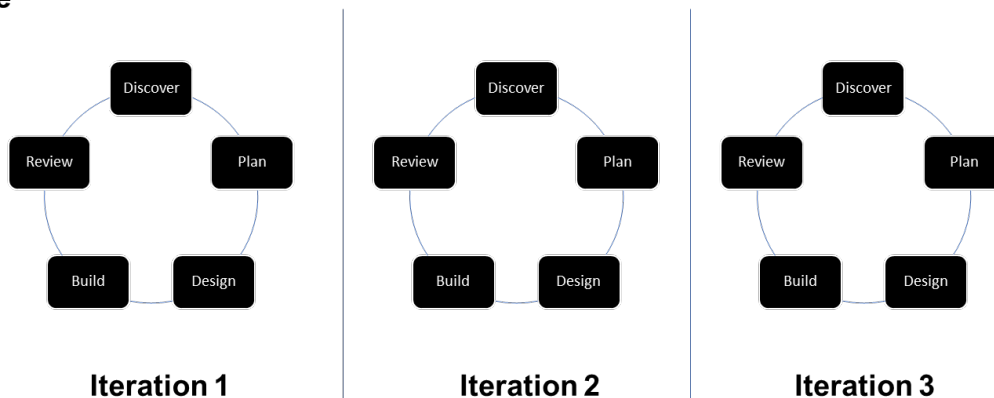
Waterfall
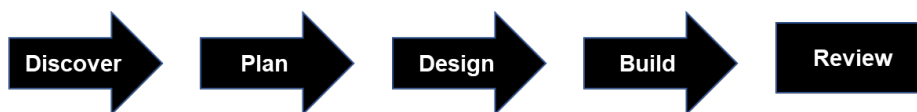
Agile

Figure 1: Waterfall vs Agile Approach

The second key difference between Waterfall and Agile project approaches of interest here, is that some of the traditional project management tasks are completed by others on the Agile team (Nkukwana & Terblanche, 2016). For example, Agile proponents advocate self-organizing teams (Hoda & Murugesan, 2016) who work with the Product Manager to determine sprint requirements (Nkukwana & Terblanche, 2016). Therefore, while many project tasks remain in Agile projects, they are performed by other Agile team members; same project tasks, different roles responsible for task completion.

Agile Success

Has Agile been successful? Serrador and Pinto conclude from a study of 1002 Agile projects that there is a positive, statistical relationship between Agile and dimensions of project success: efficiency, stakeholder satisfaction, and overall project performance, and they called for additional research to confirm their conclusion (Serrador & Pinto, 2015).

Agile Challenges

However, there remain challenges with successful Agile project management (Drury, et al, 2012; Hoda & Murugesan, 2016; Gren, et al, 2017); that is, like traditional project management delivery techniques, Agile is not a project success silver bullet. There are many reasons why Agile projects falter such as team member lack of commitment (Moe, et al, 2008). Or some Agile projects fail due to team members not adopting Agile principles and values, a weak understanding of Agile project management, lack of leadership support, contract alignment problems, determining the "correct" amount of documentation, and metrics not suitable for Agile projects (Novac & Ciochină, 2018).

Research into Agile adoption challenges reveal that technical teams and team members are sometimes not prepared to complete non-technical tasks such as requirements definition and prioritization that require more advanced communication and negotiation skills: "Many requirements engineers are familiar only with the technical side of software development and are not prepared for the kind of gamesmanship that occurs in negotiation with a savvy customer. Yet this negotiation may be the single most important factor in the success of the project" (Kovitz, 2003, p. 141). Here, typical waterfall project activities performed by the project management are pushed to technical team members in Agile projects who may not have sufficient experience and skills to succeed.

Teams can be challenged moving from a traditional project management approach where individual work is the focus to self-organized teams; specifically, moving from a position of high individual autonomy to an autonomous team can be difficult for some Agile team members (Moe,et al, 2009). Again, this is presumably due to a project management task (e.g., team organization and building) that has been pushed to the Agile Development Team that may not be fully ready to become autonomous. Agile teams involving technical members are more likely to require assistance with the psychological aspects of building teams (Gren, et al, 2017) and project managers can perform this role of mentorship (Nkukwana & Terblanche, 2017).

Agile Solutions - Individuals

To address these challenges the Agile literature offers solutions. We read that Agile team members should have both discipline-specific technical knowledge, skills and experience

(e.g., systems engineering) and Agile project skills (Novac & Ciochină, 2018); communication and collaboration skills (Larsen, 2005); and, business acumen and relationship-building skills (Matook & Maruping, 2014). These skills (and others) have long ago been identified as critical to traditional project success (Skulmoski & Hartman, 2010).

