TOWARD A GENERAL THEORY OF AGILE PROJECT MANAGEMENT – A RESEARCH DESIGN

Research in Progress

Drechsler, Andreas, University of Duisburg-Essen, Essen, Germany,
andreas.drechsler@icb.uni-due.de

Ahlemann, Frederik, University of Duisburg-Essen, Essen, Germany,
frederik.ahlemann@icb.uni-due.de

Abstract

This paper presents a research design to develop a general theory of agile project management to describe and explain the effects of adopting agile methodologies in a comprehensive and integrative way. The theory is to contain the key constructs and their relations responsible for the effects and success of agile methodologies in current practice. This theory's scope is grander than existing theoretical lenses, which constitute partial perspectives to explain selected phenomena, or the success of agile methodologies. First, the existing partial perspectives are captured by an extensive literature review and integrated into an initial comprehensive theoretical model. Afterwards, experienced practitioners' perspectives on concepts responsible for the effectiveness of agile methodologies are captured through a Delphi panel and integrated into the comprehensive theoretical model. The resulting general theory of agile project management is independent of the domain of software development and is in keeping with the intention to facilitate the transfer of agile principles to general project management. Other researchers can employ and adapt the overall research design to develop comprehensive theories about existing practice phenomena which integrate existing theoretical lenses as well as practitioners' perspectives.

Keywords: agile methodology, agile theory, theory development, theory building, theorizing, Delphi

1 Introduction

Over the last fifteen years, project managers have developed agile methodologies, such as Extreme Programming (Beck and Andres, 2004) and SCRUM (Schwaber, 2009), in order to cope with common software project challenges. These methodologies' widespread and ongoing adoption in actual software projects is also an indication of their usefulness for software project managers and team members in order to achieve software project success (Baskerville et al., 2011). Agile methodologies have also received a considerable amount of attention in research. Often, research on agile methodologies only consists of lessons learned from single cases or contexts (Laanti et al., 2011; Moe et al., 2010) or the identification of critical success factors (Chow and Cao, 2008; Misra et al., 2009) with little or no roots in theory. Alternatively, researchers have only selected theories to suit particular aspects of their interests.

Since practitioners have developed these agile methodologies, they lack a coherent theoretical underpinning (Dingsøyr et al., 2012). The principles and values codified in the agile manifesto are their least common denominator (Beck et al., 2001a, 2001b). This lack of a coherent and comprehensive theoretical underpinning leaves the – admittedly not insignificant – research findings isolated and difficult to

place in a larger context. Each partial theoretical perspective only captures part of the "essence" that makes agile methodologies effective and distinguishes them from traditional project management methodologies. In turn, this constitutes an obstacle for a theoretically grounded transfer of agile concepts to project or other management beyond the domain of software development.

Therefore, the goal is to develop a general theory of agile project management to provide such a coherent, comprehensive, and integrative theory framework. The resulting general theory of agile project management is to capture the key constructs and their relationship, which are responsible for the effects and success of agile methodologies and agile project teams (as unit of analysis) in current practice. During theory development, the existing partial theoretical perspectives on agile methodologies are to be integrated into a general theory. Thereafter, it is to be validated and extended by means of a Delphi panel consisting of experts on agile methodologies. Once consensus is reached among the experts, the resulting theory is to be juxtaposed with existing theories, in order to embed it into the existing body of management and IS theories and identify connections and relations.

As a first step toward reaching this goal, this paper presents the research design to develop the general theory of agile project management. The research design has no specific elements for the domain of software development or project management; other researchers can therefore adapt and use it for any research project to develop a theory about a phenomenon of practice while capturing the current state of research as well as practitioners' perspectives. The paper is organized as follows: At first, the current state of theory-driven agile research is reviewed. Afterwards, it presents the steps of the overall research process and gives details about the data collection and analysis. It ends with a discussion and a conclusion.

