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Partnering to create IT-based value: A contextual ambidexterity approach

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ABSTRACT

Going beyond the boundary of the firm and traditional notions of how IT contributes to value creation, scholars have started to investigate under what conditions, in what ways, and with which results firms can co-create IT-based value. However, we lack comprehensive insights into how firms can develop such collaborative partnerships and the types of value they create at different stages of the process. Using a qualitative case study, we analyze in detail how a mining company, a manufacturer of mining machinery, and an IT provider developed a joint venture over a ten-year period. Drawing on ambidexterity theory, we show how the three firms successfully built a context that encouraged alignment of interests and allowed the participants to adapt to emerging conditions as they collaborated to create IT-based value. Moreover, we uncover the different types of value they created over the various stages of developing the collaboration. As a result, we contribute to the literature on IT-based value co-creation with insights into how inter-firm collaboration can be developed to create different types of IT-based value. In addition, we advance contextual ambidexterity theory by demonstrating how it applies to developing new partnerships between firms.

1. Introduction

While most prior research views value derived from the development, application and use of information technology (IT) from the perspective of a single firm, many organizations increasingly rely on open architectures, resource sharing and collaborative processes to deliver value (Ceccagnoli, Forman, Huang, & Wu, 2012; Grover, Chiang, Liang, & Zhang, 2018; Kohli & Grover, 2008; Sarker, Sarker, Sahaym, & Bjørn-Andersen, 2012; Tempini, 2017). IT-based value is thus increasingly being created and realized through actions of multiple parties (Kohli & Grover, 2008), as organizations actively seek cooperation and co-dependency in the pursuit of mutually beneficial behavior (Gallivan, 2001; Grover & Kohli, 2012; Swan, Newell, Scarbrough, & Hislop, 1999; Swan & Scarbrough, 2005; Van de Ven, 2005). In order to capture current business practices, scholars have therefore studied the creation of different types of IT-based value, through various forms of established inter-firm collaboration (Grover & Kohli, 2012), such as supply chain relationships (Rai, Pavlou, Im, & Du, 2012), platform ecosystems (Ceccagnoli et al., 2012; Constantinides, Henfridsson, & Parker, 2018; Sarker et al., 2012) and open innovation alliances (Han et al., 2012). In addition, researchers have highlighted how partnering firms seek to create a stable context where partners' business interests and expectations are aligned while they simultaneously embrace

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flexibility and encourage adaptability to keep up with both environmental and technological changes (Chandrasekaran, Linderman, & Schroeder, 2012; Im & Rai, 2014; Kietzmann et al., 2013).

However, although previous research offers valuable insights into developing inter-firm collaboration (Ring & Van de Ven, 1994; Vanneste, Puranam, & Kretschmer, 2014; Zaheer, McEvily, & Perrone, 1998), emerging research suggests we know little about how firms can develop new collaborative contexts that are amenable for co-creation of IT-based value (Schryen, 2013; Zander, Mandrella, & Kolbe, 2016). Indeed, most IT-value research to date concentrates on the outcome of the value creation process, not the process itself, leading to a lack of insights into why and how value co-creation occurs. In this paper, we argue that in order to understand the potential for IT-based value between multiple firms, it is essential to understand the context where value co-creation takes place. We therefore draw on contextual ambidexterity theory (Birkinshaw & Gibson, 2004; Gibson & Birkinshaw, 2004; Napier, Mathiassen, & Robey, 2011; O'Reilly & Tushman, 2013) to analyze how three firms in the mining industry collaborated over a ten-year period to build an environment that enabled them to co-create IT-based value. Accordingly, we ask the following research question: How can firms over time collaborate to build a multi-firm context with capabilities that allow them to co-create IT-based value? As such, we seek to provide insights into how firms can collectively build a context for IT-based value and which types of value they create at different stages of that process. In addition, we seek to demonstrate how contextual ambidexterity theory can be used to study the process of developing new collaborative partnerships between firms.

2. Investigative context

Context can be defined as “a set of situational opportunities for, and countervailing constraints against, organizational behavior, [and can as such] be represented as a tension system or force field comprising such opportunities and constraints” (Johns, 2006, p. 387). Specific contexts may therefore serve as sensitizing devices for advancing new theory (Bamberger, 2008). Adopting this approach, we show how three firms: a mining company (LKAB), a manufacturer of mining machinery (Sandvik), and a provider of remote monitoring technology (SKF) collaborated over a ten-year period to build a context that enabled them to co-create IT-based value in the maintenance of complex industrial machinery. The three partners saw the emerging collaboration as an opportunity to increase revenue and bring new jobs to the region. Each firm expected to gain something from the collaboration: LKAB would implement a more effective and efficient maintenance organization to save time, cut costs, and get to know operations in more detail through systematic analysis of machine data; Sandvik would gain access to equipment data and advanced measurements that could be used for product development; and, SKF would put their remote monitoring system (RMS) to use and be able to develop their methods and technology further based on experiences in a real-world industrial setting.

In such multi-firm settings, value co-creation shifts from the activities performed by one firm together with its customers (Füller, Mühlbacher, Matzler, & Jawecki, 2009; Prahalad & Ramaswamy, 2004; Ramaswamy & Gouillart, 2010; Zwass, 2010) to the activities performed in partnerships between firms (Normann & Ramirez, 1993; Ramirez, 1999). Kohli and Grover (2008, p. 28) outline the principles for investigating such IT-based value co-creation: “(a) IT value is increasingly being created and realized through actions of multiple parties, (b) value emanates from robust collaborative relationships among firms, and (c) structures and incentives for parties to partake in and equitably share emergent value are necessary to sustain co-creation.” Based on these principles, researchers have demonstrated how firms can access and leverage a wide range of valuable resources from other firms through established partnerships (Grover & Kohli, 2012). So far, however, the central impetus in co-creation of IT-based value research has been to understand how resource contributions of individual firms lead to value outcomes (Grover & Kohli, 2012). Hence, our understanding of the detailed processes and interactions through which firms develop collaborative partnerships for IT-based value creation is still in its infancy (Grover & Kohli, 2012), offering several opportunities to advance theory.

First, although the management literature has long addressed the many benefits related to developing inter-firm collaboration (Dyer & Singh, 1998; Hardy, Phillips, & Lawrence, 2003; Tiwana, 2008), these insights have yet to be explicitly applied and developed in the context of IT-based value co-creation. Previous research has shown how such partnerships emerge, evolve and dissolve through three cyclical stages of negotiations, commitments and executions, highlighting the important role of trust in creating successful partnerships (Ring & Van de Ven, 1994; Vangen & Huxham, 2003). In the negotiations stage, firms develop joint expectations about their motivations, investments, and perceived uncertainties of their cooperative venture. In the commitments stage, they reach an agreement on the obligations and rules that form the governing principles of the collaboration. In the executions stage, firms carry out their commitments in accordance with the jointly agreed-upon rules. As partnerships evolve over time, re-negotiations may take place updating previous agreements and incorporating changing expectations and conditions.

Second, we have limited insights into the different types of value that are created at various stages of developing partnerships for IT-based value co-creation. Studies have revealed how IT may contribute to transactional business value through increased efficiency and cutting of costs (Melville, Kraemer, & Gurbaxani, 2004; Mirani & Lederer, 1998; Mukhopadhyay, Kekre, & Kalathur, 1995) and to transformational business value through changes in the structure of firms (Brynjolfsson & Saunders, 2010; Lucas & Goh, 2009; Zhu, 2004). Furthermore, IT-based value is created on different organizational levels (Kohli & Grover, 2008) and it may materialize in tangible form as digital components are increasingly embedded into products (Nambisan, 2013) as well as in intangible form through development of digital services (Bharadwaj, Bharadwaj, & Konsynski, 1999; Kleis, Chwelos, Ramirez, & Cockburn, 2012; Yoo, Henfridsson, & Lyytinen, 2010). To advance knowledge about the different types of value that are created at different stages of developing partnerships for IT-based value co-creation, we build on Grover and Kohli (2012) and define affective IT-based value as a perception-related social value, where IT contributes to a feeling of closeness, trust, and having shared goals and expectations within a partnership; intermediate IT-based value as a process-related transformational value where IT is connected to improving business and supply chain processes for the individual members of the partnership; and economic IT-based value as a financially-related

transactional value, where IT can be directly linked to an increased yield and increased production for individual partners.

Third, acknowledging that partnering firms need to synergistically pursue alignment aimed at creating productive relationships as well as adaptability aimed at managing digital technology and market dynamics (Chandrasekaran et al., 2012; Im & Rai, 2014; Kietzmann et al., 2013), we draw on contextual ambidexterity theory (Birkinshaw & Gibson, 2004; Gibson & Birkinshaw, 2004; Napier et al., 2011; O'Reilly & Tushman, 2013) to analyze how the three firms conceptualized and developed their collaboration (Ring & Van de Ven, 1994). The notion of contextual ambidexterity underscores how firms can balance exploration and exploitation across multiple levels and activities simultaneously (Lavie, Stettner, & Tushman, 2010). Such ability to learn is considered key with distinct effects on innovation and results during development of collaborative partnerships (Ellonen, Wikström, & Jantunen, 2009). Whereas contextual ambidexterity was originally studied from the perspective of the single firm, Im and Rai (2014, p. 74) define inter-firm contextual ambidexterity as “the capacity of its management system to achieve synergies between the alignment and adaptation of goals, resources, and activities for the interfirm relationship”. In other words, to ascertain cooperation and value creation and extraction among firms, intentional and purposeful actions must be taken to build an appropriate context (Vanneste et al., 2014; Zaheer et al., 1998).

