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Leadership in Agile Software Development: A Systematic Literature Review

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Abstract

Effective leadership is deemed essential for successful projects and teams. However, leadership in agile software development projects and teams is a challenge in practice, and the research literature provides no general agreement on what constitutes effective leadership in this environment. To address this issue and give the agile community a comprehensive overview of the research on agile leadership we report the results of a systematic literature review (SLR). The SLR identified 33 studies in the Scopus database published from 2000-2019 that contribute to agile leadership knowledge. The results indicate that whilst some studies apply leadership theories to explore and explain the role of agile leadership other studies propose alternative approaches to leadership within agile software teams and projects. The results suggest that agile leadership research needs further attention and that more empirical studies are needed to better understand agile leadership in general and in the various agile information systems development environments.

Keywords Agile methods, agile information systems development, agile project leadership, agile team leadership, Scrum leadership.

1   Introduction

Agile software development is a philosophy including methods and practices for developing software-intensive systems in an adaptive manner. Agile approaches aim to regularly produce increments of working software that meets customer requirements using teamwork, close customer collaboration, and short iterations (Beck et al. 2001; Cockburn 2002; Schwaber et al. 2017). Agile software development is adopted extensively in the software development industry and more generally across mainstream business domains (Dikert et al. 2016; Stavru 2014; VersionOne 2020). Despite the growth and popularity of agile methods within organisations, seminal sources such as the Agile Manifesto (Beck et al. 2001) and others (Beck 2000; Cockburn 2002) provide little guidance on what constitutes effective leadership in agile software development project teams (i.e. agile leadership).

Traditionally, effective leadership is deemed essential for successful projects but that research tends to focus on leadership models with hierarchical team structures and formally appointed leaders (Morgeson et al. 2010). Morgeson et al. (2010) developed a taxonomy of team leadership functions but the relevance of these functions to agile software development is unclear. Gregory et al. (2016) and Stray et al. (2018) confirm that Agile leadership is a challenge in practice, and the risks of projects failing are higher without sufficient leadership and support. Furthermore, a recent industry survey of agile software development use (VersionOne 2020), reports that leadership participation is a challenge experienced by agile teams. Another problem is that, although certain leadership types are proposed in the leadership research in agile project teams, the research offers no general agreement on what constitutes effective leadership. Practitioner guidelines refer to servant leadership (Schwaber et al. 2017) and limited empirical research proposes shared leadership (Moe et al. 2009a; Strode 2015) or self-organising teams (Stray et al. 2018). Current understanding of leadership in agile project teams appears to be fragmented.

These issues in the agile software development community of practitioners and academics motivated us to undertake a comprehensive review of the empirical and conceptual research on agile leadership. Our aim was to form an integrative perspective on what is currently known about effective leadership of agile projects and teams with the overall goal to improve understanding of effective agile leadership and thus outcomes for agile projects and teams.

To fully understand effective agile leadership, we report the results of a systematic literature review (SLR) of agile leadership research. Such a review not only summarises the current literature but identifies gaps within the body of research and suggests areas for further investigation. To ensure that effective agile leadership was explored adequately, and relevant literature was captured through our review, we posed the following research questions

RQ1: *How is agile leadership studied; what research methods are used in studies of agile leadership; what is the strength of evidence for agile leadership?*

RQ2: *What is the current knowledge of agile leadership within software development and information systems development projects?*

In carrying out the SLR we followed guidelines for information systems research and software engineering research (Dyba et al. 2008; Kitchenham et al. 2009; Okoli 2015). We carried out the SLR on publications in the Scopus database appearing from 2000 to 2019.

This paper is organised as follows. First, we review leadership theories focusing on teamwork and describe the main ideas on leadership in the agile software development community. We then describe our method for carrying out the systematic literature review. We present the review results organised to address each of the research questions and synthesise the results to guide researchers and practitioners using agile approaches in the discussion and conclusion.

Note: In this paper, the term 'study' refers to an individual conference paper or journal article.

2   Background Literature

Leadership is a mature research domain with formal and substantive theoretical underpinnings (Bass et al. 1990; Dugan 2017). One branch of leadership research focuses on team leadership. For brevity and to enable a comparison with research on agile leadership, the following brief narrative review focuses only on team leadership literature rather than all leadership literature.

2.1   Team Leadership Theory

The branch of leadership theory concerned with team leadership has numerous theories. Salas et al. (2005) define team leadership as the *"Ability to direct and coordinate the activities of other team members, assess team performance, assign tasks, develop team knowledge, skills, and abilities, motivate team members, plan and organize, and establish a positive atmosphere."* (p. 560). This definition is based on a well-founded and influential theory developed from general teamwork literature. Salas et al. (2005) provide six markers that define the behaviours of a team leader as follows (Salas et al. 2005, p. 560): facilitate team problem-solving, provide performance expectations and acceptable interaction patterns, synchronize and combine individual team member contributions, seek and evaluate information that affects team functioning, clarify team member roles, engage in preparatory meetings and feed-back sessions with the team.