2 Current state of research on agile theory

Initially, software development practitioners developed agile methodologies as a reaction to the identified shortcomings of traditional project management for software projects, such as the lack of communication with the customer, or the lack of flexibility to account for changes to a project during its duration. These practitioners codified agile principles and values in the agile manifesto (Beck et al., 2001a, 2001b), explained them further in books (Highsmith, 2002, 2010), and constructed specific agile methodologies to operationalize the abstract principles and values and to make them immediately applicable. The most common agile methodologies are: Extreme Programming (Beck and Andres, 2004), Scrum (Schwaber, 2009), and the Crystal method family (Cockburn, 2007). A decade of practical success (Dingsøyr et al., 2012) is an indication that using agile methods is no fad or fashion, but an established and effective way of managing software projects successfully (Baskerville et al., 2011). In turn, researchers became increasingly interested in investigating the success of agile methodologies, especially from the second half of the last decade onward.

In a recent literature review, Hummel (2014) analyzes 482 papers on agile methodologies, covering information systems publications and software engineering journals and conferences. He follows a strong understanding of theory (Whetten, 1989) and reveals that only 40% of the papers rely on explicit theoretical foundations and just 11.5% are concerned with theory-building. He concludes his review with a call for increased theory-building and theorizing. Dingsøyr et al. (2012) likewise call for research on agile methodologies to develop a unifying theoretical perspective.

Hummel (2014) further identifies the top three theories used to explain the effects of agile methodologies: complex-adaptive systems theory (e.g., Alaa and Fitzgerald, 2013), control theory (e.g., Persson et al., 2012), and coordination theory (e.g., Strode et al., 2012). Other theories that were recently used include the shared mental models theory (Yu and Petter, 2014) and the theory of reflective practice (Babb et al., 2014).

In addition to theories, other papers sometimes rely on more basic concepts to explain agile methodologies phenomena. These concepts do not form part of full-fledged theories in the respective papers, but are candidates for integration into a more comprehensive theory. The following, selected concepts illustrate the diversity of the concepts found in papers published in high-ranking information systems and software engineering journals: trust (Goh et al., 2013; McHugh et al., 2012), communication (Hummel et al., 2013; Layman et al., 2006), expertise coordination (Maruping et al., 2009), social facilitation and individual and group information processing (Balijepally et al., 2009), decision-making (Drury et al., 2012), self-organization (Hoda et al., 2013), emergent design and the holographic organization (Nerur and Balijepally, 2007), organizational culture (Iivari and Iivari, 2011; Tolfo and Wazlawick, 2008), and team autonomy and team diversity (Lee and Xia, 2010). The different levels of abstraction, overlapping scopes, and missing relations between some concept pairs are the main challenges to integrating these diverse concepts into a more comprehensive theory.

Besides using existing theoretical or conceptual lenses to explain agile methodologies, some researchers choose a different approach. Adolph, Kruchten, & Hall (2012) have developed a grounded theory on how agile software development processes work. While this grounded theory is insightful, the authors do not connect or relate it to other theories, leaving their findings isolated from the existing body of knowledge.

As agile project management is a special instance of general project management, it is important to distinguish generic factors such as top management support (2008) as well as emerging general theories of project management (Andersen, 2006; Sauer and Reich, 2007; Turner, 2006a, 2006b, 2006c, 2006d) from factors, concepts, and theories that are related specifically to agile project management. At the same time, special attention should be paid to any conflicts with or contradictions to the general theory of agile project management. While there may be good reasons for such conflicts with the more specific domain of agile project management, they need to be highlighted and discussed thoroughly during theory development.

There is also a discourse on the agility concept itself (Desouza, 2006) and its specific role in sub-disciplines such as IS strategizing (Galliers, 2006) in the Information Systems discipline. Galliers (2006), for example, highlights the important role abstract phenomena or concepts such as emergence, bricolage, and drift play when organizations try to practice agility. While not directly related to agile project management, this discourse can provide a wider context for the general theory on agile project management or inform and substantiate the theory's constructs. A thorough review of the respective discourse and in-depth connection to extant research on agile project management is outside of this paper's scope, however.