Agile Solutions - Teams

There is another project management perspective about competencies required for Agile project success: given that the Agile Manifesto's values and principles, emphasizes teams and teamwork, some researchers have proposed that we should also examine competence from a team rather than an individual perspective (Gren, et al, 2017; Nkukwana & Terblanche, 2017). Indeed, a key change to Agile from traditional projects is the way in which the delivery team operates (Nkukwana & Terblanche, 2017). Developing team competence is quite different than developing individual competencies; high performing teams are often mentored by coaches and managers to create the initial conditions for success and positive team experiences (Ericksen & Dyer, 2004). There is a long history of research that supports project team building to help with goal-setting, developing interpersonal relations, clarifying roles, and developing problem-solving techniques (Huemann, et al, 2007; Klein et al., 2009; Turner, et al, 2008). The recurring research conclusion is that team performance is positively related to team building on traditional projects.

Research into effective Agile teams is scarce despite the creation of the Agile Manifesto in 2001 triggering the Agile movement adoption within the practitioner community and new research opportunities for researchers. For example, the Agile project team's office layout has been studied and optimized to encourage effective communication, role success and task performance (Rola, et al, 2016). Agile teams are more effective when they are committed to teamwork and team results (Gren, et al, 2017). The quality of the team (measured by effective communication, coordination, team member contribution, mutual support, effort, and cohesion) is positively related to Agile team performance (Lindsjørn, et al, 2016). Agile teams can have higher performance when a team member can perform in multiple roles on a multifunctional team (Yauch, 2007). Research into team members' personality types can have an effect both on Agile team performance and cohesion (Karn, et al, 2007). Once can only expect more research into Agile teams as Agile type delivery methods are adopted by non-IT industries.

Agile Solutions – By Phase

Some researchers argue that since the nature of work changes within each phase, some of the required competencies within each phase should also change. Technical skills need to change as one progresses through the Agile process as they begin to understand the technical problem, through to designing, developing and testing technical solutions (Kovitz, 2003). We also have insight into the soft skills by phase project managers require to deliver projects by the traditional waterfall method (Skulmoski & Hartman, 2010). Skulmoski and Hartman's research identified the soft competencies project team members require in each phase of traditional projects. For example, previous research repeatedly found that communication is important in projects. Who could argue with this type of conclusion? Skulmoski and Hartman's research went further; for example, at the front end of the project, the type of communication skills that were important were the ability to ask questions and then to listen to the full answer. To get approval to proceed with the project, presentation and writing skills to market the project became important. Thus, Skulmoski and Hartman (2010) conclude that the required project soft competencies changed by project phase. There is no extant research into the soft competencies in Agile projects by phase that are critical for project success. Instead, we are offered high-level advice such as communication and collaboration skills are important for Agile project success (Larsen, 2005). What is not well understood are the soft competencies of individual team members and the team by Agile sprint phases. Further research into Agile team members' soft competencies by role and by phase may improve our understanding of how to more consistently deliver successful sprints. We may also gain insight into Agile project success through research into collective team performance by Agile phase.

Distinct Challenge: Self-Organizing Teams

While these challenges need to be addressed, there are two distinct challenges in Agile projects of interest here: self-organizing teams (Hoda & Murugesan, 2016), and shared decision-making (Moe, et al, 2012). The interesting thing about self-organizing teams and shared decision-making is that these challenges are distinct to Agile project management; that is, the other challenges may also occur in waterfall projects. For example, not adopting Agile is really, not adopting the organization's project management technique which can happen with any organizational initiative. Likewise, traditional projects can also have metric, contract

alignment, and documentation problems. What is unique is that self-organizing teams and shared-decision making are distinctly Agile project challenges.

In Agile projects, core team members self-organize to achieve the sprint objectives while in traditional projects, it is often the project manager or PMO leadership who organizes project teams. Creating effective and efficient self-organizing teams can be a key challenge on Agile projects (Hoda & Murugesan, 2016); indeed, sometimes this autonomy is not sought after, and/or valued (Hodgson & Brian, 2013). What makes self-organizing challenging? Self-organized teams commit to, select, plan, organize and execute agreed and prioritized tasks (Hoda & Murugesan, 2016). In a waterfall project, project managers lead many of these tasks while in Agile projects, self-organized Development Teams lead the sprint team effort with the assistance of other roles in the sprint like the Product Owner and Scrum Manager (Schwaber & Sutherland, 2016). One should not underestimate this fundamental change in project delivery: some activities once performed by the seasoned project manager are now passed to the team to complete. Making more than one person accountable for a task violates the practical "one-throat-to-choke" accountability adage.

