Can Process Facilitation Improve Globally Distributed Collaboration? An Action Design Research

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Abstract

Distributed collaborators still face problems to organize, to coordinate, and to build consensus. Collaboration tools still have difficulty to configure, to use, and to help facilitate collaboration management. In this study, we conducted an action design research on Company A that relies on distributed collaboration for their business activities. Based on the design theory of collaboration engineering, we designed a process facilitation support application to address the problems identified from Company A with real organizational problems. After rounds of iteration, we proposed two artifacts including facilitated collaboration process and collaborative tools for applications of process guidance. Findings suggest the benefits of facilitated process guidance on globally distributed collaboration. The results of survey show consistently high satisfaction towards the tool and process guidance from the employees. Our research serves as an exploratory investigation in the field of distributed collaboration, and provides evidence regarding the organizational challenges in a business context.

1. Introduction

Globally distributed collaboration has long been a question of great interest in a wide range of fields [22][24][27]. Especially with the continuous development of economic globalization and international trade integration, the importance of globally distributed collaboration has been recognized as a central issue in addressing challenges of the global business. Globally distributed collaboration help decrease the risks from information asymmetry, and make full use of the complementary resources from both sides. According to a recent report released by PWC, seamless business collaboration has a significant influence on enterprise innovation improvement, and thus facilitates revenues and enterprise competitiveness[1].

A considerable amount of literature has been published on globally distributed collaboration [7][13][15][27]. But distributed teams are still hard to get right. It is still a challenge for many organizations. Many people find themselves confused by collaboration technology and consider virtual collaboration less productive [12]. But the virtual nature of distributed team must rely heavily on information and communication technology. Thus, though globally distributed collaboration has a lot of advantages regarding to the flexibility and responsiveness, the issue on how to get distributed collaboration right is an unsolved question.

According to the observation of collaboration among peers in the biology world, such as bees, ants, living cells and many types of micro-organisms, successful bioteams often exhibit some similarities in the way of collaboration [14]. The key traits include a high level of self-organization, a specific networked relationship structure, member autonomy and effective communication system. In the practical cases of human collaboration, it's more complex than bioteams regarding to culture, values and language barriers. But at least, there might be some enlightenment from the case of bio-collaboration. Especially in the case of global collaboration, can we design a guideline of collaborative process for team members to achieve autonomy and self-organization in globally distributed teams? Since members are dispersed in globally distributed collaboration, the role of leadership might not be as effective as in face to face collaborations. If

[1]https://www.pwc.com/gx/en/services/advisory/forensics/collaboration.html

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there exists an easy to use and process support applications (PSAs) as process facilitation, team members may collaborate with higher efficiency and effectiveness.

Taken together, firstly, a structured collaboration process facilitation will facilitate member autonomy in the lack of leadership and expert facilitator in distributed collaboration. Secondly, the communication tools should be easy to use for team members. Thus, in this paper, we report a design science research initiative [1] on PSAs to address the issues in globally distributed collaboration. We employed the action design research (ADR) based on the collaboration problems in real globally collaborative settings [25]. We initiate the ADR rigor by the iteration of problem diagnosing, action planning, action taking, evaluation and formalization of learning. Both quantitative results from survey and qualitative results from interviews validate the evaluation of this study.

This paper begins by this introduction section, followed by the research background in this domain. The third section is concerned with the research design and the case introduction of this study. Then, section four begins by laying out the specific research procedures of the action design, and looks at how the participatory intervention influence members' perception of globally distributed collaboration. Straight after, we present the preliminary results of the research, focusing on the interview comments and survey perceptions of the study. Finally, discussion and implication are provided.

2. Background

2.1 Globally distributed collaboration

Globally distributed collaboration refers to a form of collaboration between globally distributed team members, they come from different geographical locations, work across time and organizational boundaries [22]. In distributed collaborative teams, groups of individuals interact through interdependent tasks toward common goals [19]. Different with traditional team collaboration that user engagement is easy in the form of synchronous and collocated interaction, globally distributed collaboration mostly takes the form of virtual interaction, thus digital artifacts are used as a mean of communication. According to media richness theory, digital artifact, as a lean media, conveys a limited set of information cues [23]. It is compounded to coordinate compared to the traditional context.