Contextual ambidexterity stems from the idea that to stay competitive firms must be simultaneously efficient in handling day-to-day business (alignment) as well as effective in managing changing environments (adaptability) (Andriopoulos & Lewis, 2009; Birkinshaw & Gibson, 2004; Duncan, 1976; Tushman & O'Reilly, 1996). Unlike structural ambidexterity, which proposes that ambidexterity can be achieved through spatial separation of organizational efforts towards alignment and adaptability, or temporal ambidexterity, which suggests that these efforts are separated over time, contextual ambidexterity suggests that these dual strategies can and should be simultaneously integrated at the business unit level (Gibson & Birkinshaw, 2004; O'Reilly & Tushman, 2013). Hence, the challenge is to develop a select set of systems and processes that collectively define a context that allows for both alignment and adaptability to take place (Carmeli & Halevi, 2009). Research suggests that a high-performance context is developed through a combination of social support, which is made up of support and trust, and performance management, which consists of discipline and stretch (Gibson & Birkinshaw, 2004).

3. Analytical framework

We followed our case over a ten-year period during which the joint venture was developed, launched, and subsequently re-designed. In order to structure the data, we apply the framework by Ring and Van de Ven (1994) as an overarching template to organize our case analysis into the four stages of negotiations, commitments, executions and re-negotiations. In addition, we draw on Grover and Kohli (2012) types of IT-based value and on contextual ambidexterity (Birkinshaw & Gibson, 2004; Gibson & Birkinshaw, 2004) to trace in each of the four stages how the three firms built a context that afforded opportunity to co-create IT-based value by continuously aligning interests and adapting to uncertain technological and market conditions. Hence, as summarized in Table 1, we trace four inter-firm activities through four stages of partnership development.

First, we trace how the collaboration developed between the three firms. For each stage of development, we examine which configuration of stakeholders from the involved firms drove the development of the partnership with specific abilities to co-create IT-based value. Second, we analyze how the firms build a context amenable to value co-creation. Specifically, we focus on how they build performance management and social support systems and processes that enabled them to co-create IT-based value under uncertain conditions. Third, we trace how this emerging context enabled growing ambidextrous capabilities within the partnership. Here, our focus is on revealing the extent to which the pursuit of both alignment and adaptability sustained business processes for value co-creation. Lastly, we consider the different types of value that were created throughout the various stages of the process. To

Table 1
Analytical framework.

Activity	Concepts	Focus	References
Developing collaboration	<ul style="list-style-type: none"> ● Negotiations ● Commitments ● Executions ● Re-negotiations 	At each stage of development, who drove the development of the partnership with specific abilities to co-create IT-based value?	Ring & Van de Ven, 1994
Building context	<ul style="list-style-type: none"> ● Performance management (discipline and stretch) ● Social support (support and trust) 	At each stage of development, how did the partners build a context of performance management and social support systems and processes for value co-creation?	Gibson & Birkinshaw, 2004 Birkinshaw & Gibson, 2004 Im & Rai, 2014
Becoming ambidextrous	<ul style="list-style-type: none"> ● Alignment ● Adaptability 	At each stage of development, how did the emerging context result in growing simultaneous ambidextrous capabilities, i.e. the provisioning of both alignment and adaptability to sustain business processes for value co-creation.	Duncan, 1976 March, 1991
Creating value	<ul style="list-style-type: none"> ● Affective value ● Intermediate value ● Economic value 	At each stage of development, what affective, intermediate and economic values were co-created?	Kohli & Grover, 2008

capture both tangible and intangible outcomes, we focus on co-created affective, intermediate as well as economic IT-based value.

4. Research method

Our qualitative case study (Klein & Myers, 1999; Walsham, 1993) centered on an inter-firm effort to co-create IT-based value in the mining industry. Qualitative research is characteristically fluid and flexible, data-driven and context-sensitive, and the decisions about design and strategy are ongoing and grounded in the practice, process and context of the research itself (Mason, 2002). By adopting a qualitative approach, with its goal of revealing the participants' views of reality, we gathered, analyzed, and discussed multiple sources of data to extract the underlying reasons for the approach to co-creation of IT-based value. Hence, we tracked practices and events over time to construct a process narrative that captures the development of context and capabilities that allowed for co-creation of IT-based value.

4.1. Research site

The use of modern IT solutions has revolutionized mining and the last couple of decades have seen a steady increase in the use of sensor technology to enable continuous remote monitoring of machine data (Jonsson, Holmström, & Lyytinen, 2009; Jonsson, Mathiassen, & Holmström, 2018). Already in 2001, our focal firm, LKAB, an international high-tech minerals group with iron ore mines, processing plants, harbors, and sales companies, made a conscious decision to use sensor technology as a basis for creating a joint venture. Together with SKF, a developer of an advanced technological solution for remote machine monitoring, and Sandvik, a supplier of mining and excavation technology, LKAB formed Monitoring Control Center (MCC), a joint venture specializing in remote monitoring of mining equipment. The IT solution that the joint venture was based upon included both the sensor-based system that connected mining machinery and software used for analyzing and visualizing sensor data, as well as an interface that linked the remote monitoring system to LKAB's greater computerized maintenance management system.

We first came in contact with LKAB in 2003 when MCC was about to be launched. The research site was interested in collaborating, provided us access to multiple sources of data and gave us the possibility of purposeful sampling, all being important factors when conducting a qualitative case study (Peppard, 2001; Yin, 2003). As our research question focuses on how firms over time can collaborate to build a multi-firm context with capabilities that allow them to co-create IT-based value, and LKAB both masterminded the creation of MCC and was initially the main driver behind the inter-firm collaboration, the majority of the interviews were performed at LKAB and MCC. At the same time, our contact with LKAB provided access to SKF and Sandvik. All partnering firms shared ownership of MCC and took part in the co-creation of value. As such, they contributed to developing the collaborative setting and all expected to gain value from the collaboration. Overall, our research covers the development of a partnership for IT-based value co-creation over a ten-year period.

4.2. Data collection

The first author and a fellow researcher conducted all data collection. We used semi-structured in-depth interviews and document reviews as the main sources (Yin, 2003). The interviews were carried out between 2003 and 2012, and in total we conducted 43 interviews with 34 different people from the four firms. The majority of the interviews, 28, were carried out at LKAB, in all three mining locations where they are present. The respondents ranged from technical staff and maintenance workers to division managers and top management including the service director. We also interviewed seven people at MCC; one technician from each location, the operations analysis project manager, the technician team manager, and the CEO. Furthermore, we interviewed the consultant involved in making the original business plan for MCC, and the MCC board representatives from SKF and Sandvik. A full list of respondents can be found in Appendix A. In addition to the interviews, we reviewed documents and visited the facilities at LKAB and MCC to gather data. For example, we gained access to the original business plan of MCC, consultancy reports, notes from meetings, power point presentations, employee newsletters, and customer magazines, and we toured the mines and processing plants as well as MCC's monitoring control room to gain a deeper understanding of the environment we were studying.

The interviews had one structured part with a framework of questions concerning the joint venture, the remote diagnostics technology, and the co-creation of value. Moreover, there was an unstructured element with follow-up questions and questions that emerged from previous interviews, documents and meetings. Most LKAB and MCC interviews were performed on site in the respondents' actual work environment. The SKF and Sandvik interviews were done over the phone. The interviews were audio recorded and then transcribed to facilitate the analysis. During the first interviews in 2003, the three partnering firms had just finished writing the business plan for MCC. During these interviews, we learned of the hopes and expectations of the project and of the IT-based value that was expected to be co-created. We followed up with a larger number of interviews in 2006, capturing outcomes, both positive and negative, of those initial expectations. In 2008, MCC met one of the major goals in the original business plan and landed their first customer outside of LKAB, which marked the end of the re-negotiations stage. However, we continued to stay in touch with the case

Table 2
Data sources.

Data source	Description
Interviews	A total of 34 interviews were conducted over a period of nine years.
Document reviews	The original business plan of MCC, consultancy reports, notes from meetings, power point presentations, internal documents, employee newsletters, and customer magazines.
On-site visits	Three on-site visits were made with in-depth tours of both the LKAB facilities and MCC.
E-mail, phone and informal meetings	Over the years, several emails were exchanged, foremost with the MCC CEO. We also had continuous phone contact to stay in touch with MCC at least once a year as the case unfolded.
Workshop	In 2006 we conducted a workshop with MCC representatives to present and discuss some of the research findings.
Observations	On two separate occasions we were allowed to accompany and observe an MCC technician at work in the field (one in the mine, and one in a pelletizing plant).

up until 2012, to ensure that the contextual conditions for the co-creation of IT-based value had stabilized, and to fill in some blanks from earlier interviews. Table 2 provides an overview of the different data sources.

4.3. Data analysis

We constructed the narrative around the four stages of developing inter-firm collaboration described by Ring and Van de Ven (1994): negotiations, commitments, executions, and re-negotiations. Based on this temporal bracketing, we analyzed the data belonging to each stage drawing on the concepts of our analytical framework (Table 1). Hence, for each stage we traced evidence related to developing collaboration, building context, becoming ambidextrous and creating value. We used Atlas.ti software to aid these analyses based on systematic coding. We created an initial coding scheme consistent with our analytical framing (Table 1) and tried it out between the first and second author, who performed inter-coder reliability tests to ensure codes were applied rigorously. After three rounds of test coding and refining codes, we applied the coding scheme to the entire data set. For a full coding scheme, please see Appendix B. The first round of coding generated four sets of data, divided into the four stages. After that we engaged in a second round of coding, where we broke the contextual ambidexterity concepts into sub-concepts, as for example performance management is made up of both discipline and stretch and social support contains both support and trust. After the second round of coding, we compiled the results, grouped by stage and in the next section we expound upon them to show how the firms developed a context and related ambidextrous capabilities that allowed them to co-create different forms of IT-based value over time.

