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Influential Factors on the Awareness of Agile Software Development Methodology: A Systematic Literature Review☆

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ABSTRACT

Agile software development methodology has been implemented by software industries over a decade ago and well accepted in the practitioner community. However, there is limited understanding on how agile practitioners aware towards implementation of agile practices in software development. Lack of awareness will lead to misunderstandings among agile practitioners and misuse the agile practices. In order to understand the awareness of agile practices, this paper aims to investigate the factors that affect awareness of agile practitioners in implementing agile practices. A systematic literature review (SLR)was conducted in order to classify and define the factors of awareness in agile software development methodology. The review was based on papers between 2002 and December 2014 from seven electronic databases. The relevant papers were included 20 journal articles, 24 conference papers,16 book chapters, 9 workshop papers.Consequently, 69 papers were identified that closely related with awareness in agile software development methodology. From the thematic analysis, 13 factors were classified from 42 elements. Based on the review result, understanding the influential factors on the awareness of agile practices will provide benefit to researchers and agile practitioners.

☞ keyword : Awareness, agile practices, agile software development methodology

1. Introduction

The agile methodology has gained increasing interest among software engineering industry and academic researchers that able to deliver software product within estimated time [1], [2]. Agile methodologies is based on values and principles that focus on iterative and incremental delivery [3]. In order to implement agile methodology, there is a set of practices from agile methodology that emphasis on people and their knowledge, abilities and skill [4].

The people's factors are the main issues in implementing agile methodology towards performance on successful projects[5]-[8].Agile methodology was designed to capitalize on agile practitioner's competency and strength that focus on improving their knowledge, skills and abilities in implementing agile practices. Agile practitioners should have knowledge, behavior, communication and experience in order to implements agile practices properly[9]. The important to be aware of the specific project, practices and development process makes agile practitioners understand and effort to keep agile practices in use.

Awareness could be a key factor in implementing software practices that contributes to understand its benefits and occurrence of quality problems in the software development [10], [11]. However, there was lack of focus given to the awareness of agile practitioners to implement the agile practices [12]. As a result, there is a need to explore the awareness of agile practices implementation.

The first step to explore the awareness of agile practices implementation is to investigate the factors that affect the awareness of agile practitioners. Hence, this paper aims to investigate on the factors that contribute agile practitioners' awareness regarding agile software development methodology implementation.

The remainder of this paper is structured as follows: Section 2 presents the related works in the field of agile software development methodology. Section 3 focuses on the research methodology used in this study and followed by presentation

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of results from the review in Section 4. Section 5 discussed the findings and finally Section 6 concludes this study.

2. RELATED WORKS

Awareness has been discussed in ambient system and lead sense of responsibility among agile practitioners[13]. In global software engineering, the mechanism to maintain awareness is promotes the Agile Service Networks (ASN) which is networks of service-oriented application to decrease delay time of project status change and support awareness of agile practitioners in the project [14]. The findings from awareness in ambient system and awareness in global software engineering revealed that agile practitioners are well aware with their task and responsible to complete the task properly. However, thesefindings discussed awareness in agile methodology generally in development.

In distributed software development, awareness has been discussed widely. Many organizations have started to implement agile software development methodology as their software process in distributed environments as alternative to traditional software methodology approach [15], [16]. The awareness of agile practitioners is required for distributed environments to achieve the software project goal[17]. Spatial distance and temporal distance does not prevent agile methodology implemented properly in distributed development as long as software practitioners aware of project, practices, task, artifacts and development teams.

In Malaysia context, there is lack of awareness amongst agile practitioners reported in implementing agile practices[16], [18]. Lack of awareness among agile practitioners also has been investigated in developing countries such as Vietnam[19], [20], Indonesia[21], and Sri Lanka [22]. Awareness of agile practitioners is researchable and needs attention in agile software development methodology [23].

3. RESEARCH METHODOLOGY

Systematic Literature Review (SLR) has been chosen as research method for this paper. SLR used to aggregate and interpret all available research that relevant to research of interest and summarize the existing evidence of research [24].In order to perform the objective of this paper, SLR are conducted based on the SLR guidelines which consists of three phases: planning the review, conducting the review and reporting the review [25]. These phases are further discussed in the following sub-sections.