There are several challenges in globally distributed collaboration, existing studies have focused on knowledge transfer [22], on conflict management and on shared understanding [15][28], and on trust building [17]. In order to address these issues, Powell et al. [23] identified four dimensions of the globally distributed collaboration related studies, including inputs, social-emotional processes, task processes and outputs. Specifically, inputs concern with the team endowments before teamwork really begins, including team structure, culture and technical expertise. Better design of collaboration setups avoided the potential collaborative conflict from the source [2][21]. The socio-emotional processes refer to the relationship building and cohesion during the process of globally distributed collaboration. It is a longitudinal process since some studies found that the level of team cohesion keeps changing in different stages of team collaboration [26]. The third dimension, task process, relates to communication, coordination and task-technology-structure fit [10]. The dimension of task process is related to social-emotional processes, studies have found that communication and trust are the keys to unlock the relationship in team performance and relationship building [4][9]. The final dimension concerns with the output of team collaboration, including satisfaction and performance. Since different studies have various focuses on the investigations of globally distributed collaboration, the corresponding outputs vary across research context, but all about better outcome of collaboration.

2.2 Process facilitation

In globally distributed collaboration, there are generally three stakeholders, the practitioners who are domain experts that participate in the collaboration, the designers who plan the collaboration agenda, and the facilitators who guide the process during distributed collaboration, respectively [17]. Expert designers and facilitators work with a team to help define goals, design process and manage collaboration progress. However, it is always expensive and not always feasible in some collaboration cases to recruit collaboration experts [5]. If there was a structured package for non-expert execute collaboration process themselves, then it might be economic feasible and effective.

Based on Collaboration Engineering (CE), existing studies have proposed the concept of process support applications (PSAs) [6]. PSAs refer to a collaboration application designed to present the group procedures with a series of activities. It enables the sufficient collaboration expertise package within technology, and PSAs make it possible for non-experts easily execute collaboration process. According to Bikson[3], the combination of social systems and technical systems

contribute to better implementation of team collaboration. Social systems refer to team structure, task design and collaboration facilitation, while technical systems are the hardware or collaborative software. Thus, the idea of PSAs is in line with the general principle for better collaboration outcomes as it shown in Figure 1.

In order to design the application for process facilitation support, the software itself should be easy to use and easy to configure, easy to modify and no software code required [20]. Following the collaboration patterns of generate, reduce, clarify, organize, evaluate and build commitment [11], each collaboration pattern has its corresponding thinkLets modules. In order for the design of process facilitation, thinkLets serve as the building block for repeatable collaboration processes. As the design patterns in CE, a thinkLet is "a named, scripted technique for predictably and repeatedly invoking known effects among people working together toward a goal." [16]. A thinkLet constitutes facilitation skills and experiences by providing scripts for the collaboration as smallest unit of intellectual capital, and also provides the way to use and configure tools. The permutation and combination of thinkLets can be designed to satisfy the needs of various collaborative tasks.