2.2   Leadership in Agile Software Development

Leadership in agile software development is considered important in the practitioner and the research literature but there is no consensus on what type of leadership is effective in this context. In the practitioner guidelines for agile projects, such as the Scrum guide and the Agile practice guide (Griffiths et al. 2017; Schwaber et al. 2017), leadership takes the form of servant leadership, a form of leadership described by Greenleaf (2003) and Van Dierendonck (2011). The servant-leader facilitates team empowerment and motivation and performs boundary spanning between the organisation and the team (Holtzhausen et al. 2018).

The empirical research literature offers various perspectives on agile leadership. One perspective is that agile teams are self-directing (i.e. self-organising or autonomous) and are not directed and coordinated by a designated leader (Hoda et al. 2016). Other studies have found that leadership in agile project teams is shared rather than imposed by a single leader (Moe et al. 2009a; Moe et al. 2009b; Strode 2015), yet other studies indicate that leadership should take the form of transformational leadership (Yang et al. 2009). Reviews of agile leadership literature are few. An initial literature review and development of a research agenda to investigate leadership types for self-organised agile teams was carried out by Parker et al. (2015) in the context of organisational agility. However, within the current body of literature, we could find no systematic literature review focusing exclusively on leadership within agile software development teams. This lack was also identified by Hoda et al. (2017) in an SLR study of SLRs in agile software development.

3   Method

A systematic literature review is a thorough review of a relatively small number of publications that is carried out using a precisely defined and reproducible process (Barn et al. 2017). For our research problem, an SLR is appropriate because we had specific research questions, a relatively narrow topic, which is leadership in agile software development projects, and a relatively small number of publications to search. The SLR method we used to address our research questions was carried out following guidelines in information systems and software engineering (Dyba et al. 2008; Kitchenham et al. 2009; Okoli 2015) because they are the two primary domains where empirical research on agile software development is published.

3.1   Purpose and Goal of the SLR

The purpose of the SLR was to investigate knowledge of leadership in agile software development projects to inform future research and guide practitioners on effective theory and practices to improve agile software development leadership. The goal of the SLR was to answer specific research questions to help clarify what is already known and identify gaps in the knowledge of leadership in agile software development projects.

3.2   Protocol

The systematic literature review was carried out by searching the Scopus database. This database was selected because it includes content published in scholarly journals, conferences, and books that meet the following minimal criteria (Elsevier 2019). The journal consists of peer-reviewed content; the journal is published regularly and has an ISSN number registered with the International ISSN Centre; content is relevant and readable for an international audience (at a minimum has references in Roman script

and English language abstracts and article titles); the journal has publication ethics and publication malpractice statements; the journal had at least a 2-year publication history before it was reviewed for Scopus coverage.

The Scopus database includes content from the software engineering and information systems communities including publications by the ACM, SpringerLink, Elsevier, IEEE, all journals in the Association of Information Systems Senior Scholars basket of journals (see https://aisnet.org/page/SeniorScholarBasket) and the major information systems conferences: ICIS, ECIS, PACIS, AMCIS, and ACIS. Also, the Scopus database includes the conference proceedings for the highly ranked agile and software engineering conferences such as ICSE and the XP conference series. This coverage was considered adequate to capture significant publications on agile leadership within the software development and information systems domains.

3.2.1 Search process

Within the Scopus database, our search strategy was to search within the title of the text or the abstract or the keywords with specific search terms. The search strings were formulated by combining two key concepts with the 'AND' operator. Keywords in each key concept were combined using 'OR' operator to ensure good coverage of studies. The complete search string was as follows:

Title OR Abstract OR Keyword: (agile OR extreme programming OR XP OR scrum) AND Title OR Abstract OR Keyword: (leader*)

The search took place after April 2020, so all papers published in 2019 were likely to be in Scopus. This initial search yielded over 1000 studies. Thereafter, the search was limited to journal articles and conference proceedings published in English from 2000 to 2019. This timespan was chosen to increase the inclusion of all possible sources on the subject of agile leadership. The earliest publications on agile approaches emerged in the late 1990s but we excluded pre-2000 literature, because it was prescriptive books or papers with limited empirical research and no research could be located that was concerned with agile leadership (Aoyama 1997; Beck 1999; Highsmith 1997; Schwaber 1995). This time range also enabled us to see how the subject has evolved. Furthermore, as our focus was to examine agile leadership within the software development and information systems domains, we limited the search criteria to the subject areas of computing and business management within Scopus. These restrictions resulted in 302 papers. Thereafter the papers were filtered by reading the abstracts and this resulted in 102 papers. Subsequently, the paper abstracts and, when necessary, the full paper where fully checked to ensure the study met the inclusion and exclusion criteria (see section 3.2.3), and identical versions of studies were removed. Experience reports were included because of the lack of empirical studies. The overall search process is shown in Figure 1.