5. Results

Our process narrative captures the development of the interorganizational context over time and traces the ambidextrous capabilities that allowed for the co-creation of IT-based value. The joint venture developed through four stages of negotiations, commitments, executions, and re-negotiations, and different types of values emerged during the process.

5.1. Negotiations 1999–2002

LKAB started an innovation project in 1999 to develop a new strategy for maintaining mining machinery. As part of this effort, LKAB devised an IT strategy that introduced a new information system to support both internal and external communication and collaboration. Relying on the advances in IT connectivity, LKAB decided in 2001 that it would be possible to significantly improve the productivity of its core mining operations without investing in new, expensive machinery. The intention was to move to preventive maintenance of mining machinery by developing remote diagnostic services that combined IT-based collaboration with embedding disparate IT functionality into the excavation and processing machinery. Said LKAB's Service Director:

When you measure [machine conditions] and know [the status of the machines] and have time to act, you can also take calculated risks [...] Today things just break down and we just stand there.

(LKAB Service Director)

LKAB's service director was put in charge of the innovation project. As head of the Service and Maintenance Division, he wanted his organization to respond effectively to all emerging maintenance issues because any stoppage of excavation or processing activities was extremely expensive. In addition, he was committed to launching a new organization that practiced preventive maintenance to reduce the number of emergency maintenance situations. Working towards realizing this vision, he had the full trust and support of LKAB's top management. At the same time, however, he knew that the existing maintenance staff had been involved in the established routines for many years and would likely be reluctant to change existing practices, something he thought was essential in order for an

organization to thrive:

I think the goal is not the organization, the goal is change.

(LKAB Service Director)

In order to create an environment conducive to change, LKAB's service director decided to approach two well-known and long-standing business partners to involve them in the project, so that they could share knowledge and benefit from mutual efforts. Hence, he contacted SKF, who produced several forms of diagnostic technologies, and Sandvik, who delivered some of LKAB's machinery. The service director explicated LKAB's vision, and made sure to accommodate the interests of the partners, facilitate cooperation between the participants, and involve other people with requisite abilities when needed. From early on, he envisioned that the cooperation would eventually grow into a joint business venture between the three partnering firms. The partners would pool resources and explore business opportunities, sharing costs and potential profits. He proceeded to enroll LKAB's chief technical officer, who agreed with his vision:

Again, this is about focus. If we are to create our own monitoring center that only focuses on our mines and plants – that would be pretty expensive. But with the technology that is available today... If we were to set up an organization and staff it, we might as well perform these monitoring services for others as well. That is how MCC started taking shape.

(LKAB Chief Technical Officer)

In the spring of 2002, LKAB and partners initiated the creation of MCC, a joint venture designed as a 24 h per day, 7 days per week surveillance center that would detect errors, monitor machine trends and see early warning signs in expensive mining machinery based on real-time capture of data about the status and operation of each individual machine. These services would help LKAB move from emergency maintenance performed when machines break down, to preventive and planned maintenance. It was estimated that if this resulted in three additional days of production per year, the entire investment in remote diagnostics would soon pay off. LKAB's service director appointed one of his trusted men as the project manager of the tightly-knit group of persons he had committed to the initiative. The other two firms sent representatives who had well-established and close relationships with the service director. Eventually, the project manager from LKAB was appointed CEO of MCC.

LKAB's service director was the key actor in developing collaboration at this point, driving the project forward according to his vision, and sharing that vision with the partners and his appointed project manager. Moreover, LKAB's top management entrusted him with the necessary resources to pursue implementation of his main ideas. The service director had masterminded the collaboration and through his vision, LKAB provided the partnership with strategy and structure while at the same time emphasizing both internal and external collaboration.

During the negotiations stage, the partnership context, which was then synonymous with the project group, was strong on both performance management and social support as group members worked on aligning interests. Discipline was mediated through LKAB's existing standards of performance and behavior, and stretch through a clearly articulated and shared vision for the innovation. The group also faced complex and uncertain challenges requiring high levels of adaptability—after all, the vision was to support innovation across the partnering firms, rather than to sustain existing practices and solutions. Furthermore, through MCC, LKAB opened up its maintenance operations and provided access for both SKF and Sandvik. In order to do that, both support and trust were needed.

At this stage, the context was purposefully developed to create conditions that would support and sustain the vision. The carefully chosen partners, the formation of a close-knit project group, and the decision to make a trusted employee CEO of MCC were all intentional moves towards creating a strong collaborative environment. As a result, the context afforded a strong focus on both alignment and adaptability, where group members worked coherently to support overall objectives, while change was expected, encouraged and addressed. Said the service director:

One has to learn how to live with constant change. [...] We live in a changing environment; you can never stand still, because then you won't be fast enough.

(LKAB Service Director)

By engaging in the partnership with SKF and Sandvik, LKAB wanted to exploit win-win opportunities to allow the partners to develop their technologies and services in ways that contributed to LKAB's improved mining operation. There was affective value created, as the three partners started to share a common vision of what the collaboration and the investment in and use of the RMS would generate. At this stage, no economic value had yet been realized. However, as LKAB developed its IT strategy and initiated the collaboration, they created intermediate value, which was largely of social character and oriented towards developing new maintenance processes based on remote monitoring technology. [Table 3](#) provides a summary of the Negotiations stage developments.

Table 3
Negotiations stage developments.

Concept	Evidence
Developing collaboration	<ul style="list-style-type: none"> • From the start of the collaboration there is a clear vision about preventive maintenance and related technologies • LKAB's service director is the driving force and negotiates the partnership. He develops the vision, creates the project group and appoints the project manager. • Maintenance at LKAB is the initiative's testbed
Building context	<p>Performance management</p> <ul style="list-style-type: none"> • Explicit vision for preventive maintenance that radically transforms current LKAB practices • Vision is shared to establish sense of togetherness and common goals • New standards and procedures for maintaining mining machinery <p>Social support</p> <ul style="list-style-type: none"> • Representatives for partners chosen to ensure strong support and trust within the emerging partnership • SKF and Sandvik get access to LKAB's maintenance operation • Project is given freedom to articulate and experiment with improved maintenance
Becoming ambidextrous	<p>Alignment</p> <ul style="list-style-type: none"> • Project is resourced appropriately and staffed with people with requisite skills • Partners have congruent interests in project outcomes <p>Adaptability</p> <ul style="list-style-type: none"> • Project is response to changing conditions within mineral and mining industry • The new preventive maintenance practices challenge existing reactive practices • Project is given authority to quickly move towards preventive maintenance • Affective value is created among the three partners through jointly set goals and expectations • Intermediate value is created for LKAB's service and maintenance division through process improvements connected to the initiation of the partnership and implementation of the vision • Economic value is expected, but not yet realized
Creating value	

5.2. Commitments 2002–2003

As the official business plan took form, formalizing guidelines and goals for the joint venture, the development of the partnership continued. A year after initial discussions, the three partners were committed to the project. Said the LKAB service director:

It has taken us a year of negotiations in order to gain understanding for this concept. They have never done anything like this before. You have to stand on common ground when you set out to sail the ocean together. If you don't you are immediately back to the old buy-sell relationship where you feel safe and comfortable.

(LKAB Service Director)

A formal contract clearly outlined the responsibilities for all partners and when MCC launched in 2003, each firm sent a representative to the newly formed MCC Board of Directors. SKF chaired the board. MCC focused on condition monitoring and maintenance development with the aim to provide various services in the minerals and mining industry such as:

[...] operations analysis, implementation of infrastructure for condition monitoring, collection of measurement data, and in the long term, even functional responsibility on a contract basis for certain objects.

(MCC Business Plan)

The business plan delineated a context that was strong on performance management with specific measures and shared goals, something which reinforced the original emphasis on social support with bonds that were forming among key stakeholders and the recruitment of well-known LKAB staff to MCC. At this time, LKAB was committed as MCC's first and only customer, but within five years, MCC was expected to be active on a global market with at least ten unique customers on several continents. MCC would be continuously evaluated and get feedback from the board meetings with all firms present, allowing each partner full insight into the project as it progressed. To support collaboration, LKAB granted SKF and Sandvik access to critical production processes through MCC, so that data from equipment could be obtained and analyzed; SKF contributed with the remote diagnostics technology; and, Sandvik supplied some of the mining and excavation equipment and brought manufacturing expertise to the partnership. The partners agreed to:

Create a relationship of trust and confidence among clients by nurturing an open corporate culture that is characterized by service-mindedness, commitment, competence development and quality.

(MCC Business Plan)

MCC was thus created with the specific focus of bringing disparate firm resources together for joint value creation. The configuration of the new MCC Board was almost identical to that of the original project group, and the people who participated had already established close ties to each other. The project members became MCC Board Members with the SKF representative as chairman, the project manager became the new MCC CEO, and the MCC staff members were recruited mainly from LKAB. The three partners used their unique resources in a structured way for the common good. Thereby, they also avoided conflicts of interest to emerge. As expressed by the new MCC CEO:

The focus is what is new, the focus on condition monitoring for the mining industry... that focus in combination with SKF's knowledge in condition monitoring, LKAB's knowledge in performing maintenance on mining and excavation equipment, and Sandvik's knowledge about that type of equipment. It is the combination, there is no specific part that is new, but the focus and the combination of knowledge.

(MCC CEO)

The context was purposefully developed so that agency shifted from LKAB to the partnership, where the MCC Board of Directors with the newly appointed MCC CEO took charge of the collaboration. The LKAB service director was still active, but now only as one of LKAB's representatives to the board. The business plan was the guiding document and it incorporated the formerly expressed vision from LKAB:

We have a saying that focus is incredibly important in order to succeed. We have three keywords: focus, competence and systematic work practices. If we work with these three we will succeed all the time.