3.1 REVIEW QUESTIONS

The aim of this review is to investigate the awareness factors that influence agile practitioners in agile software development methodology implementation. In order to achieve this aim, the review question are formulated by using PICOC (Population, Intervention, Comparison, Outcomes and Context.) to identify the related papers which fulfill the aims of review[26], [27]. (Table 1) shows the criteria and scope of the PICOC.

(Table 1) Summary of PICOC

Criteria	Scope
Population (Who or what?)	Implementation of agile software development methodology
Intervention (How?)	Influential factors on the awareness
Comparison (Compared to what?)	None
Outcome (What are trying to accomplish?)	Awareness factor
Context (What circumstances?)	Agile software development methodology

Based on the summary of PICOC, the research question is: What are the awareness factors regarding agile software development methodology implementation?

3.2 SEARCH STRATEGY

The relevant keywords for the search is based on the review question and aims of the review [25]. The relevant keywords are built from following steps:

a. Derive major terms from research questions.
b. Identify the synonyms for major terms.
c. Identify relevant keywords in papers.
d. Use Boolean OR to incorporate synonyms
e. Use Boolean AND to link the major terms.

The results of relevant keywords used in this paper are as follows:

(awareness) AND (practitioner OR developer OR "development team") AND ("agile software development methodology" OR agile method OR agile practices)

In this review, there are seven electronic databases involves to search relevant papers; ACM Digital Library, IEEE Xplore, Springer Link, Science Direct, Engineering Village, Web of Science and Wiley Online Library. The selected electronic databases were chosen as they provide the highest impact full-text journals and conference proceedings.

3.3 SELECTION PROCESS

The selection process can minimize the bias on selecting the relevant papers [25]. In this review, the selection process focuson three different parts of papers based on the following sequence: title and abstract, introduction and conclusion and main body of papers. First, the papers were selected by referring title and abstract in order to see whether the literature study complies with the inclusion and exclusion criteria. Then, the process of skimming the introduction and conclusion and main body of the article are involved.

3.4 SELECTION CRITERIA

The selection criteria involves identifying relevant papers involves inclusion and exclusion criteria [26]. The review was including published articles in English language from peer-reviewed journals, refereed conference proceedings and book chapters. The review includes articles that published between 2002 and December 2014.The significant of limitation years on 2002 was decided after manually search several times. This review also excludes the duplicate articles.

3.5 QUALITY ASSESSMENT

Each accepted papers was assessed in terms of its quality. Quality assessment was performed to evaluate the strength of evidence reported [28]. According to SLR guidelines, the quality assessment of selected papers was achieved by scoring techniques to obtain relevant studies and guide the interpretation of findings [25]. The response score used was Yes (Y)= 1, Partially (P)= 0.5, No (N)= 0. There are four questions to assess the quality of relevant papers as follows:

a. Is it clear on what objectives of the study?
b. Does the research methodology is clearly stated?
c. Does the findings of the research are clearly stated?
d. How well the awareness factors defined?

3.6 DATA EXTRACTION

Data extraction process used to record relevant information from relevant papers into data extraction forms [25]. The data extracted from each relevant paper are:

a. The extraction information covers the date of data extraction and paper's identifier
b. The publication information refer to the title, authors, journal or conference name, electronic database and year of publication.
c. The context information deal with the description of relevant papers' settings
d. The factors that affect the awareness of agile practitioners

3.7 DATA SYNTHESIS

The data synthesis summarizes the results of relevant papers in quantitative or qualitative results [25]. In this review, the relevant papers were synthesized with qualitative synthesis due the synthesis represent a line of argument. Thematic analysis was chosen as a synthesis method for the review due variety of available information among relevant papers and relevant coded text. The analysis is organized according to theme and code. The relevant codes were identified from the data extraction form. Then, the codes were merged into the themes to address the review question.

In order to support the data analysis, the information was classified into searchable codes by using ATLAS.ti version 7.5.10. The thematic analysis steps [29], [30] are described as in (Table 2). This table shows the example of relevant papers and identified codes through thematic analysis. For example, the relevant papers stated, *"Agile environments thus provide motivation for individuals to work harder towards team goals when compared to environments where team members are less aware of the activity of others, or where it is less clear how the team is working together to produce results"*. In this statement, the codes extracted are because these code show the factor that affect the awareness.