3.2.2 Data collection procedure

Searches were performed as specified in Figure 1. At stage 3 in the process, the 102 studies were downloaded in full. For this set of studies, the meta-data for each study was stored in a spreadsheet and included: author, publication date, title, abstract, keywords. Although the search strategy was carefully planned to minimise the number of studies that were out of scope, we followed a similar strategy to Jalali et al. (2012), where the studies were categorised as "relevant", "irrelevant" and "maybe relevant". The studies that both authors classified as "maybe relevant" were read fully by both authors and a joint decision was made to include or exclude them in the review.

Overall this process produced the final set of studies to be included in the review. During this process, a further four relevant studies were captured through a backward snowballing search (Petersen et al; 2015). The final set of studies totalled 33 and these studies were then analysed. The process and result of each step are described in Figure 1.
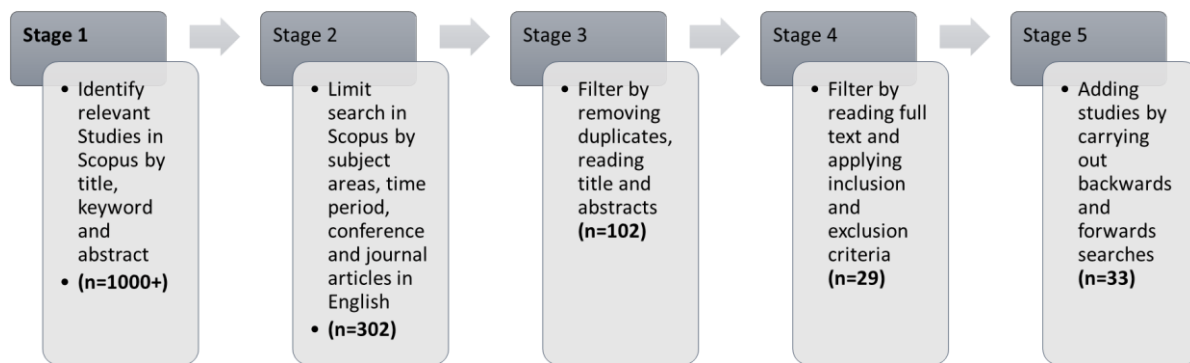
Figure 1. The process for filtering studies and the resultant number of studies at each step.

3.2.3 Quality evaluation: Inclusion and exclusion criteria

Inclusion: A study was eligible for inclusion if: (i) The study focused on aspects of leadership within agile software teams; (ii) the study was peer-reviewed; (iii) the study was empirical, theoretical, conceptual, or lessons learned from practitioners; (iv) the study was published between 2000 to 2019; and (v) the study was in English.

Exclusion: A study was excluded if: (i) the study did not contribute to agile leadership knowledge within the software development or information systems field; (ii) the study was emergent such as Research-in-Progress or poster presentations or editor's reports; and (iii) the study was teaching-related where students were used as the sample.

3.2.4 Data analysis procedure

For the data analysis process, we read the studies in full and we used a spreadsheet to record the concepts, findings and contributions for each of the studies. The following data was extracted: (i) title and authors; (ii) year of publication and type of publication; (iii) reference, (iv) abstract; (v) research aims/questions; (vi) research method; (vii)source country of the empirical data; (viii) findings of the study; (ix) what theories were applied/generated; (x) future work; (xi) notes. The guidelines provided by Petersen et al. (2015) were followed to develop a topic-related classification. This classification allowed the researchers to create theoretical classification categories for agile leadership. The theoretical contributions were initially determined by one researcher and reviewed by the other researcher. Any disagreement was resolved with a discussion between the researchers.

4   Results

After applying the inclusion and exclusion criteria a final set of 33 studies were found. In this section, we discuss the results of the SLR according to the research questions posed in the introduction.

4.1   Overview of the studies

The final set of studies was organised by year of publication (see Appendix A - Table 5). Table 5 shows the publication source (conference or journal article), research approach, and the study context (i.e. the country where the evidence for the findings or results was collected). The distribution of reviewed studies published from 2000 to 2019 is presented in Table 1. Regarding the number of studies per year, research in agile leadership has grown since about 2005; there were no significant studies before that year. To answer our first research question, 66% (22/33) of the studies were published in conferences, 33% (11/33) in journals. This shows that in two decades of research, only 33 studies were published on agile leadership and of these, 66% were conference papers.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Studies	0	0	0	1	0	2	0	2	2	4	3	1	0	3	1	5	1	2	3	3

Table 1. Number of studies per year

Within the set of 33 studies, the research approaches and data collection methods were primarily qualitative. The approaches ranged from experience reports (n=6) to single case studies (n=11), multi-case studies (n=3), mixed-method studies (n=6), proposals (n=1), qualitative and quantitative survey studies (n=2), field studies (n=2), and conceptual studies (n=2). Early publications were experience reports and single case studies, whereas multi-case studies, mixed-methods studies, and large-scale field studies (surveys) were published in more recent years. We found a single design pattern on agile leadership.