(MCC Board Member, LKAB)

Although the formal emphasis was on systematizing work practices and on the division of roles and responsibilities, the board's focus was equally much on creating a culture of collaboration:

We also have this as part of our strategy; that technology and processes are important, but the most important thing is what we call culture or human relationships. If that doesn't work, it doesn't matter if you have the world's best technology or process, nothing will work.

(MCC Board Member, SKF)

As each partner committed to the partnership, they promised to supply it with an inflow of ideas from their respective areas of expertise, which would allow MCC to rapidly adapt to changes in the market. They all agreed that MCC would be used as an arena where ideas could be tested and projects could succeed or fail. This meant that the focus would be on increasing collective knowledge instead of on seeking scapegoats if something would go wrong.

At this point the collaborative context remained articulated rather than realized. Alignment was visible through the clear division of responsibilities and the pursuit of mutual goals as noted in the business plan, which was written to avoid conflicts of interest. The partnership's high ambitions to expect, encourage, and respond to change both in the internal and the external environment was a sign of an emerging context that also encourages adaptability. Furthermore, the three partners agreed on the importance of balancing a flow of both internal and external ideas in the partnership and made it a founding principle for MCC, encouraging innovation and knowledge exchange. However, the capabilities for doing so were, at this stage, emerging rather than well-established.

The value created at this stage was mainly affective residing in the firms' perceptions of what the partnership would accomplish through use of specific ITs. By MCC using real time data logging and remote diagnostics systems, LKAB would be able to detect current status, unusual use, and early signs of equipment failure, and thus minimize costly unplanned maintenance stops. SKF would be provided with the opportunity to put their RMS to use and develop methods and technology while trying them out in a real setting. Sandvik would get access to equipment data and advanced measurements that could be used for machine development purposes and to enhance their own service offerings. Thus, the partners planned for both economic and intermediate value. It was, however, not until the next stage that this value would be realized. [Table 4](#) provides a summary of the Commitments stage developments.

Table 4
Commitments stage developments.

Concept	Evidence
Developing collaboration	<ul style="list-style-type: none"> • The partners commit to an official business plan for the joint venture • The joint MCC Board of Directors, headed by SKF, but with representatives from all partner firms, assumes responsibility for the project and takes over initiative from LKAB as the driving force • LKAB is the only committed customer, but the intention is to establish MCC as service provider for larger mineral and mining firms
Building context	<p>Performance management</p> <ul style="list-style-type: none"> • Representatives work closely to reinforce collective identity through MCC business plan • Representatives explicate ambitious, shared business goals in MCC business plan • Representatives explicate individual partner contributions in MCC business plan <p>Social support</p> <ul style="list-style-type: none"> • Representatives commit to develop and share requisite resources across partners in MCC business plan • Representatives commit to experimental approach and explicate learning as an objective in MCC business plan • Representatives eventually implement the business plan into MCC through distributed responsibility for the individual partners
Becoming ambidextrous	<p>Alignment</p> <ul style="list-style-type: none"> • The partners pursue common goals based on explicated division of responsibilities • The business plan is written to avoid conflict of interests among partners <p>Adaptability</p> <ul style="list-style-type: none"> • Representatives commit MCC to help LKAB move from traditional maintenance to preventive maintenance • Representatives commit MCC to move beyond LKAB to engage new customers • MCC designed to be responsive to changes in internal and external environment
Creating value	<ul style="list-style-type: none"> • Affective value is created as the firms commit to the RMS-based partnership • The potential for both economic and intermediate value creation is clearly outlined but not yet realized

5.3. Executions 2003–2006

As the partners started executing the joint venture business plan, MCC rapidly expanded in both size and skills. They increased staff numbers from an original four to fourteen and were busy with establishing procedures for their work, performing operations analysis, setting up monitoring technology and writing error reports. LKAB was now in the role of the customer, strongly pursuing the idea of performance-based contracting, where MCC would guarantee an agreed upon minimum level of machine availability based on their ability to detect errors in time. MCC would thus be paid for actual performance instead of contracted service delivery and could potentially both gain and lose money. SKF and Sandvik launched individual projects together with MCC, with LKAB as the testing grounds for new monitoring methods and techniques.

During this stage, MCC emerged as a strong entity in its own right and started coordinating partnership actions instead of merely executing board decisions. Indeed, once the joint venture took off, the Board of Directors took a step back. The collaborative context had over a period of seven years been developed so that joint venture management had shifted from the partnership's initiator, LKAB, in the negotiations stage, to the joint MCC Board of Directors, in the commitments stage, and then, in the executions stage, to MCC itself. As the current main driver of events, MCC kept in touch with all partners, suggesting projects and initiating discussions on technology investments.

The MCC CEO implemented strict work standards that all staff members adhered to. While two operations analysts determined the need for remote monitoring within the different LKAB plants, each plant had a designated MCC service technician overseeing the remote monitoring technology and performing the data analysis. MCC worked actively on developing their staff, encouraging them to be creative, take responsibility, and come up with their own approach to solving problems based on the established standard. For the former LKAB workers, this was a big change in how they previously operated:

We have worked very hard on developing our staff. We talk a lot about the journey from x to y. We took over people who were collectively bargained employees at LKAB for a very long time and who worked for a very different type of organization. Here they are white-collar workers with a clear area of responsibility, but with a much more uncertain future than in LKAB, where you know that you will be working in the same place, doing the same thing next year.

(CEO MCC)

LKAB, having transferred competence from the internal to the external organization was satisfied with the arrangement. LKAB's MCC Board Member expressed:

We think it is good, very good. It allows us to maintain our focus. [...] The most important thing is that we are now less dependent on skilled individuals. Of course you could find someone internally who is very skilled, but MCC has a specific work practice, which is the same regardless of location. When you meet MCC, the presentation is the same all over.

(MCC Board Member, LKAB)

The decision to employ former LKAB workers as MCC technicians was a shortcut to establish trust in the new organization, like the decision to turn project group members into MCC Board Members. However, this also led to conflicts of interest between MCC and LKAB technicians. LKAB workers were initially very skeptical of the new technology, and were not always informed of the purpose of MCC, what they could and could not do. They also saw the MCC technicians as old co-workers and had difficulty relating to them in their new roles. The local mining culture was very harsh on people who were regarded as outsiders, and by transferring to MCC some technicians were viewed as being disloyal to LKAB. Thus, while MCC worked on establishing a work context with support and trust, the interactions with local culture meant they were also challenged in this area. In a move to establish clear standards of behavior, MCC decided to appoint a middle manager to serve as an interface between the technicians and MCC's customers, thus formalizing some of the interactions between MCC and the other firms.

Although there had been initial high hopes for MCC bringing in new ideas and methods and being the catalyst for innovation, things were moving a lot slower than anticipated. In 2003, MCC's turnover was 4 million SEK, and LKAB accounted for 99% of the revenues. In 2004, the turnover was 12 million and LKAB accounted for 95% of the revenues. During this time, LKAB was MCC's only customer. The business plan called for more external customers, and the goal was now that by December 2006, less than 50% of MCC's revenues should come from LKAB. The MCC Board of Directors conducted yearly evaluations to see how well their investment was paying off, and a lot of time and money was spent on developing performance metrics.

As the partnership evolved, MCC promoted specific standards and related work practices for delivering high quality services regardless of location. Their service technicians were given a lot of responsibility and the mentioned middle manager to address their needs and reinforce the collective identity. Established relationships among the three partners still held, but MCC employees worked hard to establish trustful relations with skeptical LKAB maintenance staff. By actively designing and redesigning their context, MCC encouraged both alignment and adaptability.

As MCC grew in size, strength, and intent, the partnering firms started seeing returns on their investments and co-creation of new value. Affective value was still strong as the relationships between the three partners became more firmly established over time, working together around the new technology. For LKAB, both economic and intermediate IT-based value was produced at this stage. The operation's analysis and the remote diagnostic systems exposed weak spots of both machinery and process, and thus enabled LKAB to better structure their maintenance processes. This led to the anticipated increase in up-time and with the upsurge in production, LKAB's revenues grew. The main value for both SKF and Sandvik was of intermediate character, leading to process improvements for both organizations. By having access to a live case, SKF were able to develop their vibration analysis methods, both in terms of the technology used in data collection and the decision support systems, that is, the software used for data analysis. The

MCC project also highlighted for them the benefits of collecting data, keeping detailed records and building a knowledge base. Sandvik launched a project together with MCC concerning some of their equipment and as a result learned more about their machines to extend their knowledge base. At this stage, MCC also provided value related to intellectual property development within the areas of data measurement and analysis. Table 5 provides a summary of the Negotiations stage developments.

Table 5
Executions stage developments.