Distinct Challenge: Self-Organizing Teams

A second key challenge to effective Agile teams is successfully shared decision-making (Moe, et al, 2011; and Drury, et al, 2012). Many project decisions (e.g., requirements prioritization, task duration estimation, team member capacity determination, etc.) once were driven by project managers in the command and control style of waterfall projects, but these decisions are now the responsibility of autonomous Agile teams (Nkukawana, et al, 2017; Drury et al; 2012). The decision quality of autonomous Agile teams is sometimes poor since decisions are made by the team rather than by an expert or project manager (Moe, et al, 2012). When Agile teams struggle to make decisions, there may be a time lag while the decision is escalated usually to the Scrum Master (Drury, et al, 2012). Thus, shared decision-making has the potential to improve decision quality, but Agile teams sometimes struggle when given shared decision-making responsibility. While these Agile challenges exist, there also exists possible solutions from the world of waterfall projects.

Using Square Pegs

While Agile research continues, we can improve upon Agile team success by helping individuals and teams with the challenges cited in the literature in this paper. We can apply many of the waterfall solutions to Agile challenges; square pegs can fit!

Effective Team Performance

A fundamental shift in Agile project delivery is the movement away from the individual to a focus on effective Agile teams. Organizations may improve project performance by applying general team building principles to Agile teams. We do not need to wait for the latest Agile team research; we can build effective Agile teams guided by non-Agile research and best practice.

Self-Organizing Teams

The composition of Agile teams should be based on the sprint goals. However, forming teams to achieve sprint objectives may be challenging for some Agile teams (Hoda and Murugesan, 2016). Here, more senior team members on the Agile team might be coached or given formal training about team building and project dynamics. Human resource management is a common topic in project management education programs and project manager training courses, and relevant topics could be recommended to Agile team members to pursue as part of their professional development. Again, we do not need to wait for the latest Agile self-organizing team research to be published; we can help Agile team members form teams through mentoring and/or we can recommend these team members read non-Agile research and best practice literature for guidance, or attend training.

Shared Decision Making

A key challenge for Agile teams is that they are now responsible for more complex project tasks like requirements definition and prioritization often requiring supplemental negotiation skills. We can offer problem-solving and negotiation mentoring and formal training to more capable Agile team members who naturally perform informal leadership roles during sprints. This type of soft skills training could be part of a managed career path for an Agile Development Team member to develop the skills to perform the role of Scrum Master.

Conclusion

Agile type implementations within and outside the IT discipline, and across industries is growing (Rigby, et al, 2016). However, we see some individuals and teams struggle with Agile adoption. Specifically, the shift away from individual to team accountability for Agile project success working as autonomous teams can be challenging for some. They may also struggle with some complex tasks (e.g., requirements definition and negotiation) previously performed by project managers.

While we can wait for published research about Agile teams and team members to improve our practice, there are things we can do now to address some of the obstacles. For example, project managers may include more mentoring activities since many traditional project manager activities have been pushed to other Agile team members. The project manager or other capable mentors can help team members use project management tools, processes, and methods required in their new role as Agile team members. Agile team members can also take formal courses specifically about Agile project management, but also about traditional project tools, methods and processes.

Thus, we can teach important skills used routinely on waterfall type of projects to our Agile team members. We do not necessarily need an "Estimating for Agile Projects" course; instead, we can coach Agile team members to set up an Excel sheet to capture duration estimates and, we may even show them the three-point estimating method (PERT estimating). We can help Agile team members to prioritize requirements (e.g.,, must have, should have, would be nice) thereby reducing conflict and avoiding negotiation. Here, we can use waterfall techniques on Agile projects; "square pegs fit."

References

Drury, M., Conboy, K., & Power, K. (2012). Obstacles to decision making in agile software development teams. *The Journal of Systems & Software, 85*(6), 1239-1254. doi:10.1016/j.jss.2012.01.058

Ericksen, J., & Dyer, L. (2004). Right from the start: Exploring the effects of early team events on subsequent project team development and performance. *Administrative Science Quarterly, 49*(3), 438-471.

Gren, L., Torkar, R., & Feldt, R. (2017). Group development and group maturity when building agile teams: A qualitative and quantitative investigation at eight large companies. *The Journal of Systems & Software, 124*, 104-119. doi:10.1016/j.jss.2016.11.024

Haworth, S. (2017). Agile vs waterfall. what should you use for your project. Retrieved from https://thedigitalprojectmanager.com/agile-vs-waterfall/

Hoda, R., & Murugesan, L. K. (2016). Multi-level agile project management challenges: A self-organizing team perspective. *The Journal of Systems & Software, 117*, 245-257. doi:10.1016/j.jss.2016.02.049

Hodgson, D., & Briand, L. (2013). Controlling the uncontrollable: 'Agile' teams and illusions of autonomy in creative work. *Work Employment and Society, 27*(2), 308-325. doi:10.1177/0950017012460315