The data collection methods were standard techniques such as interviews and surveys. In some case studies, additional data collection evidence such as project documentation and observation were also applied. A single study used the novel technique of repertory grid for data analysis. The research study context, which indicates the source country for the study data, shows that agile leadership research is carried out across a range of countries.

4.2 Knowledge areas in agile leadership

The second research question aimed to review and classify the main knowledge areas of agile leadership. We categorised agile leadership studies into three groups: (i) studies based on leadership theories; (ii) tangential theories and models where leadership is included; and (iii) different leadership styles.

4.2.1 Studies based on leadership theories

A few studies have applied leadership theories as a theoretical lens to gain a better understanding of agile leadership. This group of studies are presented in Table 2. Five studies belong to this group, each study employed a different theory base.

Studies	Leadership theories
Yang et al. (2009)	Uses full-range leadership theory (consisting of transactional, transformational and laissez-faire leadership) as a theoretical lens to analyse the perceptions of agile and traditional project managers.
Bonner (2010)	Propose the use of Churchman's five modes of inquiry as an approach to assess an individual's leadership success in an agile software development environment.
Srivastava et al. (2017)	Develop a leadership framework for distributed Scrum teams based on Morgeson et al. (2010) leadership taxonomy that considers leadership as a set of functions.
Bäcklander (2019)	Draws on complexity leadership theory (CLT) to examine how agile coaches practice enabling leadership by supporting other leaders within agile software development teams in Spotify.
Spiegler et al. (2019)	Applies role theory to understand how the Scrum master role changes as an agile team matures.

Table 2. Studies based on leadership theories

4.2.2 Tangential theories and models

Some of the studies utilise theories and models where leadership is only one of the elements being studied. This group of studies focus on subjects tangential to leadership, such as teamwork, management, or autonomy. There were eight studies in this group. See table 3 for this group of studies.

Studies	Tangential theories or model
Moe et al. (2010)	Use the Dickinson & McIntyre model, where team leadership and team orientation are 'input' components of teamwork.
Paasivaara et al. (2014)	Apply Communities of Practice (CoP) theory in a large-scale agile software development context. One characteristic of a CoP is a successful leader who is engaged, an expert, a passionate leader and a person who people appreciate.
Augustine et al. (2005); Kautz et al. (2015)	Use the concept of 'edge of chaos' from Complex Adaptive Systems (CAS) theory to investigate the positive impact of team leadership in Scrum teams.
Moe et al. (2015)	Apply a team effectiveness model to understand the leadership challenges in a global agile team.
Strode (2015)	Applies an adapted form of Big Five teamwork theory and develops a revised definition of: "shared team leadership".
Poston et al. (2016)	Employ social intelligence and resistance concepts to recognise that scrum masters who find informational value in resistance, also exhibit significant levels of social intelligence.
Gren et al. (2017)	Apply a group development model highlighting that teams need different leadership depending on their group development stage.
Gutierrez et al. (2019)	Utilise three different frameworks (Goleman's, Marquet and Kniberg's) as a tool to measure the degree of self-management in agile teams. They conclude that leadership styles are one key aspect of self-management and autonomy in agile teams.

Table 3. Studies applying tangential theories and models

4.2.3 Types of Leadership styles

Some of the studies focus on different leadership styles that the authors argue are suitable for agile software development context. Nine leadership styles were identified, and these studies are presented in Table 4. Although there is considerable variety in the leadership styles proposed in this group of studies, the common theme is a focus on team enablement and adopting a collaborative, positive, and authentic leadership approach (Avolio et al. 2005).

Approach	Reported studies
Adaptive Leadership	Augustine et al. (2005) suggest an adaptive approach to agile leadership which means leading teams by nurturing small organic teams, establishing a guiding vision, establishing rules and managing with a light touch.
Shared Leadership	Moe et al. (2009a), Moe et al. (2009b) and Ringstad et al. (2011) apply shared leadership, where leadership is rotated to a person with the knowledge and skills to resolve issues and to share decision-making. Srivastava et al. (2017) argue that shared or rotational leadership is useful in distributed contexts when the team has more than one scrum master. Strode (2015) gives an alternative definition of shared team leadership where the team takes responsibility for task completion.
Transformational Leadership	Transformational leadership style is concerned with motivating, inspiring, expressing visions and engaging the emotional involvement of followers while focusing on long term commitment and engagement. Yang et al. (2009) emphasise a need for transformational leadership to achieve success in agile projects. Similarly, van Kelle et al. (2015) and Riaz et al. (2018) stress that this form of leadership is appropriate because it can align values within an agile team.
Ad-hoc leadership	Dubinsky et al. (2010) report on a dynamic ad-hoc leadership style characterised by interactions between the change leader and the team, the customer and the management involved in transition processes to agile software development.
Mentor	Hoda et al. (2013) argue that agile teams need a mentor; a person who guides and supports the team, helps them to become confident in their use of agile methods and encourages the development of self-organizing practices in the team.