In sum, the theories and concepts that researchers employ to explain phenomena related to agile methodologies are highly diverse. Consequently, there are – as yet unanswered – calls for a unified theoretical perspective on agile methodologies. We intend using the proposed research project to propose a general theory of agile project management to fill this identified research gap.

Finally, the transfer of agile principles to domains other than software development has been of recent interest as well (Conforto et al., 2014; Randall, 2014). However, the findings are still of a very exploratory nature. In this respect, the propositions regarding agile project management to be based on the general theory we will develop, may serve as a further stepping stone toward a theoretically grounded application of agile principles and methodologies beyond software development. However, such a generalization requires a careful consideration of a theory's boundaries. For this reason, we regard such a transfer as out of scope for this research endeavour, but as sufficiently sophisticated for a subsequent one.

3   Research design

3.1   Overview

The overall research design is based on the methodology that Anderson et al. (1994) developed for formulating a theory starting with practitioner-oriented principles. These scholars derived a theory of quality management based on Deming's 14 principles of quality management (Deming, 1981). Analogous to the principles and values of agile methodologies as codified in the agile manifesto (Beck et al., 2001a, 2001b), practitioners (or rather, a single practitioner) formulated Deming's principles as prescriptive guidelines with a practitioner audience in mind. These principles likewise lack a theoretical foundation, but have proved effective and useful in practice. Therefore, we regard the Anderson et al.'s (1994) approach as suitable to formulate a general theory of agile project management.

Anderson et al. (1994) understood theory in the sense of Whetten (1989), who points out the importance of the following four elements for a theory: 1) variables, constructs, or concepts ("what?"), 2) the relationships between these elements ("how?"), 3) rationales and assumptions for the inclusion of the elements and the nature of their relations ("why?"), and 4) the context or boundary constraints of the theory's applicability. They employed the Delphi method (Hsu and Sandford, 2007; Landeta, 2006; Okoli and Pawlowski, 2004) to identify concepts and relationships for their theory, drawing on a Delphi panel consisting of seven experts on Deming's principles and quality management in general. In three Delphi rounds, their experts identified 37 concepts underlying Deming's principles and achieved far-reaching consensus about the concepts' validity. Afterwards, Anderson et al. refined the 37 initial concepts to seven by increasing the level of abstraction. Examples of their final concepts are "visionary leadership," "continuous improvement," and "customer satisfaction." They furthermore developed relationships between the concepts, as well as between the testable propositions. Finally, they related their proposed theory (concepts and relationships) of quality management to the existing body of organizational and management theory in order to cover the "why" part and the boundaries of their theory.

However, there has been significant published research on agile methodologies drawing on existing theory, which is not the case with Deming's principles for quality management. Therefore, we modify Anderson et al.'s approach in this research project to explicitly cover, and include, the existing partial theoretical perspectives in the process of developing a general theory of agile project management.

In detail, the research will follow the following seven steps:

1. Systematize existing theoretical lenses on agile project management: In the first phase, we will systematize the theories and concepts that existing research on agile methodologies has used in an initial theoretical model and relate the constructs and concepts to each other, as well as to the principles and values of the agile manifesto.

2. Apply the Delphi method: The initial theoretical model forms the basic input for the Delphi panel in which experts on agile methodologies from practice add and comment on the model's constructs. The experts are selected based on their experience, renown and activities in the agile practitioner community. The specific Delphi process to collect and analyse the experts' inputs as data is further detailed in the subsequent sections 3.2 and 3.3.

3. Refine concepts: Based on Anderson et al.'s (1994) experiences, we expect the execution of the Delphi method to yield more potential theory elements than are feasible for a useful general theory of agile project management. Therefore, we will increase the identified theory elements' level of abstraction in order to reduce their number, while maintaining their expressive power. We will furthermore

subject our fledgling theory to a rigorous evaluation, following the framework proposed by Weber (2012).

4. (Re)develop relationships between concepts and formulate testable propositions: After we have finalized the concepts for the future general theory of agile project management, we will (re)develop the relationships between the concepts. The extent of the existing relationships' redevelopment and the proposal of new relationships will depend on the extent of the changes made to the theory between steps 1 and 3. In addition, we will formulate testable propositions based on the concepts and the proposed relationships as a first step towards the practical application of the theory.