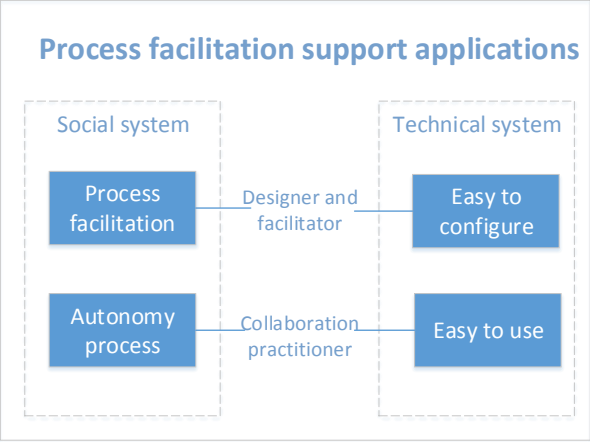

Figure 1. PSAs requirement

3. Research design

3.1 Research methodology

This study is conducted through action design research (ADR) [25]. As a practice-inspired research, ADR not only enables building and evaluating artifacts but also combines knowledge generation with research intervention. Considering the still existing challenges in the context of globally distributed collaboration, directly artifact design might not be relevant to the authentic settings. Thus, we chose a typical case company in which employees often collaborate in the form of globally distributed collaboration. Based on the principles of both action research [18] and design science research [1], we aim to investigate whether or not our designed artifact is useful in addressing the real-life problems of globally distributed collaboration, and to summarize the generalized mechanisms for better globally distributed collaboration.

3.2 Case introduction

Based on action research principles, in order to address a problem situation in real business settings, Company A (pseudonym) was selected as our research case. Our study on Company A starts on the early 2015. As a representative company in the industry of manufacturing and global trade, Company A is a listed company that is famous for the production of curtain wall. Headquartered in Beijing, it has established fabrication bases, R&D centers, and sales departments in a lot of cities in China and around the world, such as Shanghai, Chengdu, Abu Dhabi, Singapore and Canada. In order for the execution of their business activities, employees in Company A have some regular and temporary distributed meetings with colleagues in distributed locations. Based on the globally distributed collaboration case of Company A, the overview process of this study is shown in Figure 2 below.

4. Action design implementation

4.1 Problem formulation

Following the principles of "practice-inspired research" and "theory-ingrained artifact", we visited headquarter of Company A several times to diagnose the problems in their globally distributed collaboration. As we know, there are two information and communication tools in their globally distributed collaboration process, which respectively are Tencent Real Time Exchange (RTX) and POLYCOM video conference system. RTX is mainly used for instant message and document transfer. While the POLYCOM system is mainly used for online meeting across distributed locations. In some cases, over 100 employees from all over the world participate project collaboration through those two tools. Sometimes, the team members don't know each other completely. Especially for the project meeting that involves several departments from various branches, the role of leadership fails to take effect since the nature of flat organizations in their globally distributed collaboration.

We conducted in-depth interviews on employees in Company A, including the CIO, the technology manager of IT department, the global business assistant, the director of enterprise planning department and the assistant manager of regional coordination. All the interviewees have several years of globally virtual collaboration practices and coordination experiences. Talking about the current distributed collaboration, the global business assistant said: "Sometimes the distributed work efficiency is low, we have to keep reserve virtual meeting for a single problem. Sometimes, final decision is difficult to make, the distributed collaboration always have to be delayed. It's obvious that employees are not satisfied with frequent and delayed meetings."