(Table 2) Example of thematic analysis

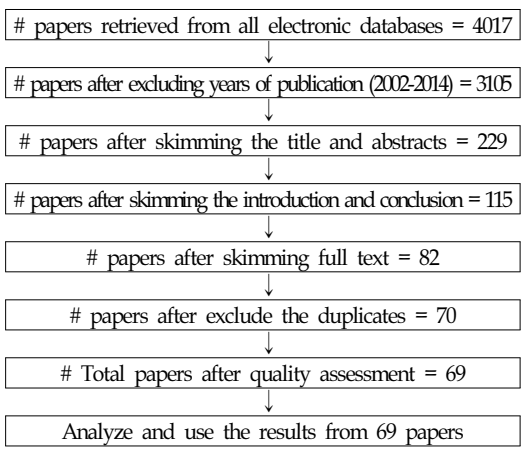
Steps	Example of synthesis
Familiarize the extracted data	Team members aware of activity of others
Generate codes form extracted data	Team activities
Translate the codes into themes	Team
Reviewing and refining themes	Team Member
Defining and naming themes	Team memberis a group of practitioner who had common goal to working together in software development.
Familiarize the extracted data	Team members aware of activity of others

4. RESULTS

This section represents the search results, synthesis results, findings on review question, sources of results and year of publication. These results were obtained from relevant papers based on extracted data.

4.1 SEARCH RESULTS

The initial phase of the search process identified 4017 articles as shown in(Figure 1). After excluding the years of publication (2002-2014), there are 3105 potential articles to be reviewed. There are 229 articles are identified after skimming the title and abstract of articles, while there are 115 published articles identified after skimming the introduction and conclusion of articles.



(Figure 1) Search results

Then, 82 articles were identified after skimming full text articles. Each of these studies was filtered according to the inclusion and exclusion criteria before being accepted for the synthesis of evidence. 70 articles were accepted after skimming process and exclusion of duplicates. Finally, 69 articles were selected after assessing the quality of the papers. Thesearch results of the review are describes below.

4.2 SYNTHESIS RESULTS

The thematic analysis helps to identify forty-two (42) different codes from the selected studies. These 42 codes were classified and categorized under thirteen (13) themes; responsive teams, team characteristics, collaborative work, availability of resources, project management process, priorities of project and task, development plan, learning process, agile process and advantages, changes of development process, project and physical artifact, project definition process and workplace design to address the review question.

4.3 FINDINGS ON REVIEW QUESTIONS

13 factors are identified based on 42 elements that extracted from relevant papers as shown in(Table 3). There are three factors that are most addressed by relevant papers, including: project management process (29 papers), collaborative work (26 papers) and responsive teams (20 papers). On the other hand, project definition process (2 papers), project and physical artifact (3 papers), and priorities of project and task (3 papers) are less mentioned factors in this review

Team activities addressed frequently as the elements of agile practitioners' awareness (12 papers). There were 14 elements addressed once in this review. These elements contribute to the awareness of agile practices.

(Table 3) Numbers of relevant papers addressing the identified factors

Factors	Elements	Papers	Total
Project management process	Project progress	11	29
	Project status	9	
	Current task	6	
	Collective task	2	
	Synchronization	1	

Factors	Elements	Papers	Total
Collaborative work	Meetings	11	26
	Conversation	6	
	Collaboration	3	
	Media	2	
	Standardization	2	
	Shared documentation	2	
Responsive teams	Team activities	12	20
	Team expertise	5	
	Team ideas	1	
	Interaction of roles	1	
	Team changes	1	
Changes of development process	Requirement changes	4	10
	Source code changes	3	
	Continuous improvement	3	
Learning process	Training	4	10
	Coaching	3	
	Learning	2	
	Peer to peer mentoring	1	
Governance	Goals of organization	3	8
	Business value	3	
	Regulations	2	
Team characteristic	Work habit	3	7
	Responsibility	3	
	Trust	1	
Agile philosophy	Agile advantages	4	7
	Agile process	3	
Availability of resources	Team presence	3	5
	Availability tools	2	
Workplace design	Physical design	2	4
	Separated location	1	
	Shared workspace	1	
Priorities of development process	Prioritize task	2	3
	Project priorities	1	
Artifact	Project artifact	2	3
	Physical artifact	1	
Project definition process	Role of artifact	1	2
	Roles specification	1	

In order to provide further information related to the identified factors, (Table 4) represents the description of identified factors that affect the awareness of agile practitioners.