Approach	Reported studies
Servant Leadership	Holtzhausen et al. (2018) argue the importance of servant leadership skills when identifying and developing Scrum masters. They contend that Scrum masters who make use of servant leadership can influence the team's effectiveness via mediating processes.
Situational Leadership	Gren et al. (2017) argue that a situational leadership approach is more appropriate when leading agile teams depending on team readiness and team maturity.
Expert leadership	Srivastava et al. (2017) argue that a distributed scrum team should be guided by a person who is technically competent in every phase of software development. Expert leaders should have inherent competence, technical knowledge, industry experience and innate leadership characteristics so that developers are inspired by their leaders.
Super leadership	Srivastava et al. (2017) argue that a distributed scrum team should be guided by super leadership. Super leadership occurs when leaders lead others to lead themselves.

Table 4. Types of leadership styles

5 Discussion and Conclusion

To address the research questions, we carried out an SRL of agile leadership literature in the Scopus database from 2000 to 2019. The SLR resulted in a final set of 33 studies that were then analysed.

RQ1: The SLR shows that studies of agile leadership grew from about 2005. The small number of studies of agile leadership shows that the research is relatively nascent with only 33 studies published in two decades. Most of the studies used qualitative research approaches possibly because agile leadership is a social process and most value insights are gained by investigating real-life contexts. Experience reports occur in earlier years and multi-case studies and surveys are reported in recent years. This evolution implies that agile leadership research is growing more mature in the use of research methods, a pattern observed in management studies (Edmondson et al. 2007). The review also identified that the research is carried out across a range of countries and it is not restricted to any one geographical area of hemisphere. In summary, the strength of the evidence supporting agile leadership is limited, implying that further large-scale field studies, both qualitative and quantitative, theory-building and theory-testing, are needed to fully understand agile leadership. Further research could examine recent team leadership literature closely to identify insights in that literature that could inform agile software development. Another research focus could be to examine agile software development teams and identify how leadership is enacted in the field.

RQ 2: The SLR shows that existing studies do not provide a unified view of agile leadership but they do confirm that agile leadership needs a nuanced approach not based on hierarchical or bureaucratic management. The results showed common themes in the different leadership styles, which focus on team enablement and adopting a collaborative leadership approach, similar to the authentic leadership approach defined by Avolio et al. (2005). Leadership needs change as agile project teams evolve, develop and mature (Gren et al. 2017; Spiegler et al. 2019). From a theoretical perspective some studies focus on the leadership perspective and apply leadership theories to gain insights (e.g. Bäcklander 2019) whilst other studies examine leadership as part of a wider context of agile teams (Gren et al. 2017; Moe et al. 2010; Strode 2015).

Overall, the SLR results indicate a need to investigate the effectiveness of agile leadership in collocated, large-scale, and globally distributed agile projects and teams. A single study (Srivastava et al. 2017) explores leadership in distributed self-organised scrum teams. Furthermore, agile leadership in virtual agile teams is warranted in the context of the COVID'19 pandemic. Research is needed because different leadership approaches might be necessary in different environments.

The SLR has certain limitations. To reduce the risk of bias in selecting studies, we designed a transparent data collection process by predefining the research questions, database, search strategy, keywords, and search terms, and we specified rules for including and excluding studies. Limitations of our SLR are that we searched only the Scopus database, and the search procedure did not include methods such as Kanban or DSDM. Therefore, there is a small risk that relevant studies were omitted.

In summary, this SLR provides a foundation of knowledge on agile leadership and serves as a basis for further research and to inform the agile community concerned with information systems development, IT project management, and behavioural software engineering.

References

Aoyama, M. 1997. "Agile Software Process Model," *Proceedings of the Twenty-First Annual International Computer Software and Applications Conference.*, pp. 454-459.

Augustine, S., Payne, B., Sencindiver, F., and Woodcock, S. 2005. "Agile Project Management: Steering from the Edges," *Communications of the ACM* (48:12), pp. 85-89.

Avolio, B.J., and Gardner, W.L. 2005. "Authentic Leadership Development: Getting to the Root of Positive Forms of Leadership," *The Leadership Quarterly* (16:3), pp. 315-338.

Bäcklander, G. 2019. "Doing Complexity Leadership Theory: How Agile Coaches at Spotify Practise Enabling Leadership," *Creativity and Innovation Management* (28:1), pp. 42-60.

Baker, S.W., and Thomas, J.C. 2007. "Agile Principles as a Leadership Value System: How Agile Memes Survive and Thrive in a Corporate It Culture. ," in: *Agile 2007 (AGILE 2007)*. Washington, DC, : IEEE, pp. 415-420.

Barn, B., Barat, S., and Clark, T. 2017. "Conducting Systematic Literature Reviews and Systematic Mapping Studies," *Proceedings of the 10th Innovations in Software Engineering Conference*, pp. 212-213.