5. Re-evaluate the developed theory and discuss practical implications: In this step, we will subject the refined theory to an evaluation round with the Delphi panelists. This will take place during a live symposium, during which we will encourage the panelists to engage in moderated, face-to-face discussions in order to capture additional and novel aspects that may emerge from the discussions. In addition, during the symposium, we will task the panelists with discussing the concrete practical implications of the theory for general project management, in order to further facilitate the theory's transfer to project management practice beyond the domain of software development. Based on the gathered feedback, we will revise the theory accordingly.

5. Juxtapose the concepts and their relationships in existing literature: In order to substantiate and justify the concepts and their relationships, we conduct an extensive literature review for each of them. Afterwards, we place the overall theory developed so far in the context of related theories and discussed further, for example, to the wider discourse on agility in information systems (Desouza, 2006), or to topically related IS theories such as user participation theory (Markus and Mao, 2004). This step also includes identifying boundary constraints in applying the theory – i. e. aspects limiting its scope of applicability.

6. *Present theory and practical implications to the community*: In the final step, we will seek feedback about the final theory from the IS research and the agile community and prepare the final publications.

3.2   Data Collection

In the Delphi panel, we will task with experts on agile methodologies from practice with identifying and defining concepts that, in the experts' experiences, are responsible for the effectiveness of agile methodologies. We will treat these experiences as existing theories-in-use about the effects and effectiveness of agile methodologies. The Delphi panel will proceed according to the following steps:

1. The Delphi panelists will *identify and define concepts* underlying agile project management in an initial round. The findings of our initial literature review form the initial input for this round.

2. The panelists will *evaluate and rank the concepts* identified in the previous step regarding their suitability and importance for capturing the essence of agile project management.

3. We will *re-iterate sub-steps 1 and 2* and task the panelists with agreeing, disagreeing, and commenting on the previous findings until they reach a substantial agreement on the concepts, or other criteria are met that indicate the process has been completed (see subsequent section on data analysis).

In each Delphi round, the panelists will document their response on a standardized form and send these to us. We will evaluate, analyse, and harmonize their responses. Following the current recommendations in the literature (Hsu and Sandford, 2007) and taking Anderson et al.'s (1994) practical experiences into account, we expect to reach sufficient consensus after three Delphi rounds.

3.3   Data Analysis

The data analysis will be undertaken after each Delphi round. We intend to follow best practices regarding Delphi study questionnaire design and evaluation (Delbecq et al., 1975; Hsu and Sandford, 2007; Okoli and Pawlowski, 2004; Paré et al., 2013; Schmidt, 1997):

In the first round, we will give the panelists the initial set of concepts from the initial literature systematization and ask them to comment on the concepts, as well as add and describe any additional concepts they regard as relevant. We will not limit the number of concept each panelist may provide (Schmidt, 1997). In the subsequent data analysis phase, we will consolidate the submitted concepts and will merge differently named concepts that have similar descriptions. Afterwards, we will submit the consolidated list for a re-review by the panelists to ensure that we did not cause data distortion when consolidating the concepts (Delbecq et al., 1975; Paré et al., 2013). This list forms the basis of the next Delphi round.

If we arrive at more than 30 unique concepts (Okoli and Pawlowski, 2004) in the first round, we will ask the panelists to identify the ten most important concepts (Delbecq et al., 1975) on the unordered list that we will send them. We will remove any concepts that at least a third or half of the panelists (Paré et al., 2013) do not regard as important, until 20-30 concepts remain.

Afterwards (or immediately after the first round, if the panelists specify less than 30 concepts initially), we will ask the panelists to rank the concepts in order of importance and to comment on their rankings. Based on the numerical rankings, we will calculate the mean item ranking and Kendall's W coefficient of concordance. Following Okoli and Pawlowski (2004), we will stop when W is > 0.7, three ranking rounds have been performed, or when, based on the McNemar test, the mean rankings of two successive rounds do not differ significantly. Following Schmidt's (1997) recommendations, we will, at the beginning of a subsequent ranking round, give the panelists controlled feedback on the interpretation of Kendall's W in the previous round, the percentage of panelists placing each concept in the top half of their ranking, and relevant comments the other panelists made.