(Table 4) Identified factors that affect the awareness

Factor	Description
Project management process	The process of managing project to enhance the project awareness.
Collaborative work	Achieve satisfaction by working together to deliver product.
Response team	The teams actively participate in team activities.
Changes of development process	The changes of requirements and code to develop quality software.
Learning process	The learning environment to implement agile practices.
Governance	Business value is plan and aligns with the organization's goal.
Team characteristics	The characteristics of practitioner with their teams.
Agile philosophy	The agile process and advantages of implementing agile methods.
Availability of resources	The involvement of practitioners and tools in development.
Workplace design	The space design motivates teams to focus with their works.
Priorities of development process	The priorities indicates the level of importance of project and task to be considered and executed.
Artifact	The artifact produced during development and visible.
Project definition process	The description of deliverables and roles in development process.

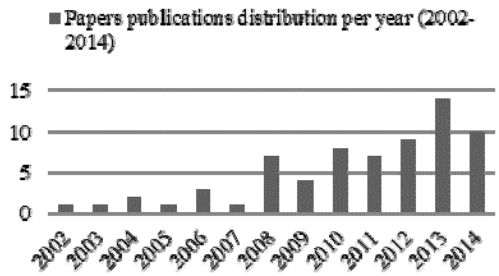
4.4 SOURCES OF RESULTS

There were 20 relevant papers published in journals. Majority papers were from Empirical Software Engineering in Springer Link databases and Information and Software Technology from ScienceDirect databases. 16 relevant papers were identified in book chapters and the majority was from Agile Processes in Software Engineering and Extreme Programming (XP). 24 relevant papers were from conference proceedings. The most relevant papers were from International Conference on Software Engineering (ICSE). There are 9 papers came from workshops and the most relevant papers were from Workshop on Cooperative and Human Aspects on Software Engineering (CHASE).

4.5 YEAR OF PUBLICATION

There was significant amount of selected papers in the area of awareness in agile software developmentmethodology published after 2002 and increased the number of publications until 2014. (Figure 2) shows the numbers of selected papers

were published between 2002 and 2014, which means awareness in agile software development methodology were gaining significant increase over the last eight years.



(Figure 2) Number of relevant papers by years of publication

5. DISCUSSION

The 13 awareness factors were identified from the relevant papers that contribute to the awareness of agile practices. Project management process are frequently factor that addressed by the relevant papers (29papers). On the other hand, project definition processwas less addressed as awareness factor by the relevant papers (2papers). There are five papers (S13, S39, S45, S56, S64)addressed the most awareness elements rather than other relevant papers. The team activities element was frequently mentionedto contribute to the agile practitioners' awareness in implementing agile practices (12 papers).

Agile software development methodology encourages the agile practitioners to involve and responds the team activities, giving ideas, share their expertise and interact with each other. The responsive teams define their own task to deliver working software. Hence, the team activities addressed frequently as the elements of agile practitioners' awareness. Team members spent their working hours to develop software product and understand their work on the project allocated to them. These team members often play several roles in agile such as scrum master, project owner and development teams. The team members aware of their activities by sharing the ideas and had experience with different roles.

In this review, the priorities of development process factor addressed once by two papers. The agile practitioners need to know their current priorities of task to eliminate the delay of iteration. Eventhough, this factor was less mentioned as influential factors on the awareness, agile practitioners need to maintain awareness of project and task priorities. By implementing agile practices, agile practitioners would maintain their awareness of what has to be developed to satisfy the customer and deliver quality working software on time.

The above mentioned factors can generate a need for assessing agile practitioner's awareness regarding agile practices.

6. CONCLUSION

The goal of this research was to investigate the factors that affect the awareness of agile practitioners in implementing agile practices. The method used in this paper was systematic literature review. The review plan involves formulating the review question by using PICOC to achieve the goal of the study. Then, the search strategy formulates the relevant keywords for searching the relevant papers in electronic databases. The selection process, selection criteria, quality assessment, data extraction and data synthesis were executed to find the awareness factors from relevant papers.

The initial list of awareness factors reported in this paper comprises of 13 factors. There are *responsive teams, team characteristics, collaborative work, availability of resources, project management process, priorities of development process, governance, learning process, agile philosophy, changes of development process, artefact, project definition process and workplace design.*The initial list described in this paper may act as a constructive development towards a list of awareness and provide a guide for assessing agile practitioner's awareness. In future studies, we plan to ask a panel of agile experts to review and validate the identified awareness factors.