Concept	Evidence
Developing collaboration	<ul style="list-style-type: none"> ● MCC executes procedures and infrastructure and grows from four to fourteen employees ● MCC takes over as the driving force in the collaboration with LKAB as customer ● SKF and Sandvik work with MCC to test new monitoring methods and techniques at LKAB
Building context	<p>Performance management</p> <ul style="list-style-type: none"> ● Previous articulations of discipline and stretch implemented into service standards ● Service technicians given high responsibility while middle managers reinforce collective identity ● Board of Directors conduct yearly performance assessment <p>Social support</p> <ul style="list-style-type: none"> ● MCC staff handpicked from LKAB to ensure competence and establish relations ● Services are based on analyses of facts about machinery conditions ● MCC service technicians work hard to establish trust with LKAB maintenance staff ● SKF and Sandvik use LKAB maintenance as testing ground for new monitoring methods and techniques
Becoming ambidextrous	<p>Alignment</p> <ul style="list-style-type: none"> ● Intensive efforts to develop service standards and related work practices ● Clear responsibilities within MCC and between partners ● Reinforcing and developing collective identity in MCC's organization and work practices <p>Adaptability</p> <ul style="list-style-type: none"> ● MCC responds quickly to new conditions by proposing amendments to business plan ● Planning for performance-based contracting with customers ● Appointing middle manager in response to critique from LKAB to have clear lines of communication
Creating value	<ul style="list-style-type: none"> ● Affective value is still strong as the relationships between the three partners become more firmly established over time as they work together around the new technology ● Both economic and intermediate value is created for LKAB ● Intermediate value is created for SKF and Sandvik through their individual projects together with MCC using LKAB as testing grounds

5.4. Re-negotiations 2006–2008

A few years after MCC was launched, it was clear that activities were no longer evenly distributed across the partnering firms. LKAB was still MCC's main customer and had daily interactions with MCC staff. Sandvik had an ongoing project, collecting data from specific machinery, but due to a large internal re-organization scheme, where people changed positions, they paid less attention to MCC. When the original MCC Sandvik Board Member was exchanged for a new one, who did not see the same value potential in the partnership, Sandvik became a passive, peripheral partner.

At the same time, MCC had started to identify as an SKF sub-division and negotiated joining SKF's bonus program, increasing interactions with SKF. As the RMS made it possible to detect potential machine failure months in advance, the MCC CEO argued that the remote monitoring technology obliterated the need for a staffed round-the-clock surveillance center, and claimed that the focus for MCC should instead be to package their acquired experience as monitoring services, a concept that could further be used within SKF's service and aftermarket division. In 2006, the original business plan was therefore revised and it was decided that instead of establishing a global 24 h per day surveillance center, MCC would act locally, find customers in geographical proximity, and export their concept through SKF globally.

When we made the original business plan, we talked very much about having 24 h per day machine monitoring. LKAB still talks about it a lot. But for me, I have a hard time connecting that to the technology we are using as it is very much based on not having to have constant monitoring [because machine errors can be detected long before a breakdown occurs].

(MCC CEO)

As such, the re-negotiations stage marks a shift in the collaboration. MCC still acted as the main driver, and as old Board Members were replaced with new ones, the board was reduced to a more symbolic status, and interactions were placed at an inter-firm level, mainly between MCC and its customers. This, however, did not mean that the context stopped evolving. On the contrary, MCC continuously strived to build individual relationships with each of the three partners. This was successful in regards to both LKAB and SKF, but not to the same extent with Sandvik.

MCC's technicians managed to create an understanding for the possibilities and limitations of their measurement methods, by spending a lot of time on site, talking to LKAB's staff, showing up not only for work but also for coffee and discussions. Furthermore,

MCC had provided LKAB with some courses on vibration analysis and had made a conscious effort to show their customers graphs and diagrams on the computer screen and explain what they indicated. On certain occasions, LKAB would let a machine run until it broke down, and then pick it apart and analyze the cause, only to prove that MCC's predictions had been on target.

MCC were keen on obtaining direct feedback, both in order to hold people accountable for their performance, but also as a means of improving performance. The MCC middle manager arranged regular meetings with all technicians in order to create an arena for knowledge exchange, as well as establish a collective identity. Thus, performance management was not only present, but actively pursued. The main lesson from MCC's interactions with LKAB, however, showed the importance of social support, giving ready access to needed information, basing decisions on facts, setting realistic goals, and building trustful relationships.

During this stage, the interactions between MCC and SKF grew in frequency and strength. SKF started using MCC as an example of joint service development, sending groups of visitors to MCC to be inspired by the concept. As the relationship between MCC and SKF became more tangible and robust, MCC served as a source for the creation and identification of new needs for products and services, and reinforced SKF's total market offering in terms of resources, products and service offerings. This enhanced and supported SKF's image as a supplier of services for assuring operating reliability. Through MCC, they were also reminded of the importance of establishing trust and having local awareness and personal knowledge in order to form strong customer relations. SKF talked a lot about reciprocity, to use internal knowledge externally and external knowledge internally: what was being done locally should be exported on a global market and vice versa. MCC was for SKF a part of that strategy. Said the SKF MCC Board Member:

What we learn from and develop with LKAB is supposed to follow us out in the world and into other firms. And the whole idea is that what we learn from other firms in the next step forward then follows us back to LKAB. I think it was very insightful of LKAB to have that as a specific strategy in MCC's business plan. Most others do the exact opposite and push secrecy instead.

(MCC Board Member, SKF)

Again, there was both performance management (for example through the bonus program and establishing a collective identity) and social support (for example by pushing decisions down to the lowest level and creating an atmosphere of trust) present in the relationship between MCC and SKF, creating an ambidextrous context where both firms thrived. Although the market was not as mature as they had thought and MCC had not landed new customers at the rate originally intended, SKF saw the potential in establishing MCC as experts in delivering remote services and transferring that knowledge to SKF's global service organization. This led to a tighter alignment of interest between SKF and MCC and it demonstrates that both parties were ready to adapt to changing conditions and find new ways of creating value.

As MCC was strengthening its ties with both LKAB and SKF, the relationship with Sandvik slowly deteriorated. Being the smallest shareholder, Sandvik had largely been part of the project because of personal ties between their original Board Member and LKAB's service director. As Sandvik re-organized their entire firm, new people were brought in and they did not see the same value in being part of the partnership or the RMS as the previous Board Members had. MCC was supposed to enable improved machine availability and capacity and therefore reduced operating costs, and by learning more about their machines, Sandvik would see an increased profitability from service contracts, and an opportunity for better logistics and lower inventories. Although Sandvik did not see all their initial hopes realized with the MCC project, they appreciated the opportunity to develop closer relationships with both LKAB and SKF. They thought that there would be even greater potential in evaluating and analyzing data in order to improve their own service and maintenance strategy and achieve cost-productivity through the use of RMSs, but felt that they had somehow been reduced to being a data provider. The Sandvik MCC Board Member expressed:

We have done some projects where we have tried to come up with solutions, but remote diagnostics is not exactly rocket science. We have our own systems to do that. What we wanted was to become better at evaluating the data, and that we together with a user of our products, LKAB, and an expert on systems and hardware would come up with an evaluation logic so that we can evaluate data from a multitude of mining systems which would result in a good maintenance strategy. Now we deliver data instead of create knowledge.

(MCC Board Member, Sandvik)

Eventually, Sandvik stopped showing interest in the project, and minimized their interactions with MCC. This led to a context where neither performance management, nor social support was present, and eventually, after the end of our study, Sandvik pulled out of the project and joint venture entirely, although it is still a supplier of machinery to LKAB.

The value that was created was of affective, intermediate, and economic character. Through the creation of MCC and the introduction of remote monitoring technology, LKAB gained more days of production, a strong focus on structured maintenance processes, thereby becoming less dependent on skilled individuals, and developed a closer relationship with SKF. However, they would have wished for more external input as was called for in the original business plan, where MCC was supposed to expand beyond LKAB borders at a much more rapid pace. The main value that was created for SKF, besides the economic gains that came from being the major shareholder of MCC, was the possibility to develop new service concepts and their service organization around remote monitoring technology. Sandvik had expected to strengthen its image among customers as a high-tech company and increase the competitive advantage for service contract products, by using MCC and the collective knowledge gained from the partnership. This was only partly achieved, because Sandvik decided to play a lesser role. Still, Sandvik saw the new customers as potential catalysts for a deeper involvement with a chance to expand their market. SKF on the other hand thought that Sandvik had been too passive and maintained a too narrow view of what the joint venture could offer them. They believed that if Sandvik had been more active in marketing MCC towards their customers, SKF would have benefited from that as well. Table 6 provides a summary of the Re-negotiations stage developments.

Table 6
Re-negotiations stage developments.

Concept	Evidence
Developing collaboration	<ul style="list-style-type: none"> ● MCC negotiates to become an SKF sub-division focused on the local market ● MCC is the main driver in the collaboration emphasizing interactions directly with its customers rather than the Board of Directors ● MCC becomes an important part of SKF's business strategy and LKAB its primary customer while Sandvik changes leadership and becomes a passive partner
Building context	<p>Performance management</p> <ul style="list-style-type: none"> ● LKAB feedback used to hold MCC staff accountable and improve performance ● Regular meetings with technicians to create knowledge arena and develop collective identity ● Each technician engages with LKAB to develop understanding of how best to serve the customer ● Establishes MCC as a formal business unit within SKF <p>Social support</p> <ul style="list-style-type: none"> ● MCC technicians responsible for building personal relationships with customer and for making maintenance decisions with them ● MCC technicians give customer ready access to information about machinery conditions to support evidence-based maintenance ● MCC technicians set realistic maintenance goals with customer to support machine operations analyses
Becoming ambidextrous	<p>Alignment</p> <ul style="list-style-type: none"> ● Co-production of maintenance services between MCC and LKAB based on shared goals ● MCC operations managed and developed as integral part of SKF <p>Adaptability</p> <ul style="list-style-type: none"> ● Implementation of amendments to business plan turning MCC into a local service center with global impacts within SKF ● Relationship to Sandvik becomes increasingly peripheral ● Affective intermediate, and economic value are created but not for all partners ● All three partners express that their perception of the other partners had changed during the project, and that they had developed closer and stronger relationships as a result of collaborating around the RMS ● LKAB and SKF successfully use MCC to improve their own processes ● Both LKAB and SKF gain economic value from the MCC project ● Sandvik and SKF use the MCC project to enhance their own images as high-tech service suppliers
Creating value	

6. Discussion

Following calls for rethinking IT-based value co-creation (Grover & Kohli, 2012; Kohli & Grover, 2008), this article offers a fresh look at IT-based value by exploring how firms can develop collaboration and build contextual conditions for IT-based value co-creation. By linking contextual ambidexterity theory with the literature on IT-based value, we have explored how three firms over a ten-year period engaged in developing collaboration, building context, becoming ambidextrous, and co-creating different forms of value for each stage in the process (Table 1). Based on these empirical results, we contribute to extant research on the co-creation of IT-based value with new insights into how collaborative partnerships may develop over time and how different types of IT-based value emanate from and develop during the process. In addition, we contribute to the literature on contextual ambidexterity by showing how multiple firms can build a shared context that afford them ambidextrous capabilities for productive collaboration.