Bass, B.M., and Stogdill, R.M. 1990. *Bass & Stogdill's Handbook of Leadership: Theory, Research, and Managerial Applications*. Simon and Schuster.

Beck, K. 1999. "Embracing Change with Extreme Programming," *Computer* (32:10), Oct 1999, pp. 70-77.

Beck, K. 2000. *Extreme Programming Explained: Embrace Change*. Boston: Addison-Wesley.

Beck, K., Beedle, M., van Bennekum, A., *et al.* 2001. "Manifesto for Agile Software Development." Retrieved 1 January 2012, from http://www.agilemanifesto.org

Blotner, J.A. 2003. "It's More Than Just Toys and Food: Leading Agile Development in an Enterprise-Class Start-Up. ," in: *Proceedings of the Agile Development Conference, 2003. ADC 2003*. Salt Lake City, UT, USA: IEEE, pp. 81-91.

Bonner, N.A. 2010. "Predicting Leadership Success in Agile Environments: An Inquiring Systems Approach," *Academy of Information & Management Sciences Journal* (13:2), pp. 83-104.

Cockburn, A. 2002. *Agile Software Development*. Boston: Addison-Wesley.

Dikert, K., Paasivaara, M., and Lassenious, C. 2016. "Challenges and Success Factors for Large-Scale Agile Transformations: A Systematic Literature Review," *The Journal of Systems and Software* (119), pp. 87-108.

Dubinsky, Y., and Hazzan, O. 2010. "Ad-Hoc Leadership in Agile Software Development Environments. ," in: *Proceedings of the ICSE Workshop on Cooperative and Human Aspects of Software Engineering*. pp. 32-38.

Dugan, J.P. 2017. *Leadership Theory: Cultivating Critical Perspectives*. John Wiley & Sons.

Dyba, T., and Dingsoyr, T. 2008. "Empirical Studies of Agile Software Development: A Systematic Review," *Information and Software Technology* (50:9-10), pp. 833-859.

Edmondson, A.C., and McManus, S.E. 2007. "Methodological Fit in Management Field Research," *Academy of Management Review* (32:4), pp. 1155-1179.

Elsevier. 2019. "How Scopus Works." Retrieved 5 September, 2020, from https://www.elsevier.com/solutions/scopus/how-scopus-works

Greenleaf, R.K. 2003. *The Servant-Leader Within: A Transformative Path*. NY, USA: Paulist press.

Gregory, P., Barroca, L., Sharp, H., Deshpande, A., and Taylor, K. 2016. "The Challenges That Challenge: Engaging with Agile Practitioners' Concerns," *Information and Software Technology* (77), pp. 92-104.

Gren, L., Torkar, R., and Feldt, R. 2017. "Group Development and Group Maturity When Building Agile Teams: A Qualitative and Quantitative Investigation at Eight Large Companies," *Journal of Systems and Software* (124), pp. 104-119.

Griffiths, M., Fewell, M., Slusanschi, H., *et al.* 2017. "Agile Practice Guide." Pennsylvania, USA: Project Management Institute, p. 168.

Gutierrez, G., Garzas, J., de Lena, M.T.G., and Moguerza, J.M. 2019. "Self-Managing: An Empirical Study of the Practice in Agile Teams," *IEEE Software* (36:1), pp. 23-27.

Haselberger, D. 2015. "Give Recognition to the Impervious. ," in: *Proceedings of the 18th European Conference on Pattern Languages of Program, EuroPLoP,* . pp. 1-17.

Highsmith, J. 1997. "Messy, Exciting, and Anxiety-Ridden: Adaptive Software Development," *American Programmer* (10:4), April, pp. 23-29.

Hoda, R., and Murugesan, L.K. 2016. "Multi-Level Agile Project Management Challenges: A Self-Organizing Team Perspective," *Journal of Systems and Software* (117), pp. 245-257.

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

Hoda, R., Salleh, N., Grundy, J., and Tee, H.M. 2017. "Systematic Literature Reviews in Agile Software Development: A Tertiary Study," *Information and Software Technology* (85), pp. 60-70.

Holtzhausen, N., and de Klerk, J.J. 2018. "Servant Leadership and the Scrum Team's Effectiveness," *Leadership & Organization Development Journal* (39:7), pp. 873-882.

Jalali, S., and Wohlin, C. 2012. "Global Software Engineering and Agile Practices: A Systematic Review," *Journal of Software: Evolution and Process* (24), pp. 643-659.

Judy, K.H., and Krumins-Beens, I. 2007. "Ript: Innovation and Collective Product Ownership," in: *Proceedings of the Agile 2007 (AGILE 2007) Conference*. Washington, DC: IEEE, pp. 316-316.

Kautz, K., Johansen, T.H., and Uldahl, A. 2015. "The Perceived Impact of the Agile Development and Project Management Method Scrum on Team Leadership in Information Systems Development " in: *Proceedings of the Conference on Information Systems Development: Transforming Healthcare through Information Systems*. pp. 167-183.