The work in this paper is a part of broader investigation of awareness issues among agile practitioners and achieves the goal of this paper to present list the factors that affect awareness of agile practitioners.

Appendix Primary studies in review

Code	Citation
S01	Alyahya, S., Ivins, W. K., & Gray, W. A. (2012). A Holistic Approach to Developing a Progress Tracking System for Distributed Agile Teams. In 11th International Conference on Computer and Information Science (pp. 509-518). IEEE Computer Society. http://doi.org/10.1109/ICIS.2012.7
S02	Alyahya, S., Ivins, W. K., & Gray, W. A. (2013). Raising the Awareness of Development Progress in Distributed Agile Projects. Journal of Software, 8(12), 3066-3081. http://doi.org/10.4304/jsw.8.12.3066-3081
S03	Asnawi, A. L., Gravell, A. M., & Wills, G. B. (2011). Empirical Investigation on Agile Methods Usage: Issues Identified from Early Adopters in Malaysia. In Agile Processes in Software Engineering and Extreme Programming (pp. 192-207). Springer Berlin Heidelberg.
S04	Asnawi, A. L., Gravell, A. M., & Wills, G. B. (2012). Emergence of agile methods: Perceptions from software practitioners in Malaysia. In Proceedings AGILE India (AGILE INDIA) (pp. 30-39). http://doi.org/10.1109/AgileIndia.2012.14
S05	Babb, J. S., Hoda, R., & Nørbjerg, J. (2013). Barriers to Learning in Agile Software Development Projects. In Agile Processes in Software Engineering and Extreme Programming (pp. 1-15). Vienna, Austria,: Springer Berlin Heidelberg.
S06	Badampudi, D., Fricker, S. A., & Moreno, A. M. (2013). Perspectives on Productivity and Delays in Large-Scale Agile Projects. In Agile Processes in Software Engineering and Extreme Programming (pp. 180-194). Springer Berlin Heidelberg.
S07	Baheti, P., Gehringer, E., & Stotts, D. (2002). Exploring the Efficacy of Distributed Pair Programming. In Proceedings of the Second XP Universe and First Agile Universe Conference on Extreme Programming and Agile Methods (pp. 208-220). UK: Springer Berlin Heidelberg.
S08	Bass, J. M. (2014). How product owner teams scale agile methods to large distributed enterprises. Empirical Software Engineering, 1-33. http://doi.org/10.1007/s10664-014-9322-z
S09	Becker-pechau, P., Breitling, H., Lippert, M., & Schmolitzky, A. (2003). Teaching Team Work: An Extreme Week for First-Year Programmers. In Extreme Programming and Agile Processes in Software Engineering (pp. 386-393). Springer Berlin Heidelberg.
S10	Bjarnason, E., Wnuk, K., & Regnell, B. (2011). A Case Study on Benefits and Side-Effects of Agile Practices in Large-Scale Requirements Engineering. In Proceedings of the 1st Workshop on Agile Requirements Engineering (pp. 1 - 4). New York, NY, USA: ACM.
S11	Brennan, P. (2010b). What Agile Teams Can Learn from Sports Coaching. In 11th International Conference on XP (pp. 269-276). Trondheim, Norway: Springer Berlin Heidelberg.