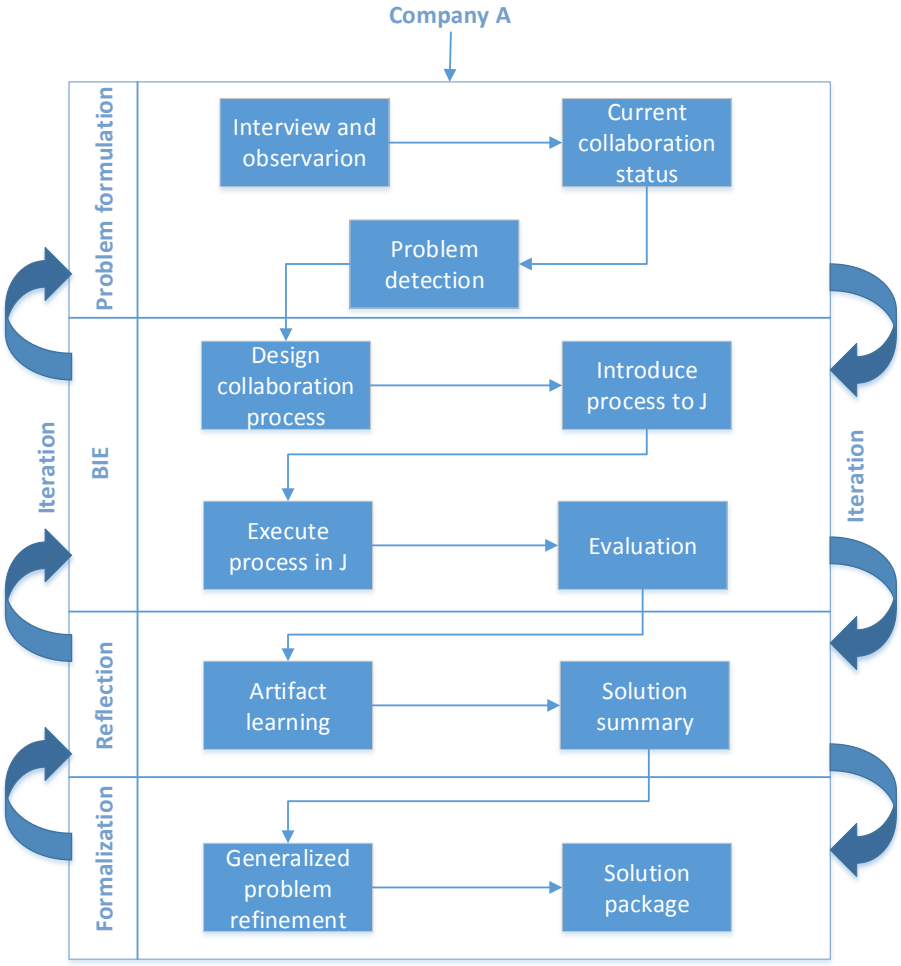

Figure 2. Research overview

Moreover, we observed how their distributed projects were discussed. On the point of decision making, they still rely on a leader to make the final decision. Nonetheless, as we mentioned earlier, the absolute leader doesn't exist in some across branches collaborations. Thus, consensus is always difficult to reach since there are always members who are against the ideas proposed by others. However, globally distributed collaboration is used to discuss business activities, decision making is really important. Team members have to continue with the collaboration process until final decision making, which sometimes leads to time consuming for globally distributed collaboration. Better decision making process always leads to higher level of satisfaction from members and better performance. On the other hand, both RTX and POLYCOM are supporting tools that only have the basic functionalities for distributed collaboration. The existing tools are just technology based but no management guidance for the collaboration process.

Through the interactions with the employees and our observation on their daily distributed collaboration, we identified two existing problems in their collaboration. Firstly, the overall satisfaction level of distributed collaboration process is low. Secondly, the collaboration is also low efficient and time consuming to build consensus. Their current way of collaboration

is challenging from 1) lack of skilled collaboration designers and facilitators for the process intervention; 2) Existing tools are just fundamental collaboration support, and fail to incorporate team management wisdoms into the tools to facilitate collaboration process.

4.2 Building, intervention, and evaluation (BIE)

Following the principles of "reciprocal sharing", "mutually influential roles" and "authentic and concurrent evaluation", we firstly began the action planning stage. Based on the design theory of Collaboration Engineering [6], we built a set of collaboration process as a part of process support applications (PSAs), so as to help non-experts exhibit facilitator behavior for better distributed collaboration. Expert facilitator skills were incorporated in the design process that is comprised of several thinkLets modules.

Artifact Version 1.0: Based on their organizational context, our first version of artifact is a series of collaboration process facilitation. According to the team facilitation knowledge from Collaboration Engineering [5], several thinkLets were incorporated in the process design. Each thinkLet has its corresponding descriptions on when and how to best match thinkLets with the collaboration tasks, thus and help facilitate collaboration process. Distributed collaboration members could self-adjust their process t according to the general collaboration pattern. Moreover, based on the process facilitation support, we designed a system to enable the functional realization of the process facilitation. Please see the following example of a designed globally distributed collaboration process.