4   Discussion and Conclusion

The research design outlined so far describes a comprehensive research process to develop a general theory on agile project management out of existing partial theoretical lenses as well as practitioner's experiences. Our work makes several contributions to the theoretical IS body of knowledge: First, the resulting theory contributes to theorizing in the IS discipline since its scope is grander than existing theoretical lenses on agile methodologies and it is able to explain the underlying mechanisms of agile methodologies through constructs and their relationships more comprehensively. The constructs and relationships in turn are to be rooted in other theories and therefore are to be well embedded into the existing theory landscape. The theory further provides a more comprehensive and coherent theoretical lens than any that currently exist for future theory-oriented research, in order to further improve our understanding of agile project management.

Second, the resulting theory is independent of the domain of software development and is in keeping with the intention to facilitate the transfer of agile principles to general project management or other management domains. Such a transfer may allow for harnessing agile methodologies' potential in projects in other domains. However, Gregor (2006) notes that a theory's domain is related to structural, ontological, epistemological, and socio-political questions. Therefore, such a transfer requires special attention to this theory's boundaries.

Third and lastly, the research design does not contain elements specific to agile methodologies and can also be employed to develop grander theories for any domain of the IS or other disciplines where an

established practice as well as partial theoretical lenses in research exist. It therefore contributes to advancing theorizing in the IS discipline by providing a generalizable blueprint on how to develop novel theories for domains where theories are lacking. It also mitigates the weakness of Anderson et al.'s (1994) research design which starts the theory development "from scratch" with no input for the Delphi panel and therefore no consideration of existing theory-oriented research for the respective domain. The research design therefore also contributes to a growing cumulative body of theories in the future.

From a managerial perspective we regard the inclusion of expert practitioners' perspective as crucial to develop a theory which is not only well-rooted in the existing body of theories and concepts, but also of high relevance for practitioners in the domain so that they can better understand their own domain and explain pertinent phenomena. We also expect to gain interesting insights from the live symposium after the Delphi rounds are finished regarding elements of the theory which are of the highest importance for the practitioners. These, in turn, contribute to theorizing to expand the theorizing audience beyond IS researchers to practitioners who seek a better understanding of their own domains. Based on our initial communications, many agile experts we identified were keen to serve on the Delphi panel and be among the first who receive the results.

By relying on established literature of theory building and evaluation such as Weber (2012) at the same time, we expect the theory building process to be an interesting exercise balancing (or juggling) rigor and relevance. Based on our experiences, we intend to derive recommendations for the research process' future application and refine it accordingly in retrospective to help its future users.

References

Adolph, S., Kruchten, P., and Hall, W. (2012). "Reconciling perspectives: A grounded theory of how people manage the process of software development." *Journal of Systems and Software* 85 (6), 1269–1286.

Alaa, G., and Fitzgerald, G. (2013). "Re-Conceptualizing Agile Information Systems Development Using Complex Adaptive Systems Theory." *Emergence: Complexity & Organization* 15 (3), 1–23.

Andersen, E. S. (2006). "Toward a project management theory for renewal projects." *Project Management Journal* 37 (4), 15.

Anderson, J. C., Rungtusanatham, M., and Schroeder, R. G. (1994). "A Theory of Quality Management Underlying the Deming Management Method." *Academy of Management Review* 19 (3), 472–509.

Babb, J., Hoda, R., and Norbjerg, J. (2014). "Embedding Reflection and Learning into Agile Software Development." *IEEE Software* 31 (4), 51–57.

Balijepally, V., Mahapatra, R., Nerur, S., and Price, K. H. (2009). "Are Two Heads Better Than One for Software Development? the Productivity Paradox of Pair Programming." *MIS Quarterly* 33 (1), 91–118.