S12	Brown, J., Lindgaard, G., & Biddle, R. (2008). Stories , Sketches , and Lists: Developers and Interaction Designers Interacting Through Artefacts. In Agile'08 Conference (pp. 39-50). Toronto, Ont.: IEEE Computer Society. http://doi.org/10.1109/Agile.2008.54
S13	Chau, T., & Maurer, F. (2004). Knowledge Sharing in Agile Software Teams. In Logic versus Approximation (pp. 173-183). Springer Berlin Heidelberg.
S14	Chong, J. (2005). Social Behaviors on XP and non-XP teams: A Comparative Study. In Proceedings of the Agile Development Conference (ADC'05) (pp. 39-48). Washington, DC, USA: IEEE Computer Society.
S15	Dewan, P., Agarwal, P., Shroff, G., & Hegde, R. (2009). Distributed Side-by-Side Programming. In Workshop on Cooperative and Human Aspects on Software Engineering (CHASE) (pp. 48-55). Vancouver, Canada: IEEE Computer Society.
S16	Dingsoyr, T., & Dyba, T. (2008). Empirical studies of agile software development: A systematic review. Information and Software Technology, 50, 833-859. http://doi.org/10.1016/j.infsof.2008.01.006
S17	Dorairaj, S., Noble, J., & Malik, P. (2011). Bridging cultural differences: a grounded theory perspective. In Proceedings of the 4th India Software Engineering Conference (ISEC) (pp. 3-10). New York, NY, USA: ACM. http://doi.org/10.1145/1953355.1953357
S18	Downs, J., Hosking, J., & Plimmer, B. (2010). Status Communication in Agile Software Teams: A Case Study. In Fifth International Conference on Software Engineering Advances (ICSEA) (pp. 82-87). IEEE Computer Society. http://doi.org/10.1109/ICSEA.2010.20
S19	Dubinsky, Y., & Hazzan, O. (2004). Roles in Agile Software Development Teams. In Extreme Programming and Agile Processes in Software Engineering (pp. 157-165). Garmisch-Partenkirchen, Germany: Springer Berlin Heidelberg.
S20	Eswaramoorthi, M., Kathiresan, G. R., Prasad, P. S. S., & Mohanram, P. V. (2011). A survey on lean practices in Indian machine tool industries. International Journal Andvance Manufacturing Technology, 52, 1091-1101. http://doi.org/10.1007/s00170-010-2788-y
S21	Fontana, R. M., Fontana, I. M., Garbuio, P. A. da R., Reinehr, S., & Malucelli, A. (2014). Processes versus people: How should agile software development maturity be defined? The Journal of Systems and Software, 97, 140-155.
S22	Heidenberg, J., Matinlassi, M., Pikkarainen, M., Hirkman, P., & Partanen, J. (2010). Systematic Piloting of Agile Methods in the Large: Two Cases in Embedded Systems Development. In Product-Focused Software Process Improvement (pp. 47-61). Springer Berlin Heidelberg.
S23	Hoda, R., Noble, J., & Marshall, S. (2012). Developing a grounded theory to explain the practices of self-organizing Agile teams. Empirical Software Engineering, 17, 609-639. http://doi.org/10.1007/s10664-011-9161-0