6.1. Developing collaborative partnerships for IT-based value co-creation

The notion of co-creating IT-based value has been an important topic in IS and management literature for some time. Nonetheless, even though it implies a collaborative effort, the co-creation of IT-based value is still often discussed in terms of single firms benefiting from individual customer input, be it in a business-to-consumer or business-to-business setting, or in terms of multiple firms co-creating value in established partnerships and networks. There are few studies of value co-creation that focus on exposing the intricacies of multi-firm environments and explaining the mechanisms through which a group of firms successfully develop collaboration over time to co-create IT-based value. In response, we see cooperative partnerships as socially constructed entities for collective action that are continuously shaped and re-shaped by the actions of the involved partners and by the context within which they operate (Ring & Van de Ven, 1994). As such, we have drawn on insights into how partnerships emerge and evolve through cyclical stages (Ahuja & Morris Lampert, 2001; Eisenhardt & Schoonhoven, 1996; Ring & Van de Ven, 1994). This approach allowed us to provide additional insights into the complexity and dynamics of developing partnership's for co-creation of IT-based value by zooming in on the characteristics of such initiatives, including the development of the collaboration and the building of a shared context.

First, the story of MCC illustrates how development of partnerships for IT-based value co-creation requires ongoing enactment of identity mechanisms (what is the common cause that brings partners together) to articulate and reinforce direction for the joint venture and to bring the involved partners together and stimulate collective action. Against the backdrop of increasingly expensive machinery, the high cost of unplanned breakdowns, and the prediction of falling prices on iron ore within the minerals and mining industry, the identity of the partnership focused on preventive maintenance and related technologies (Negotiations). The three

partners could buy into that vision from each their vintage point and diverse interests and they quickly developed the vision into a business plan for MCC with clear individual responsibilities (Commitments). Subsequently, they consolidated MCC with procedures, infrastructures and a growing number of employees (Executions). Eventually, from an initial ambition to become a global provider of services to the mineral and mining industry, MCC developed into a sub-unit of SKF focused on the local market and serving as inspiration for other global initiatives (Re-negotiations).

Second, the MCC case illustrates how the development of an IT-based value co-creation partnership requires resourceful actors: to orchestrate and manage the emerging relationships in a way that reduces transaction inertia; to provide leadership and clear guidelines that help the involved partners develop and realize overarching goals; and, to adapt and possibly step aside, so someone else can take over the initiative, if this is what serves the collaboration best. Importantly, this incorporates changes in agency of the emerging partnership over time. While most partnership research focuses on how a focal firm or a leader of an established network designs and manages network relations (Ahuja & Morris Lampert, 2001; Dhanaraj & Parkhe, 2006), this was not the case in the observed development of the partnership between LKAB, SKF and Sandvik. Instead, we saw how the driver of the collaboration shifted from the service director of LKAB (Negotiations), to the MCC Board of Directors (Commitments), and then to MCC and its CEO (Execution). Eventually, the Board of Directors only played a symbolic role, while interactions were directly between MCC and its customers (Re-negotiation). The configuration of agency was, in this sense, much like the partnership itself, socially constructed to provide requisite driving force through all stages of the process, with both authority and a sense of responsibility for the common good.

These insights about identity mechanisms and agency configuration suggest that successful development of ambidextrous capabilities that sustain IT-based value co-creation is closely related to maintaining a context supported by individual efforts and the active engagement of champions. The MCC initiative was, at different stages of development, embodied in the service director of LKAB, in the members of the initial project group who went on to become the first members of the board of MCC, and in the CEO of MCC. As long as these individuals represented stakeholder interests and actively supported the collaboration, all three firms expressed satisfaction with the partnership and the value it created. The presence of strong individuals, who believed in the value of collaboration, created a positive image of engaging in the partnership. However, as organizational changes altered the configuration of actors, the perceptions of potential value that could be created through the collaboration also changed and, in some cases, they became less optimistic. This was especially notable when Sandvik during the Re-negotiation stage faded into the background and eventually left the partnership.

These identity and agency dynamics are in line with Ring and Van de Ven's (1994) emphasis on trust between stakeholders and personal relationships as important ingredients in making partnerships successful. However, while Ring and Van de Ven (1994) see these as important in the context of a focal firm and dedicated network leadership, it was personal relationships that drove the observed partnership between the three firms and it was the shifting configuration of agency that allowed individuals to reinforce its identity, foster knowledge mobility and innovation, and thereby create IT-based value throughout the evolution of the partnership. Thus, in order to develop collaborative partnerships, firms must identify key individuals at the different stages of the process so they can take advantage of their abilities and support them in their undertakings.

6.2. Types of value in developing IT-based value co-creation

The founding premise for the joint venture MCC was the development, application and use of an IT solution in the form of a sensor-based remote diagnostics system, that remotely collected, connected, and analyzed data from mining equipment in order to co-create value for all stakeholders. While we know from earlier studies that the manifestation of IT-based value may vary, we have limited insights into how value emanates from and develops during the process of building new collaborative partnerships for IT-based value co-creation (Grover & Kohli, 2012; Kohli & Grover, 2008). Previous research has distinguished between affective value, intermediate value and economic value (Kohli & Grover, 2008), where the use of IT influences perceptions, improves processes, and increases financial returns. Our study shows how these different types of value were created during the development of both the IT solution and the partnership and it suggests that they typically manifest in a certain order during the process. From the start, affective value was shared across partners, based on interpersonal trust and an understanding of the potential for improved market position for each of the firms through the focus on preventive maintenance and the use of remote monitoring technology. This was the foundational force that drove the initiation of the joint project to develop the MCC partnership. As the three firms committed to the joint project, they established a clear set of goals on IT-based preventive maintenance and voiced their expectations for the creation of both intermediate and economic value. As MCC became operational, the partners helped each other implement support for preventive maintenance practices and related technologies and equipment. LKAB was the first to realize intermediate value by using the RMS to introduce changes in some of its maintenance work practices. As the project progressed, all three partners eventually realized intermediate value as the RMS led to improvements in LKAB's maintenance practices and technologies, enhanced SKF services, and provided Sandvik with increased product knowledge. As a result, LKAB experienced an increase in up-time and increased production, which immediately translated into economic value. In the re-negotiations stage, LKAB and SKF continued to successfully use MCC to improve their own processes, thereby realizing both intermediate and economic value, while Sandvik became passive and created no more intermediate value. In the end, the partners agreed that through the close collaboration around the RMS, affective value was sustained over time. The three firms had strengthened their ties and learned from each other, sharing knowledge, routines, and best practices.

Once created and established, affective value becomes a strong driver of intermediate value, which in turn lays the foundation for realizing economic value. At the same time, articulating and sharing expectations about intermediate and economic value can create

affective value, as the joint investment in IT becomes the manifestation of common goals, inter-firm trust and mutual hope and once intermediate and economic value is realized affective value is further reinforced. In our study, the RMS, with its ability to collect, store, and transmit data, was a central component in the value co-creation process. It contributed to the partners' perceived feelings of closeness and trust, and was the tangible artifact around which mutual goals were set; it was instrumental in altering work practices and creating new service concepts based on data analysis; and, it ultimately led to increased revenues for two of the three partners. Sandvik's failure to realize economic value was directly related to them feeling reduced to being "data providers". When both the partnership and the RMS failed to meet Sandvik's value expectations, not only were economic and intermediate value not realized, affective IT-based value was strongly diminished and eventually disappeared. In light of this, Sandvik's exit was a logical consequence of perceived weak connections between IT and value, despite personal relationships. Table 7 outlines the value created across the four different stages of the joint venture development.

In sum, while previous research has shown that IT-based value manifests in different ways, on different levels, and in different contexts (Grover & Kohli, 2012; Hitt & Brynjolfsson, 1996; Kohli & Grover, 2008; Melville et al., 2004), this study shows that in a co-creation context, the different types of IT-based value appear in a certain order and are dependent on each other. Highlighting these intricate relations between different types of value over time afford a deeper understanding of the co-creation process, its potential outcomes, and the challenges involved in managing it.

Table 7
Value creation across the four stages of developing collaboration.

Firm	Negotiations	Commitments	Executions	Re-negotiations
LKAB	Affective Intermediate	Affective Intermediate	Affective Intermediate Economic	Affective Intermediate Economic
SKF	Affective	Affective	Affective Intermediate	Affective Intermediate Economic
Sandvik	Affective	Affective	Affective Intermediate	Affective (diminishing)

6.3. Developing contextual ambidexterity for IT-based value co-creation

Contextual ambidexterity theory states that for an organization to be successful, it must provide a context for simultaneous alignment and adaptability (Birkinshaw & Gibson, 2004; Gibson & Birkinshaw, 2004). Research has shown how interorganizational contextual ambidexterity requires a management system that seeks synergies between alignment and adaptability of partnership goals, resources and activities (Im & Rai, 2014). In other words, to ascertain the co-creation of value within a partnership, contextual conditions should be actively managed (Vanneste et al., 2014; Zaheer et al., 1998). As discussed above, our study shows that the interorganizational context evolved over time and that there were substantial changes in agency and thus the responsibility for driving and managing contextual conditions over the four different stages. Acknowledging that both context and agency may change through the different stages of a partnership, contextual ambidexterity becomes a moving target, which can only be captured by identifying where and with whom ambidextrous capabilities are located for each separate stage of partnership development.