Baskerville, R., Pries-Heje, J., and Madsen, S. (2011). "Post-agility: What follows a decade of agility?" *Information and Software Technology* 53 (5), 543–555.

Beck, K., and Andres, C. (2004). *Extreme Programming Explained: Embrace Change* (2. Aufl.). Addison-Wesley Longman, Amsterdam.

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., … Thomas, D. (2001a). "Manifesto for Agile Software Development."

Beck, K., Beedle, M., van Bennekum, A., Cockburn, A., Cunningham, W., Fowler, M., … Thomas, D. (2001b). "Principles behind the Agile Manifesto."

Chow, T., and Cao, D.-B. (2008). "A survey study of critical success factors in agile software projects." *Journal of Systems and Software* 81 (6), 961–971.

Cockburn, A. (2007). *Agile software development: the cooperative game*. Upper Saddle River, NJ: Addison-Wesley.

Conforto, E. C., Salum, F., Amaral, D. C., da Silva, S. L., and Magnanini de Almeida, L. F. (2014). "Can Agile Project Management Be Adopted by Industries Other than Software Development?" *Project Management Journal* 45 (3), 21–34.

Delbecq, A. L., Ven, A. H. V. de, and Gustafson, D. H. (1975). *Group techniques for program planning: a guide to nominal group and Delphi processes*. Scott, Foresman.

Deming, W. E. (1981). "Improvement of quality and productivity through action by management." *National Productivity Review* 1 (1), 12–22.

Desouza, K. (Ed.). (2006). *Agile Information Systems: Conceptualization, Construction, and Management*. Routledge.

Dingsøyr, T., Nerur, S., Balijepally, V., and Moe, N. B. (2012). "A decade of agile methodologies: Towards explaining agile software development." *Journal of Systems and Software* 85 (6), 1213–1221.

Drury, M., Conboy, K., and Power, K. (2012). "Obstacles to decision making in Agile software development teams." *Journal of Systems and Software* 85 (6), 1239–1254.

Galliers, R. D. (2006). "Strategizing for Agility: Confronting Information Systems Inflexibility in Dynamic Environments." In K. C. Desouza (Ed.), *Agile Information Systems: Conceptualization, Construction, and Management* (pp. 1–15). Routledge.

Goh, J. C.-L., Pan, S., and Zuo, M. (2013). "Developing the Agile IS Development Practices in Large-Scale IT Projects: The Trust-Mediated Organizational Controls and IT Project Team Capabilities Perspectives." *Journal of the Association for Information Systems* 14 (12).

Gregor, S. (2006). "The Nature of Theory in Information Systems." *MIS Q.* 30 (3), 611–642.

Highsmith, J. (2002). *Agile software development ecosystems*. Boston et al.: Addison-Wesley.

Highsmith, J. (2010). *Agile project management : creating innovative products* (2. ed.). Upper Saddle River, NJ ua: Addison-Wesley.

Hoda, R., Noble, J., and Marshall, S. (2013). "Self-Organizing Roles on Agile Software Development Teams." *IEEE Transactions on Software Engineering* 39 (3), 422–444.

Hsu, C.-C., and Sandford, B. A. (2007). "The Delphi technique: making sense of consensus." *Practical Assessment, Research & Evaluation* 12 (10), 1–8.

Hummel, M. (2014). "State-of-the-Art: A Systematic Literature Review on Agile Information Systems Development." In *2014 47th Hawaii International Conference on System Sciences (HICSS)* (pp. 4712–4721).

Hummel, M., Rosenkranz, C., and Holten, R. (2013). "The role of communication in agile systems development: An analysis of the state of the art." *Business and Information Systems Engineering* 5 (5), 343–355.

Iivari, J., and Iivari, N. (2011). "The relationship between organizational culture and the deployment of agile methods." *Information and Software Technology* 53 (5), 509–520.

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), 276–290.

Landeta, J. (2006). "Current validity of the Delphi method in social sciences." *Technological Forecasting and Social Change* 73 (5), 467–482.

Layman, L., Williams, L., Damian, D., and Bures, H. (2006). "Essential communication practices for Extreme Programming in a global software development team." *Information and Software Technology* 48 (9), 781–794.