Huemann, M., Keegan, A., & Turner, J. R. (2007). *Human resource management in the project-oriented company: A review* doi:10.1016/j.ijproman.2006.10.001

Johnson, A. (403). Knowledge without frontiers. reskilling without tears. *Legal Information Management, 4*(1), 63-68. doi:10.1017/S1472669603001154

Karn, J. S., Syed-Abdullah, S., Cowling, A. J., & Holcombe, M. (2007). A study into the effects of personality type and methodology on cohesion in software engineering teams. *Behaviour & Information Technology, 26*(2), 99-111. doi:10.1080/01449290500102110

Klein, C., Diazgranados, D., Salas, E., Le, H., Burke, C. S., Lyons, R., & Goodwin, G. F. (2009). Does team building work? *Small Group Research, 40*(2), 181-222. doi:10.1177/1046496408328821

Kovitz, B. (2003). Hidden skills that support phased and agile requirements engineering. *Requirements Engineering, 8*(2), 135-141. doi:10.1007/s00766-002-0162-9

Larsen, D. (2005). The courage to communicate: Collaborative team skills for XP/agile teams. *Extreme Programming and Agile Processes in Software Engineering, Proceeding, 3556*, 281-284.

Lindsjørn, Y., Sjøberg, D. I. K., Dingsøyr, T., Bergersen, G. R., & Dybå, T. (2016). Teamwork quality and project success in software development: A survey of agile development teams. *The Journal of Systems & Software, 122*, 274-286. doi:10.1016/j.jss.2016.09.028

Matook, S., & Maruping, L. (2014). A competency model for customer representatives in agile software development projects. *Mis Quarterly Executive, 13*(2), 77-95.

Moe, N. B., Aurum, A., & Dybå, T. (2012). Challenges of shared decision-making: A multiple case study of agile software development. *Information and Software Technology, 54*(8), 853-865. doi:10.1016/j.infsof.2011.11.006

Moe, N. B., Dingsøyr, T., & Dybå, T. (2008). *Understanding self-organizing teams in agile software development* doi:10.1109/ASWEC.2008.4483195

Moe, N. B., Dingsøyr, T., & Dybå, T. (2009). *A teamwork model for understanding an agile team: A case study of a scrum project* doi:10.1016/j.infsof.2009.11.004

Nkukwana, S., & Nicky H.D. Terblanche. (2017). Between a rock and a hard place: Management and implementation teams' expectations of project managers in an agile information systems delivery environment. *South African Journal of Information Management, 19*(1), e10. doi:10.4102/sajim.v19i1.806

Novac, C., & Ciochină, R. (2018). *Challenges of applying agile principles and values to IT project management* doi:10.7341/20181442

Pinto, J. K., & Sleven, D. P. (1988). "Project success: Definitions and measurement techniques". *Project Management Journal, 19*(1), 67-72.

Project Management Institute. (2017a). Project management job growth and talent gap 2017-2027. Retrieved from https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/job-growth-report.pdf

Project Management Institute. (2017b). *Pulse of the profession: 9th global project management survey.* .PMI. Retrieved from https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/thought-leadership/pulse/pulse-of-the-profession-2017.pdf

Rola, P., Kuchta, D., & Kopczyk, D. (2016). Conceptual model of working space for agile (scrum) project team. *The Journal of Systems & Software, 118*, 49-63. doi:10.1016/j.jss.2016.04.071

Serrador, P., & Pinto, J. K. (2015). Does agile work? — A quantitative analysis of agile project success. *International Journal of Project Management, 33*(5), 1040-1051. doi:10.1016/j.ijproman.2015.01.006

Skulmoski, G. J., & Hartman, F. T. (2010). Information systems project manager soft competencies: A project-phase investigation. *Project Management Journal, 41*(1), 61-80. doi:10.1002/pmj.20146

Sutherland, J., & Schwaber, K. (2016). *The definitive guide to scrum: The rules of the game.*

The Standish Group. *The chaos report: 2015*. Retrieved from http://www.infoq.com/articles/standish-chaos-2015

The Standish Group. (1994). *The chaos report*. Retrieved from https://www.standishgroup.com/sample_research_files/chaos_report_1994.pdf

Turner, R., Huemann, M., & Keegan, A. (2008). Human resource management in the project-oriented organization: Employee well-being and ethical treatment. *International Journal of Project Management, 26*(5), 577-585. doi:10.1016/j.ijproman.2008.05.005

Yauch, C. A. (2007). Team-based work and work system balance in the context of agile manufacturing. *Applied Ergonomics, 38*(1), 19-27. doi:10.1016/j.apergo.2006.02.002