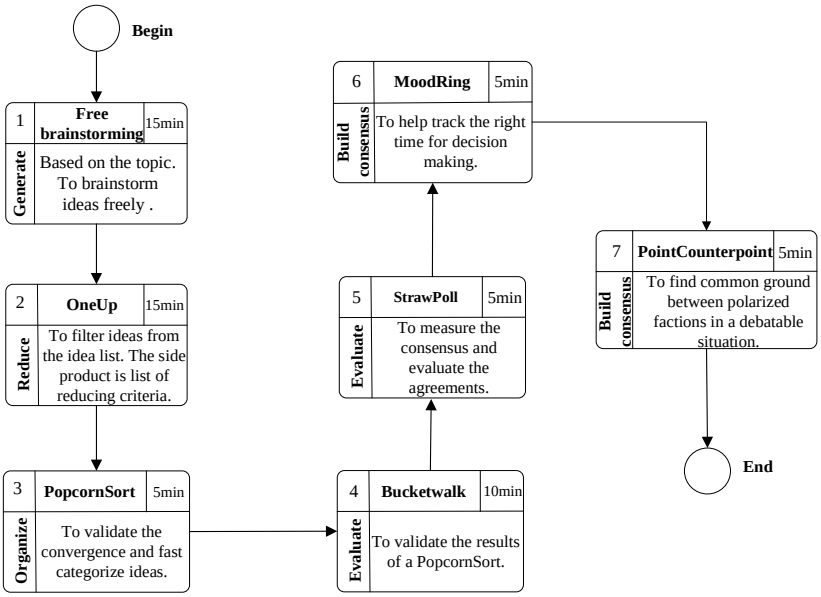

Figure 3. An example of collaboration process

After the first version of artifact was finished, we went to Company A, and showed the managers about our artifacts, we made the agreements to let them have a try of our process facilitation system. After simple training on the deployment of the system and the process design, Company A adopted our designed system, which is our first intervention on Company A's globally distributed collaboration. For our external observation, we participated in one of their globally distributed collaboration. During the collaboration, one of the employees was assigned as the facilitator who guides the collaboration process and assists designing the meeting agenda. It is worth noting that the employee who served as the facilitator is neither an authoritative leader in Company A nor an experience experts in the domain of collaborative facilitation.

Then, we asked the company to use our process facilitation software for a period of time whenever it's suitable for facilitation intervention. Two months after the first action taking, we went to Company A again. We conducted interviews for potential feedback from their usage. This is the first time of our evaluation. The interviews were audio recorded and transcribed into text forms upon completion.

There are three general findings from the evaluation: 1) Due to the well-organized collaboration process, distributed collaboration efficiency improved to a certain extent. The strict collaboration process management enables team members to concentrate on the collaboration, and avoid the possibility of gossip chat; 2) Some interviewees mentioned that the distributed collaboration is still time consuming since everyone has to sit down in the designated meeting

time, and wait until it's their turn to deliver opinions. For example, said one business manager: "In some cases, not all the project members are able to participate the distributed meeting. Thus, I would suggest a real-time notification or discuss record, so that we can check the progress at any time and space." 3) This designed process is not suitable for all the collaboration forms, for example, in the case of corporate strategic decision making, they prefer face to face meetings, and assign more weight to leaders' ideas in the decision making process. Because leaders generally have a higher angle of view in strategic solutions. Therefore, flexibility is required in the process design according to various collaboration tasks.

Based on the feedback from Company A, we conducted several rounds of iteration. During the refinement of the artifact, evaluation is interwoven with the designs and improvement. We fixed the problems of slow information transfer speed and network stabilization. Apart from the previous artifact that only had the laptop version, a mobile version of the software is also acceptable.

Artifact Version 2.0: In the new version, we made the following changes: 1) The improvement of system stability; 2) The new feature of anonymity and idea recording; 3) The mobile version of the system with process facilitation. 4) The possibility of flexible design on the collaboration process.