Initially, LKAB was the main driver of the partnership and managed to combine the specific emphasis on joint, systematic and structured maintenance practices with the act of building strong relationships based on openness and trust with selected partners, thus creating a context conducive to both alignment and adaptability. In the next stage, context and agency changed as the focus shifted from LKAB to the partnership. Still, alignment was supported in the articulation of the MCC business plan, where explicit roles and functions were delineated. Adaptability could be seen through the representatives' commitment to develop and share resources, their adoption of an experimental approach, and their joint responsibility for the partnership. As MCC took over as the partnership driver in the executions stage, they handpicked staff, based their services on analyses of machine data, and worked on upholding personal relationships, building trust, and providing steady access to information. The intense efforts to develop service standards and work practices and the strong focus on developing a collective identity were all indicative of alignment, whereas adaptability could be seen in the open, experimental and trustful environment, which made it possible to quickly respond to new conditions and amend the business plan accordingly. In the final stage of the collaboration, MCC and partner engagements were reconfigured and the context was individually negotiated between MCC and the partnering firms. Alignment could thus be seen in the co-production of maintenance services based on shared goals between MCC and LKAB and in the management and development of MCC operations as an integral part of SKF. The context also supported adaptability as illustrated by the implementation of the amendments to the business plan and in the increasingly peripheral relationship with Sandvik.

Thus, our case shows that the manifestation of ambidextrous capabilities in a partnership is closely tied to the building of the context and the development of the collaboration. These findings suggest that when a focal firm manages to create a context that is conducive to both performance management and social support, both alignment and adaptability will be supported, and this will benefit not only the focal firm, but the entire partnership, by developing potential for IT-based value co-creation. This applies even if the focal firm changes and another firm takes the lead. As the agency shifts over time, so does the instantiation of ambidextrous

capabilities. As such, it was in the personal interactions between the original project group members, between the Board Members, and between the MCC staff and LKAB workers, that contextual conditions conducive to alignment and adaptability were created and that IT-based value was realized.

7. Conclusions

This paper investigates how firms develop collaboration and build contextual conditions that afford IT-based value co-creation. First, we have provided new insights about identity mechanisms and agency configuration that suggest that the successful development of multi-firm IT-based value co-creation relationships is closely related to individual efforts and to the active engagement of champions, sending a strong message to managers to actively foster and manage team members that show high levels of partnership commitment. Second, we have shown that in an emerging co-creation context, the different types of IT-based value appear in a certain order and are dependent on each other. Affective value is a strong driver for intermediate value, which lays the foundation for realizing economic value. At the same time, we saw that articulating and sharing expectations about intermediate and economic value can create affective value and reinforce and strengthen relationships between partner firms. Third, we have demonstrated how contextual ambidexterity can be applied beyond the boundary of the firm as a contribution to our understanding of how partnerships co-create IT-based value. Our study illustrates the value of research designs that examine the process of developing partnerships for IT-based value co-creation. The process dimension provides a rich picture of how requisite capabilities and IT-based value is created over time, and contextual ambidexterity supplements the established view of the complex dynamics of co-creation. Although the partnership might seem stable over time, there are constant fluctuations in the relationship both on a firm level and an individual level. For example, we have shown that partnerships are continuously re-negotiated based on perceived value and personal interactions. By applying a process perspective and by continuously evaluating both partnership collaboration and context, we were able to trace the development of contextual characteristics that were essential for the partners to successfully co-create IT-based value, thereby adding knowledge to when, why and how IT-based value co-creation takes place. Future research should delve deeper into the complex relationship between collaboration, context and value creation and continue to unravel the intricate process of co-creating IT-based value over time.

Appendix A. List of interviews

This is a list of the interviews performed at MCC (Table 1), SKF, Sandvik (Table 2) and LKAB (Table 3) between 2003 and 2011. LKAB operates in three different locations, and consequently there is MCC staff in all three locations, in the tables recorded as L1, L2, and L3.

Table 1
MCC.

Year	Respondent
2003	Consultant responsible for drawing up the original MCC business plan
2004	CEO 1
2006	Service Technician 1 (L1) Service Technician 2 (L2) Service Technician 3 (L3) Development Engineer Condition Monitoring Group Manager
2008	CEO 1
2009	CEO 1
2010	CEO 2 (new, former CMG Manager) Service Technician 3 (L3)
2011	CEO 2

Table 2
Sandvik and SKF.

Sandvik & SKF	Respondent
2009	Sandvik's MCC Board Member
2009	SKF's MCC Board Member

Table 3
LKAB.

	LKAB Location 1 (L1)	LKAB Location 2 (L2)	LKAB Location 3 (L3)
2003	Service Director Project Manager Leader of the Hydraulics Group	Maintenance Technician L21 Maintenance Technician L22	
2004	Technology Division Manager	Maintenance Technician L21 Maintenance Manager L21	
2006	Manager Maintenance Development Division Manager L11 Service Director Maintenance Technician L11 Maintenance Technician L12 Maintenance Technician L13 Division Manager L12 Division Manager L13 Maintenance Technician L14 Maintenance technician L15 Maintenance Technician L16	Maintenance Technician L22 Maintenance Technician L23 Maintenance Manager L21	Maintenance Technician L31 Maintenance Technician L32 Maintenance Technician L33 Division Manager L31 Production Manager L31 Maintenance Manager L31

Appendix B. Coding scheme

Concepts	Attribute	Description	Code	Example observation
Performance management	Discipline	Establishment of clear standards of performance and behavior	PM_D_Standards	MCC business plan contained clear division of roles and responsibilities.
		Open, candid, and rapid feedback	PM_D_Feedback	Interactions between MCC and LKAB based on open communication.
	Stretch	Consistency in the application of sanctions	PM_D_Sanctions	Partners agreed on performance measurement standards.
		Establishment of a shared ambition	PM_S_SharedAmbition	Partners articulated shared vision and expectations.
Social support	Support	Development of collective identity	PM_S_CollectiveIdentity	A sense of togetherness was established and common goals created
		Give personal meaning to how individuals contribute to the collective whole	PM_S_StretchingPeople	Each partner had a clearly defined role.
		Allowing actors to access resources available to other actors	SS_S_AccessToInformation	The partners gave each other ready access to needed information, technology and practices
	Trust	Freedom of initiative at lower levels	SS_S_FreedomOfInitiative	Everyone had sufficient authority to do their jobs well
		Encourage taking prudent risks.	SS_S_Prudent_Risk	The partners agreed to see failure as a learning opportunity
		Fairness and equity in a business unit's decision process	SS_T_BaseDecisionOnFact	Base decisions on facts and analysis.
Alignment	Alignment	Involvement of individuals in decisions affecting them	SS_T_InvolveIndividualsInDecisions	Set realistic goals
		Staffing positions with people who possess adequate knowledge	SS_T_MatchStaffToVision	Create trustful relations by involving people
		Work coherently to support overall objectives for this organization	AL_SupportOverallObjective	Emphasize execution of overall strategy and vision
Adaptability	Adaptability	Cause the organization to use resources on productive tasks	AL_UseResourcesWell	Encourage cooperation in order to achieve common goal
		State non-conflicting objectives for specific tasks and projects	AL_AvoidConflictingObjectives	Align resources to vision
		Encourage people to challenge out-moded practices	AD_ChallengePractices	Avoid conflict of interest
		Allow the organization to quickly respond to changes in task environment	AD_RespondToChangeInEnvironment	Expect and encourage response to change
Value creation	Agency	Evolve rapidly in response to shifts in business priorities	AD_RespondToChangeInPriorities	Respond to environmental/external changes
		Type of value created	ValueCreation	Respond to business/internal changes
Inter-organizational collaboration		The driver of the partnership	Agency	Affective, Intermediate or Economic Managing contextual conditions.

Time codes: T1 Negotiations (1999–2002), T2 Commitments (2002–2003), T3 Executions (2003–2006), T4 Re-Negotiations (2006–2008).