Code	Citation
S24	Hossain, E., Bannerman, P. L., & Jeffery, D. R. (2011). Scrum Practices in Global Software Development: A Research Framework. In Product-Focused Software Process Improvement (pp. 88-102). Springer Berlin Heidelberg.
S25	Hossain, E., Babar, M. A., & Verner, J. (2009). How Can Agile Practices Minimize Global Software Development Co-ordination Risks? In Software Process Improvement (pp. 81-92). Springer Berlin Heidelberg.
S26	Ikonen, M. (2010). Leadership in Kanban Software Development Projects: A Quasi-controlled Experiment. In Lean Enterprise Software and Systems (pp. 85-98). Helsinki, Finland: Springer Berlin Heidelberg.
S27	Inayat, I., Marczak, S., & Salim, S. S. (2013). Studying relevant socio-technical aspects of requirements-driven collaboration in agile teams. In Proceedings of 3rd International Workshop on Empirical Requirements Engineering, EmpiRE 2013 (pp. 32-35). Rio de Janeiro: IEEE Computer Society. http://doi.org/10.1109/EmpiRE.2013.6615213
S28	Inayat, I., & Salim, S. S. (2014). A framework to study requirements-driven collaboration among agile teams: Findings from two case studies. Computers in Human Behavior, 51, 1367-1379. http://doi.org/10.1016/j.chb.2014.10.040
S29	Karlstrom, D., & Runeson, P. (2006). Integrating agile software development into stage-gate managed product development. Empirical Software Engineering, 11, 203-225. http://doi.org/10.1007/s10664-006-6402-8
S30	Lárusdóttir, M. K., Cajander, Å., & Simader, M. (2014). Continuous Improvement in Agile Development Practice The Case of Value and Non-Value Adding Activities. In Human-Centered Software Engineering (pp. 57-72). Paderborn, Germany: Springer Berlin Heidelberg.
S31	Layman, L., Williams, L., Damian, D., & Bures, H. (2006). Essential communication practices for Extreme Programming in a global software development team. Information and Software Technology, 48(9), 781-794. http://doi.org/10.1016/j.infsof.2006.01.004
S32	Liskin, O., Schneider, K., Fagerholm, F., & Münch, J. (2014). Understanding the Role of Requirements Artifacts in Kanban. In Proceedings of the 7th International Workshop on Cooperative and Human Aspects of Software Engineering (CHASE) (pp. 56-63). New York, NY, USA: ACM.
S33	Manen, H. Van, & Vliet, H. Van. (2014). Organization-Wide Agile Expansion Requires an Organization-Wide Agile Mindset. In Product-Focused Software Process Improvement (pp. 48-62). Helsinki, Finland: Springer Berlin Heidelberg.
S34	Martini, A., Pareto, L., & Bosch, J. (2013). Improving Businesses Success by Managing Interactions among Agile Teams in Large Organizations. In Software Business. From Physical Products to Software Services and Solutions (pp. 60-72). Springer Berlin Heidelberg.
S35	Melo, C. D. O., Cruzes, D. S., Kon, F., & Conradi, R. (2013). Interpretative case studies on agile team productivity and management. Information and Software Technology, 55(2), 412-427. http://doi.org/10.1016/j.infsof.2012.09.004
S36	Mishra, D., & Mishra, A. (2008). Workspace Environment for Collaboration in Small Software Development Organization. In Cooperative Design, Visualization, and Engineering (pp. 196-203). Springer Berlin Heidelberg.
S37	Mishra, D., & Mishra, A. (2009). Effective Communication , Collaboration , and Coordination in eXtreme Programming: Human-Centric Perspective in a Small Organization. Human Factors and Ergonomics in Manufacturing, 19(5), 438-456. http://doi.org/10.1002/hfm
S38	Mishra, D., Mishra, A., & Ostrovska, S. (2012). Impact of physical ambiance on communication, collaboration and coordination in agile software development: An empirical evaluation. Information and Software Technology, 54(10), 1067-1078.
S39	Modi, S., & Abbott, P. (2013). Understanding Collaborative Practices in Distributed Agile Development. In IEEE 8th International Conference on Global Software Engineering Workshops (pp. 74-77). IEEE. http://doi.org/10.1109/ICGSEW.2013.16
S40	Moe, N. B., Dingsøyr, T., & Dybå, T. (2009). Overcoming Barriers to Self-Management in Software Teams. IEEE Software, 26(6), 20-26. http://doi.org/10.1109/MS.2009.182
S41	Nanthaamornphong, A., Morris, K., Rouson, D. W. I., & Michelsen, H. A. (2013). A Case Study: Agile Development in the Community Laser-Induced Incandescence Modeling Environment (CLiiME). In 5th International Workshop on Software Engineering for Computational Science and Engineering (SE-CSE) (pp. 9-18). San Francisco, CA: IEEE Computer Society.
S42	Paasivaara, M., Lassenius, C., Damian, D., Petteri, R., & Schroter, A. (2013). Teaching Students Global Software Engineering Skills using Distributed Scrum. In Proceedings of the 2013 International Conference on Software Engineering (ICSE) (pp. 1128-1137). Piscataway, NJ, USA: IEEE Computer Society.
S43	Petersen, K., & Wohlin, C. (2010). The effect of moving from a plan-driven to an incremental software development approach with agile practices An industrial case study. Empirical Software Engineering, 15, 654-693. http://doi.org/10.1007/s10664-010-9136-6
S44	Petre, M., Sharp, H., & Freudenberg, S. (2012). The Mystery of the Writing That Isn ’t on the Wall: Differences in Public Representations in Traditional and Agile Software Development. In Proceedings of the 5th International Workshop on Co-operative and Human Aspects of Software Engineering (CHASE) (pp. 120-122). Zurich, Switzerland: IEEE Computer Society.
S45	Pikkarainen, M., Haikara, J., Salo, O., Abrahamsson, P., & Still, J. (2008). The impact of agile practices on communication in software development. Empirical Software Engineering, 13, 303-337. http://doi.org/10.1007/s10664-008-9065-9

Code	Citation
S46	PPlonka, L., Sharp, H., & Linden, J. van der. (2012). Disengagement in Pair Programming: Does It Matter? In 34th International Conference on Software Engineering (ICSE) (pp. 496-506). Zurich: IEEE Computer Scociety.
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