Lee, G., and Xia, W. (2010). "Toward Agile: An Integrated Analysis of Quantitative and Qualitative Field Data on Software Development Agility." *MIS Quarterly* 34 (1), 87–114.

Markus, M. L., and Mao, J.-Y. (2004). "Participation in Development and Implementation - Updating An Old, Tired Concept for Today's IS Contexts." *Journal of the AIS* 5 (11), 514–544.

Maruping, L. M., Zhang, X., and Venkatesh, V. (2009). "Role of collective ownership and coding standards in coordinating expertise in software project teams." *European Journal of Information Systems* 18 (4), 355–371.

McHugh, O., Conboy, K., and Lang, M. (2012). "Agile Practices: The Impact on Trust in Software Project Teams." *IEEE Software* 29 (3), 71–76.

Misra, S. C., Kumar, V., and Kumar, U. (2009). "Identifying some important success factors in adopting agile software development practices." *Journal of Systems and Software* 82 (11), 1869–1890.

Moe, N. B., Dingsøyr, T., and Dybå, T. (2010). "A teamwork model for understanding an agile team: A case study of a Scrum project." *Information and Software Technology* 52 (5), 480–491.

Nerur, S., and Balijepally, V. (2007). "Theoretical Reflections on Agile Development Methodologies." *Commun. ACM* 50 (3), 79–83.

Okoli, C., and Pawlowski, S. D. (2004). "The Delphi method as a research tool: an example, design considerations and applications." *Information & Management* 42 (1), 15–29.

Paré, G., Cameron, A.-F., Poba-Nzaou, P., and Templier, M. (2013). "A systematic assessment of rigor in information systems ranking-type Delphi studies." *Information & Management* 50 (5), 207–217.

Persson, J. S., Mathiassen, L., and Aaen, I. (2012). "Agile distributed software development: enacting control through media and context." *Information Systems Journal* 22 (6), 411–433.

Randall, R. M. (2014). "Agile at IBM: software developers teach a new dance step to management." *Strategy & Leadership* 42 (2), 26–29.

Sauer, C., and Reich, B. H. (2007). "What do we want from a theory of project management? A response to Rodney Turner." *International Journal of Project Management* 25 (1), 1–2.

Schmidt, R. C. (1997). "Managing Delphi Surveys Using Nonparametric Statistical Techniques*." *Decision Sciences* 28 (3), 763–774.

Schwaber, K. (2009). *Agile Project Management with Scrum*. Microsoft Press.

Strode, D. E., Huff, S. L., Hope, B., and Link, S. (2012). "Coordination in co-located agile software development projects." *Journal of Systems and Software* 85 (6), 1222–1238.

Tolfo, C., and Wazlawick, R. S. (2008). "The influence of organizational culture on the adoption of extreme programming." *Journal of Systems and Software* 81 (11), 1955–1967.

Turner, J. R. (2006a). "Towards a theory of project management: The nature of the project." *International Journal of Project Management* 24 (1), 1–3.

Turner, J. R. (2006b). "Towards a theory of project management: The nature of the project governance and project management." *International Journal of Project Management* 24 (2), 93–95.

Turner, J. R. (2006c). "Towards a theory of project management: The nature of the functions of project management." *International Journal of Project Management* 24 (4), 277–279.

Turner, J. R. (2006d). "Towards a theory of Project Management: The functions of Project Management." *International Journal of Project Management* 24 (3), 187–189.

Weber, R. (2012). "Evaluating and Developing Theories in the Information Systems Discipline." *Journal of the Association for Information Systems* 13 (1).

Whetten, D. A. (1989). "What constitutes a theoretical contribution?" *Academy of Management Review* 14 (4), 490–495.

Young, R., and Jordan, E. (2008). "Top management support: Mantra or necessity?" *International Journal of Project Management* 26 (7), 713–725.

Yu, X., and Petter, S. (2014). "Understanding agile software development practices using shared mental models theory." *Information & Software Technology* 56 (8), 911–921.