Kitchenham, B., Brereton, O.P., Budgen, D.*, et al.* 2009. "Systematic Literature Reviews in Software Engineering−a Systematic Literature Review," *Information and software technology* (51:1), pp. 7-15.

Licorish, S., and MacDonell, S. 2013a. "Self-Organising Roles in Agile Globally Distributed Teams," *24th Australasian Conference on Information Systems (ACIS)*: RMIT University, pp. 1-11.

Licorish, S.A., and MacDonell, S.G. 2013b. "How Do Globally Distributed Agile Teams Self-Organise?- Initial Insights from a Case Study," in: *Proceedings of the 8th International Conference on Evaluation of Novel Approaches to Software Engineering (ENASE-2013)*. SCITEPRESS, pp. 157-164.

Madeyski, L., and Biela, W. 2008. "Capable Leader and Skilled and Motivated Team Practices to Introduce Extreme Programming," in: *Proceedings of the IFIP Central and East European Conference on Software Engineering Techniques. Balancing Agility and Formalism in Software Engineering. CEE-SET 2007. ,* B. Meyer, J.R. Nawrocki and B. Walter (eds.). Berlin, Heidelberg: Springer, pp. 96-102.

Moe, N.B., Cruzes, D.S., Dybå, T., and Engebretsen, E. 2015. "Coaching a Global Agile Virtual Team. ," in: *IEEE 10th International Conference on Global Software Engineering*. IEEE, pp. 33-37.

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), pp. 480-491.

Moe, N.B., Dingsoyr, T., and Kvangardsnes, O. 2009a. "Understanding Shared Leadership in Agile Development: A Case Study. ," in: *Proceedings of the 42nd Hawaii International Conference on System Sciences*. Hawaii: IEEE, pp. 1-10.

Moe, N.B., Dingsøyr, T., and Røyrvik, E.A. 2009b. "Putting Agile Teamwork to the Test – an Preliminary Instrument for Empirically Assessing and Improving Agile Software Development. ," in: *International Conference on Agile Processes and Extreme Programming in Software Engineering, XP 2009. ,* P. Abrahamsson, M. Marchesi and F. Maurer (eds.). Berlin, Heidelberg: Springer, pp. 114-123.

Moore, E. 2009. "Influence of Large-Scale Organization Structures on Leadership Behaviors. ," in: *Proceedings of the Agile Conference, Chicago, IL, USA. 24-28 Aug. .* IEEE, pp. 309-313.

Morgeson, F.P., DeRue, D.S., and Karam, E.P. 2010. "Leadership in Teams: A Functional Approach to Understanding Leadership Structures and Processes," *Journal of management* (36:1), pp. 5-39.

Okoli, C. 2015. "A Guide to Conducting a Standalone Systematic Literature Review," *Communications of the Association for Information Systems* (37:1), pp. 879-910.

Paasivaara, M., and Lassenius, C. 2014. "Communities of Practice in a Large Distributed Agile Software Development Organization−Case Ericsson," *Information and Software Technology* (56:12), pp. 1556-1577.

Parker, D.W., Holesgrove, M., and Pathak, R. 2015. "Improving Productivity with Self-Organised Teams and Agile Leadership," *International Journal of Productivity and Performance Management* (64:1), pp. 112-128.

Petersen, K., Vakkalanka, S., and Kuzniarz, L. 2015. "Guidelines for Conducting Systematic Mapping Studies in Software Engineering: An Update," *Information and Software Technology* (64), pp. 1-18.

Poston, R., and Patel, J. 2016. "Making Sense of Resistance to Agile Adoption in Waterfall Organizations: Social Intelligence and Leadership. ," in: *Proceedings of the 22nd America's Conference on Information Systems*. AIS.

Rajeev, B., and Hejib, V. 2018. "Control Based Management to Self Organizing Agile Teams: A Case Study. ," in: *Proceedings of the 40th International Conference on Global Software Engineering, ICGSE '18, Gothenburg Sweden 18 May*. New York, NY, USA: ACM, pp. 16-20.

Ralston, L. 2008. "Agile Project Leadership My Top 10 Value Driven Principles. ," in: *Agile 2008 Conference, 4-8 August*. Toronto, ON, Canada: IEEE, pp. 417-422.

Riaz, M.N., Mahboob, A., and Buriro, A. 2018. "Social Success Factors Affecting Implementation of Agile Software Development Methodologies in Software Industry of Pakistan: An Empirical Study," *International Journal of Advanced Computer Science and Applications* (9:7), pp. 94-98.

Ringstad, M.A., Dingsøyr, T., and Moe, N.B. 2011. "Agile Process Improvement: Diagnosis and Planning to Improve Teamwork," in: *European Conference on Software Process Improvement: Systems, Software and Service Process Improvement. EuroSPI 2011,* R.V. O'Connor, J. Pries-Heje and R. Messnarz (eds.). Berlin, Heidelberg: Springer, pp. 167-178.