References

- Ahuja, G., & Morris Lampert, C. (2001). Entrepreneurship in the large corporation: A longitudinal study of how established firms create breakthrough inventions. *Strategic Management Journal*, 22(6–7), 521–543.
- Andriopoulos, C., & Lewis, M. W. (2009). Exploitation-exploration tensions and organizational ambidexterity: Managing paradoxes of innovation. *Organization Science*, 20(4), 696–717.
- Bamberger, P. (2008). From the editors beyond contextualization: Using context theories to narrow the micro-macro gap in management research. *Academy of Management Journal*, 51(5), 839–846.
- Bharadwaj, A. S., Bharadwaj, S. G., & Konsynski, B. (1999). Information technology effects on firm performance as measured by Tobin's Q. *Management Science*, 45(7), 1008–1024.
- Birkinshaw, J., & Gibson, C. B. (2004). Building ambidexterity into an organization. *MIT Sloan Management Review*, 45(4), 47–55.
- Brynjolfsson, E., & Saunders, A. (2010). *Wired for innovation: How information technology is reshaping economy*. Cambridge (MA): MIT Press.
- Carmeli, A., & Halevi, M. Y. (2009). How top management team behavioral integration and behavioral complexity enable organizational ambidexterity: The moderating role of contextual ambidexterity. *The Leadership Quarterly*, 20(2), 207–218.
- Ceccagnoli, M., Forman, C., Huang, P., & Wu, D. J. (2012). Cocreation of value in a platform ecosystem: The case of enterprise software. *MIS Quarterly*, 36(1), 263–290.
- Chandrasekaran, A., Linderman, K., & Schroeder, R. (2012). Antecedents to ambidexterity competency in high technology organizations. *Journal of Operations Management*, 30(1), 134–151.
- Constantinides, P., Henfridsson, O., & Parker, G. (2018). Introduction—Platforms and infrastructures in the digital age. 29(2), 381–400.
- Dhanaraj, C., & Parkhe, A. (2006). Orchestrating innovation networks. *Academy of Management Review*, 31(3), 659–669.
- Duncan, R. B. (1976). The ambidextrous organization: Designing dual structures for innovation. In R. H. Kilmann, L. R. Pond, & D. P. Slevin (Vol. Eds.), *The Management of Organization Design. Vol 1. The Management of Organization Design* (pp. 167–188). New York: Elsevier North Holland.
- Dyer, J., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660–679.
- Eisenhardt, K. M., & Schoonhoven, C. B. (1996). Resource-based view of strategic alliance formation: Strategic and social effects in entrepreneurial firms. *Organization Science*, 7(2), 136–150.
- Ellonen, H. K., Wikström, P., & Jantunen, A. (2009). Linking dynamic-capability portfolios and innovation outcomes. *Technovation*, 29(11), 753–762.
- Füller, J., Mühlbacher, H., Matzler, K., & Jaweck, G. (2009). Consumer empowerment through internet-based co-creation. *Journal of Management Information Systems*, 26(3), 71–102.
- Gallivan, M. J. (2001). Striking a balance between trust and control in a virtual organization: A content analysis of open source software case studies. *Information Systems Journal*, 11(4), 277–304.
- Gibson, C. B., & Birkinshaw, J. (2004). The antecedents, consequences, and mediating role of organizational ambidexterity. *Academy of Management Journal*, 47(2), 209–226.
- Grover, V., Chiang, R., Liang, T. P., & Zhang, D. (2018). Creating strategic business value from big data analytics: A research framework. *Journal of Management Information Systems*, 35(2), 388–423.
- Grover, V., & Kohli, R. (2012). Cocreating IT value: New capabilities and metrics for multifirm environments. *MIS Quarterly*, 36(1), 225–232.
- Han, K., Oh, W., Im, K. S., Chang, R. M., Oh, H., & Pinsonneault, A. (2012). Value cocreation and wealth spillover in open innovation alliances. *MIS Quarterly*, 36(1), 291–325.
- Hardy, C., Phillips, N., & Lawrence, T. B. (2003). Resources, knowledge and influence: The organizational effects of interorganizational collaboration. *Journal of Management Studies*, 40(2), 321–347.
- Hitt, L. M., & Brynjolfsson, E. (1996). Productivity, business profitability, and consumer surplus: Three different measures of information technology value. *MIS Quarterly*, 20(2), 121–142.
- Im, G., & Rai, A. (2014). IT-enabled coordination for ambidextrous interorganizational relationships. *Information Systems Research*, 25(1), 72–92.
- Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of Management Review*, 31(2), 386–408.
- Jonsson, K., Holmström, J., & Lyytinen, K. (2009). Turn to the material: Remote diagnostics systems and new forms of boundary-spanning. *Information and Organization*, 19(4), 233–252.
- Jonsson, K., Mathiassen, L., & Holmström, J. (2018). Representation and mediation in digitalized work: Evidence from maintenance of mining machinery. *Journal of Information Technology*, 33, 1–17.
- Kietzmann, J., Plangger, K., Eaton, B., Heilgenberg, K., Pitt, L., & Berthon, P. (2013). Mobility at work: A typology of mobile communities of practice and contextual ambidexterity. *The Journal of Strategic Information Systems*, 22(4), 282–297.
- Klein, H. K., & Myers, M. D. (1999). A set of principles for conducting and evaluating interpretive field studies in information systems. *MIS Quarterly*, 23(1), 67–93.
- Kleis, L., Chwelos, P., Ramirez, R. V., & Cockburn, I. (2012). Information technology and intangible output: The impact of IT investment on innovation productivity. *Information Systems Research*, 23(1), 42–59.
- Kohli, R., & Grover, V. (2008). Business value of IT: An essay expanding research directions to keep up with the times. *Journal of the Association for Information Systems*, 9(1), 23–39.
- Lavie, D., Stettner, U., & Tushman, M. L. (2010). Exploration and exploitation within and across organizations. *The Academy of Management Annals*, 4(1), 109–155.
- Lucas, H. C., & Goh, J. M. (2009). Disruptive technology: How Kodak missed the digital photography revolution. *The Journal of Strategic Information Systems*, 18(1), 46–55.
- March, J. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2(1), 71–87.
- Mason, J. (2002). *Qualitative researching* (2nd ed.). London: Sage Publications.
- Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Review: Information technology and organizational performance: An integrative model of IT business value. *MIS Quarterly*, 28(2), 283–322.
- Mirani, R., & Lederer, A. L. (1998). An instrument for assessing the organizational benefits of IS projects. *Decision Sciences*, 29(4), 803–838.
- Mukhopadhyay, T., Kekre, S., & Kalathur, S. (1995). Business value of information technology: A study of electronic data interchange. *MIS Quarterly*, 19(2), 137–156.
- Nambisan, S. (2013). Information technology and product/service innovation: A brief assessment and some suggestions for future research. *Journal of the Association for Information Systems*, 14(4), 215–226.
- Napier, N. P., Mathiassen, L., & Robey, D. (2011). Building contextual ambidexterity in a software company to improve firm-level coordination. *European Journal of Information Systems*, 20(6), 674–690.
- Normann, R., & Ramirez, R. (1993). From value chain to value constellation: Designing interactive strategy. *Harvard Business Review*, 71(4), 65–77.
- O'Reilly, C. A., & Tushman, M. L. (2013). Organizational ambidexterity: Past, present, and future. *The Academy of Management Perspectives*, 27(4), 324–338.
- Peppard, J. (2001). Bridging the gap between the IS organization and the rest of the business: Plotting a route. *Information Systems Journal*, 11(3), 249–270.
- Prahalad, C. K., & Ramaswamy, V. (2004). *The future of competition: Co-creating unique value with customers*. Boston: Harvard Business School Press 2004.
- Rai, A., Pavlou, P. A., Im, G., & Du, S. (2012). Interfirm IT capability profiles and communications for cocreating relational value: Evidence from the logistics industry. *MIS Quarterly*, 36(1), 233–262.
- Ramaswamy, V., & Gouillart, F. (2010). Building the co-creative enterprise. *Harvard Business Review*, 88(10), 100–109.
- Ramirez, R. (1999). Value co-production: Intellectual origins and implications for practice and research. *Strategic Management Journal*, 20(1), 49–65.
- Ring, P. S., & Van de Ven, A. H. (1994). Developmental processes of cooperative interorganizational relationships. *Academy of Management Review*, 19(1), 90–118.
- Sarker, S., Sarker, S., Sahaym, A., & Bjørn-Andersen, N. (2012). Exploring value cocreation in relationships between an ERP vendor and its partners: A revelatory case study. *MIS Quarterly*, 36(1), 317–338.
- Schryen, G. (2013). Revisiting IS business value research: What we already know, what we still need to know, and how we can get there. *European Journal of*

- Information Systems*, 22(2), 139–169.
- Swan, J., Newell, S., Scarbrough, H., & Hislop, D. (1999). Knowledge management and innovation: Networks and networking. *Journal of Knowledge Management*, 3(4), 262–275.
- Swan, J., & Scarbrough, H. (2005). The politics of networked innovation. *Human Relations*, 58(7), 913–943.
- Tempini, N. (2017). Till data do us part: Understanding data-based value creation in data-intensive infrastructures. *Information and Organization*, 27(4), 191–210.
- Tiwana, A. (2008). Do bridging ties complement strong ties? An empirical examination of alliance ambidexterity. *Strategic Management Journal*, 29(3), 251–272.
- Tushman, M. L., & O'Reilly, C. (1996). Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*, 38(4), 8–30.
- Van de Ven, A. H. (2005). Running in pack to develop knowledge-intensive technologies. *MIS Quarterly*, 29(2).
- Vangen, S., & Huxham, C. (2003). Nurturing collaborative relations: Building trust in interorganizational collaboration. *The Journal of Applied Behavioral Science*, 39(1), 5–31.
- Vanneste, B. S., Puranam, P., & Kretschmer, T. (2014). Trust over time in exchange relationships: Meta-analysis and theory. *Strategic Management Journal*, 35(12), 1891–1902.
- Walsham, G. (1993). *Interpreting information systems in organizations*. Chichester: Wiley.
- Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Newbury Park: Sage.
- Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary-The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research*, 21(4), 724–735.
- Zaheer, A., McEvily, B., & Perrone, V. (1998). Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance. *Organization Science*, 9(2), 141–159.
- Zander, S., Mandrella, M., & Kolbe, L. M. (2016). Shifting from justification to understanding: The impact of environmental uncertainty on the value of IT-enabled collaboration in supply chains. *Research papers*. 25http://aisel.aisnet.org/ecis2016_rp/25.
- Zhu, K. (2004). The complementarity of information technology infrastructure and e-commerce capability: A resource-based assessment of their business value. *Journal of Management Information Systems*, 21(1), 167–202.
- Zwass, V. (2010). Co-creation: Toward a taxonomy and an integrated research perspective. *International Journal of Electronic Commerce*, 15(1), 11–48.