The previous evaluation of the system is just among a small group of employees for globally distributed collaboration. This time, after the artifact version 2.0, a wider range of employees in Company A adopted the system. After around six months of usage, we delivered questionnaires to measure their perception of the artifact (the process facilitation and the tool). Based on the existing process evaluation studies on PSAs (See [20]), the measurements in the questionnaire includes satisfaction with process, satisfaction with outcome, perceived ease of use on the tools, perceived ease of process autonomy, perceived adequacy of process facilitation, and perceived difficulty of communication with teammates.

According to the results of the questionnaire, table 1 presents the means and standard deviation (SD) of collaborative team members' responses on their perceptions of *Artifact Version 2.0* usage. Each questionnaire item anchored from one to five, one represents strongly disagree, five represents strongly agree. On average, the feedbacks from the users are positive. The mean value of each item is all above 4, with the exception of perceived ease of PSA tools with 3.83 in mean value.

Table 1. Employees' perception of the artifact

Label	Measure(1=strongly disagree; 5=strongly agree)	Mean(SD)	Cronbach's alpha
SP	Satisfaction with process	4.13 (0.833)	0.945
SO	Satisfaction with outcome	4.17 (0.797)	0.887
TOOLDIF	Perceived ease of PSA tools	3.83 (0.539)	0.880
PROADIF	Perceived ease of process autonomy	4.35 (0.737)	0.937
GUIDADQ	Perceived adequacy of process facilitation	4.11 (0.849)	0.791
COMMDIF	Perceived difficulty of communication with teammates	4.06 (0.631)	0.832

4.3 Reflection and learning

Following the principles of "guided emergence", we move from problem solving of globally distributed collaboration in Company A to applying reflection and learning to a broader class of problems associated with globally distributed collaboration. As a continuous stage that in parallels with the previous two stages, we reflected the progress of technological and organizational development in the iteration.

From the design and redesign of this study, firstly, we realized that artifact design is an iteration process. Starting from initial version, the interaction between practitioners and the researchers provides comprehensive perspectives for artifact refinements. Secondly, the goal of this study is generally realized. We redesigned the artifacts in terms of flexibility and recording support. However, tool can just be used as a collaborative support that facilitates well guided collaboration process. The inherent problems in globally distributed collaboration, such as time differences, individual personality, and professional skills to address the project problems, are still unsolved. But team members can choose suitable thinkLet modules according to various collaborative tasks, so that the process facilitation can maximize individuals' contribution on the collaborative process, and minimize the influence of individual personality on collaboration results.

4.4 The formalization of learning

Following the principles of "generalized outcomes", we aim to articulate a set of design principles for the generalized learning formalization of globally distributed collaboration. The problem instance addressed in this study is about how to solve the problems of low distributed collaboration efficiency and satisfaction through tool advancement. Thus, the solution instance is the combination of social systems and technological systems for the tool design. In our study, the social system is comprised of a set of process packages that can be used as the building blocks for collaboration guidance. The general principles of the solution instance includes: 1) Collaboration tools should be easy to configure and easy to use; 2) Collaboration process design should be easy to conduct, at the meanwhile, the facilitator should be easily trained by the tool to well execute the process according to corresponding thinkLets support; 3) During the conceptualization of artifacts as ensembles, they are always shaped by the context of usage. Process facilitation support design should correspond to various collaboration goals.

5. Conclusion and implication

5.1 Conclusion

Globally distributed collaboration is an essential form for the teams that work across time and space, so the importance of collaboration continues to increase. There exist several collaboration support tools in order for seamless collaboration. At the same time, very few existing tools focused on the frequent interactions between practitioners and designers while designing the collaboration supported tools.

In this paper, we worked on the distributed collaboration application initiative in the field of globally distributed collaboration through the integrated approach of action and design. During the ADR period, two artifacts were designed including the collaboration process facilitation support and the tools used for process application. Through the four research stages guided by ADR principles, this paper iteratively design and redesign the artifacts targeting on the existing collaboration problems, and evaluate the artifacts on various employees in Company A. Through reflection and formalization of learning, we summarize the research for generalized outcomes in the field of globally distributed collaboration.