Salas, E., Sims, D.E., and Burke, C.S. 2005. "Is There a 'Big Five" in Teamwork?," *Small Group Research* (36:5), pp. 555-599.

Schwaber, K. 1995. "Scrum Development Process," in: *Proceedings of OOPSLA 1995*.

Schwaber, K., and Sutherland, J. 2017. "The Scrum Guide." Scrum.Org and ScrumInc. .

Spiegler, S.V., Heinecke, C., and Wagner, S. 2019. "Leadership Gap in Agile Teams: How Teams and Scrum Masters Mature," in: *Proceedings of the 20th International Conference on Agile Processes in Software Engineering and Extreme Programming, XP.,* P. Kruchten, S. Fraser and F. Coallier (eds.). Cham, Switzerland: SpringerOpen, pp. 37-52.

Srivastava, P., and Jain, S. 2017. "A Leadership Framework for Distributed Self-Organized Scrum Teams," *Team Performance Management: An International Journal* (23:5/6), pp. 293-314.

Stavru, S. 2014. "A Critical Examination of Recent Industrial Surveys on Agile Method Usage," *The Journal of Systems and Software* (94), pp. 87-97.

Stray, V., Moe, N.B., and Hoda, R. 2018. "Autonomous Agile Teams: Challenges and Future Directions for Research. ," in: *Proceedings of the 19th International Conference on Agile Software Development XP*. ACM, pp. 1-5.

Strode, D.E. 2015. "Applying Adapted Big Five Teamwork Theory to Agile Software Development," in *Proceedings of the 26th Australasian Conference on Information Systems*.

Van Dierendonck, D. 2011. "Servant Leadership: A Review and Synthesis," *Journal of management* (37:4), pp. 1228-1261.

van Kelle, E., Visser, J., Plaat, A., and van der Wijst, P. 2015. "An Empirical Study into Social Success Factors for Agile Software Development. ," in: *IEEE/ACM 8th International Workshop on Cooperative and Human Aspects of Software Engineering, CHASE'15*. IEEE, pp. 77-80.

VersionOne. 2020. "The 14th State of Agile Report." from https://stateofagile.com/#

Yang, H., Strode, D.E., and Huff, S.L. 2009. "Leadership in Software Development: Comparing Perceptions of Agile and Traditional Project Managers. ," in *Proceedings of the 15th Americas Conference on Information Systems, Paper 184.*

Young, S.M., Edwards, H.M., McDonald, S., and Thompson, J.B. 2005. "Personality Characteristics in an XP Team: A Repertory Grid Study. ," in: *Proceedings of the 2005 workshop on Human and social factors of software engineering, HSSE'05, May*. pp. 1-7.

Appendix 1 Studies included in the review by publication date

S#	Study	Research Approach	Study Context
S1	Blotner (2003)	Experience report	USA
S2	Young et al. (2005)	Case study	UK
S3	Augustine et al. (2005)	Case study	Not Specified
S4	Baker et al. (2007)	Experience report	USA
S5	Judy et al. (2007)	Experience report	USA
S6	Madeyski et al. (2008)	Proposal	Not specified
S7	Ralston (2008)	Experience Report	Canada
S8	Moe et al. (2009b)	Case study	Norway
S9	Moe et al. (2009a)	Case study	Norway
S10	Moore (2009)	Experience Report	USA
S11	Yang et al. (2009)	Mixed Methods	New Zealand
S12	Bonner (2010)	Conceptual	-
S13	Dubinsky et al. (2010)	Mixed Methods	Not specified
S14	Moe et al. (2010)	Case study	Norway
S15	Ringstad et al. (2011)	Multi case study	Norway
S16	Hoda et al. (2013)	Field study	India, New Zealand
S17	Licorish et al. (2013a)	Case study	USA, Canada, Europe
S18	Licorish et al. (2013b)	Case study	USA, Canada, Europe
S19	Paasivaara et al. (2014)	Case study	Finland, Hungary, USA
S20	Strode (2015)	Multi case study	New Zealand
S21	Kautz et al. (2015)	Case study	Not specified
S22	van Kelle et al. (2015)	Mixed methods	Holland
S23	Haselberger (2015)	Conceptual	-
S24	Moe et al. (2015)	Case study	Norway
S25	Poston et al. (2016)	Multi-site case study	USA
S26	Srivastava et al. (2017)	Mixed methods	Not specified
S27	Gren et al. (2017)	Mixed methods	Not specified
S28	Riaz et al. (2018)	Mixed Methods	Pakistan
S29	Rajeev et al. (2018)	Experience Paper	India
S30	Holtzhausen et al. (2018)	Survey	South Africa
S31	Spiegler et al. (2019)	Field study	Not specified
S32	Gutierrez et al. (2019)	Survey	22 countries
S33	Bäcklander (2019)	Case Study	Sweden

Table 5. Final selected papers by publication date