5.2 Theoretical contribution

ADR helps establish in-depth understanding of the relationships between artifacts and organizational contexts, the repeated intervention in this study is an application of the research methodology in real business case. This paper completed instances of the ADR relevance and design cycles over a number of years, and serves as a concrete practice based on ADR [25].

This study contributes to existing literatures on globally distributed collaboration. Different with some research that focus on team endowments [2], relationship building [4][8] and knowledge transfer [22], this research specifically focused on the process facilitation perspective. In Company A's current collaboration practice, it was time consuming to building consensus, which results from a lack of structured process guidance. Drawing on the design theory of collaboration engineering, we focused on the process facilitation [6] that support different collaboration practice for various goals and team compositions. This study is also an application of PSAs in the case of Company A.

This study also makes a contribution with respect to member autonomy on distributed collaboration. Expert collaboration facilitators are sometimes not feasible, and the leadership role is not as effective as in face to face collaboration. With structured process building blocks and explanations on thinkLet usage, it's feasible for non-experts design and guide collaboration process that leads to higher satisfaction level and work efficiency.

5.3 Practical implication

As an ADR, the study is a practice inspired topic in real collaboration case. Our practical implication lies in threefold. Firstly, we identified problems on the existing collaboration tools of Company A, which might be applicable in some other business settings. Secondly, this study provides some insights on process optimization through the design of artifacts. Since expert facilitators and collaboration designers are expensive and not available in some cases, it is convenient to have building blocks for non-experts self-design and guide the collaboration process. Thirdly, our research provides new evidence regarding the combination of technology and management wisdoms into the design of collaboration supported systems.

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7. References

[1] R.H. Von Alan, S.T. March, J. Park, and S. Ram, "Design science in information systems research", MIS Quarterly, 28(1), 2004, pp.75-105.

[2] R. Agarwal, B.A. Campbell, A.M. Franco, and M. Ganco, "What Do I Take With Me? The Mediating Effect of Spin-out Team Size and Tenure on the Founder–Firm Performance Relationship", Academy of Management Journal, 59(3), 2016, pp.1060-1087.

[3] T.K. Bikson, "Groupware at the World Bank. In C.U. Ciborra (ed.), Groupware and Team- work—Invisible Aid or Technical Hindrance? Chichester", UK: John Wiley & Sons, 1996, pp. 145–183.

[4] K. Boies, J. Fiset, and H. Gill, "Communication and trust are key: Unlocking the relationship between leadership and team performance and creativity", The Leadership Quarterly, 26(6), 2015, pp.1080-1094.

[5] R.O. Briggs, G.J. De Vreede, and J.F. Nunamaker Jr, "Collaboration engineering with ThinkLets to pursue sustained success with group support systems", Journal of Management Information Systems, 19(4), 2003, pp.31-64.

[6] R.O. Briggs, G.L. Kolfschoten, G.J. de Vreede, S. Lukosch, and C.C. Albrecht, "Facilitator-in-a-box: process support applications to help practitioners realize the potential of collaboration technology", Journal of Management Information Systems, 29(4), 2013, pp.159-194.

[7] X. Cheng, S. Fu, and D. Druckenmiller. "Trust development in globally distributed collaboration: A case of US and Chinese mixed teams", Journal of Management Information Systems, 33(4), 2016, pp.978-1007.

[8] X. Cheng, S. Fu, J. Sun, Y. Han, J. Shen, and A. Zarifis, "Investigating individual trust in semi-virtual collaboration of multicultural and unicultural teams", Computers in Human Behavior, 62,2016, pp.267-276.

[9] X. Cheng, G.P. Yin, A. Azadegan, and G.L.Kolfschoten, "Trust evolvement in hybrid team collaboration: A longitudinal case study", Group Decision and Negotiation, 25(2), 2016, pp.267-288.

[10] X. Cheng, Y. Li, J. Sun and J. Huang, "Application of a Novel Collaboration Engineering Method for Learning Design: A Case Study", British Journal of Educational Technology, 47(4), 2016, pp.803-818.

[11] G.J. De Vreede, R.O. Briggs, and A.P. Massey, "Collaboration engineering: foundations and opportunities: editorial to the special issue on the journal of the association of information systems", Journal of the Association for Information Systems, 10(3), 2009, pp.121-137.

[12] K. Ferrazzi, "Getting virtual teams right", Harvard Business Review, 92(12), 2014, pp.120-123.

[13] S.L. Jarvenpaa, K. Knoll, and D.E. Leidner, " Is anybody out there? Antecedents of trust in global virtual teams", Journal of Management Information Systems, 14(4), 1998, pp.29-64.

[14] K. Von Frisch, The dancing bees. Harcourt, Brace, 1955.

[15] P.J. Hinds, and M. Mortensen, "Understanding conflict in geographically distributed teams: The moderating effects of shared identity, shared context, and spontaneous communication", Organization Science, 16(3), 2005, pp.290-307.

[16] G.L. Kolfschoten, R.O. Briggs, G.J. De Vreede, P.H. Jacobs, and J.H. Appelman, "A conceptual foundation of the thinkLet concept for Collaboration Engineering", International Journal of Human-Computer Studies, 64(7), 2006, pp.611-621.

[17] G.L. Kolfschoten, and G.J. De Vreede, "A design approach for collaboration processes: a multimethod design science study in collaboration engineering", Journal of Management Information Systems, 26(1), 2009, pp.225-256.

[18] R. Lindgren, O. Henfridsson, and U. Schultze, "Design principles for competence management systems: a synthesis of an action research study", MIS Quarterly, 28(3), 2004, pp.435-472.

[19] A. Majchrzak, A. Malhotra, and R. John, "Perceived individual collaboration know-how development through information technology–enabled contextualization: Evidence from distributed teams", Information Systems Research, 16(1), 2005, pp.9-27.

[20] A. Mametjanov, C. Nguyen, D. Kjeldgaard, and R.O. Briggs, "An ontology for ActionCenter-oriented collaboration platforms. In R.H. Sprague (ed.)", Proceedings of the 45th Annual Hawaii International Conference on System Sciences. Los Alamitos, CA: IEEE Computer Society Press, 2012.

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

[22] I. Oshri, P. Van Fenema, and J. Kotlarsky, "Knowledge transfer in globally distributed teams: the role of transactive memory". Information Systems Journal, 18(6), 2008, pp.593-616.

[23] A. Powell, G. Piccoli, and B. Ives, "Virtual teams: a review of current literature and directions for future research", ACM Sigmis Database, 35(1), 2004, pp.6-36.

[24] J.R. Rentsch, L.A. Delise, A.L. Mello, and M.J. Staniewicz, "The Integrative Team Knowledge Building Training Strategy in Distributed Problem-Solving Teams", Small Group Research, 45(5), 2014, pp.568-591.

[25] M.K. Sein, O. Henfridsson, S. Purao, M. Rossi, and R. Lindgren, "Action design research," MIS Quarterly, 35(1), 2011, pp.37-56.

[26] A.G. Tekleab, N.R. Quigley, and P.E. Tesluk, "A longitudinal study of team conflict, conflict management, cohesion, and team effectiveness", Group & Organization Management, 34(2), 2009, pp.170-205.

[27] D. Tzabbar, and A. Vestal, "Bridging the social chasm in geographically distributed R&D teams: the moderating effects of relational strength and status asymmetry on the novelty of team innovation", Organization Science, 26(3), 2015, pp.811-829.

[28] J.B. Windeler, L.M. Maruping, L.P. Robert, and C.K. Riemenschneider, "E-profiles, conflict, and shared understanding in distributed teams", Journal of the Association for Information Systems, 16(7), 2015, pp.608-645.