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Recommended Citation

Norstrom, Livia and Lindman, Juho, "Exploring Blockchain Municipal Use Cases" (2020). *AMCIS 2020 Proceedings*. 24.

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Exploring Blockchain Municipal Use Cases

Completed Research

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Abstract

Developments in blockchain technology create novel service opportunities for the public sector. However, so far there has been limited empirical investigation on how the public sector takes this emerging technology to use and develop these services. This paper opts for a case study approach of a public organization (municipality). We interviewed key stakeholders to describe how the organization piloted blockchain technology. The results outline perceived benefits and challenges for public organizations when introducing blockchain. We discuss the findings in relation to public sector logics and suggest three dimensions of public sector blockchain engagement. We argue that the three dimensions represent processes of alignment and misalignment in digital transformation.

Keywords:

Blockchain, public sector, use cases, digital transformation.

Introduction

Public sectors are facing continued pressures to implement technology and transform their activities to stay relevant to citizens (De Vries et al., 2016; Damanpour and Schneider 2009). As novel technology has transformative capacity (Nambisan et al., 2017; Yoo et al., 2012), understanding how emerging technology can move beyond pilots and be implemented in organizations will allow public organizations to reap the benefits (Du et al., 2019; Rieger et al., 2019). One way to investigate public sector transformation is to focus on specific emerging technology in specific public organizations. This is what we do in this paper for one specific municipal actor and one novel technology: blockchain. As blockchain is novel technology mostly characterized by tentative promises (e.g. to enable transparency, security, avoidance of fraud and reduced corruption) (Ølnes et al., 2017), more empirical research is needed on aspects of implementation and use in the public organization context (Du et al., 2017; Rieger et al., 2019). This information is critical to support public actors to implement novel technologies and to transform public sector.

In this paper we report from a study in a municipality in the Netherlands, that has run several blockchain pilots, e.g. a voucher system for people with low income and a vote-counting system. We investigate municipality managers' perceived benefits and challenges of using blockchain technology by looking into how the managers engage with the technology, especially during implementation in the municipal context. The first research question is as follows:

RQ1: What are the perceived benefits and challenges of using blockchain technology in municipal organizations?

We then discuss how perceptions of blockchain match and mismatch with public sector logics of control, efficiency and participation, i.e. well-known public administration paradigms (Bryson et al., 2014; Denhardt and Denhardt, 2015; Villanueva, 2015). As organizational norms and practices may hamper transformative capacity of technology (Benner, 2010; and Tripsas, 2009), understanding alignment and misalignment (Berente et al., 2016) with public organization logics is critical (Navarra and Cornford, 2012), leading to the second research question:

RQ2: How are perceptions of blockchain aligned and misaligned with public sector logics?

We suggest three dimensions of blockchain engagement and argue that the dimensions represent processes of alignment and misalignment (Berente et al., 2016) in public sector digital transformation.

Literature review and theoretical concepts

Blockchain in the public sector

Blockchain technology is no silver bullet and can be implemented in many ways and many configurations (Xu et al., 2017). This technology relies on a sequential shared distributed database in which the full earlier transaction history is stored on a public ledger that is not governed by any one trusted third party (Van Alstyne, 2014; Iansiti and Lakhani, 2017; Lacity, 2018). The most famous blockchain implementation is Bitcoin cryptocurrency (Nakamoto, 2008), which combines the creative use of hashing with public key infrastructure. However, blockchain can—and has been—tested without pairing with a cryptocurrency in cases similar to transfers of contracts (Lantmäteriet, 2016) or supply chain management (Jensen et al., 2019; Kshetri, 2017; Mattke, 2019).

Research on blockchain has mainly focused on the technology's potential impact (c.f. Tapscott and Tapscott, 2018; Kshetri, 2017; Iansiti and Lakhani, 2017). An often-proclaimed benefit of blockchain is that it would promise public services that are more efficient by cutting out unnecessary tasks and intermediaries. One early estimate puts the potential cost savings—if currently centralized trust institutions were eliminated—at \$20 billion (Morabito, 2017). Blockchain experiments are being carried out for a number of public sector use cases (for listings of piloted use cases, see Berryhill et al., 2018; The Illinois Blockchain Initiative). Within IS, the early agenda-setting papers have highlighted the need to investigate the area based on empirical evidence of implementations (Lindman et al., 2017; Beck et al., 2017; Soumaya et al., 2017; Rossi et al., 2019). Literature suggests that blockchain technology benefits include lower costs, records that are more accurate, and better transparency (Yermack, 2017), in addition to the provision of novel options for more decentralized governance (Beck et al., 2018) and related generativity (Andersen and Bogusz, 2019). Blockchain may also help address earlier taken-for-granted assumptions of ideas previously expressed in literature on organizational architectures of boundaryless, virtual, ambidextrous, democratic, and entrepreneurial organizations (Scholz and Stein, 2018). Another direction is related to launching and growing technical blockchain consortiums that include various kinds of actors (Zavolokina et al., 2018). Early work lists potential public sector use cases that should be investigated further (for one such early list, see Ølnes et al., 2017). These use cases include land title registration (Hyvärinen et al., 2017), immigration (Rieger et al., 2019), and reducing fraud in banking (Moyano and Omri, 2017). Blockchain technology has been piloted in several countries; for example, in public legal records, such as birth certificates, titles, court documents, and voting-related documents. The aim of these use cases is to prevent adverse behaviors, such as forgeries, false disputes, and, for financial records, double spending (Oliveira, 2018). Ølnes et al. (2017) listed detailed blockchain promises for the public sector that include transparency, avoidance of fraud, reduced corruption, increased trust, auditability, resilience, better data quality, and security.

However, important questions for public sector blockchain usage remain unanswered. In fact, at this stage of blockchain development, careful evaluations of technical, business, and legal issues are needed for each individual use case to overcome the overblown hype around the technology (Treiblmaier, 2019). Far less research effort has been spent in actual implementations and evaluation of those implementations (Labazova, 2019) or use in organizations (Du et al., 2019). Anecdotal evidence by Gartner Insight (Furlonger and Valdez, 2017) suggests that 90% of blockchain projects are driven by fear of missing out, do not actually need blockchain to meet requirements, or result in solutions not suitable for the current IT infrastructure. An EU JRC report titled *Blockchain for Digital Government* (Allessie et al., 2019) lists well-known blockchain early pilots and reviews those projects in detail. However, as of 2020, even in our casual review, none of these projects has been able to gain a large user base. Therefore, we posit that this field is far from mature, and more empirical work is needed on the actual projects in public sector organizations to determine how to support engaging this technology.

Public sector innovation

The core of innovation in the public sector is about “the creation of something new—a practice, idea, service delivery approach, technology—in a way that creates value” (Bertot et al., 2016, p. 111). Innovation is important to sustain responsiveness and legitimacy over time (Dawson et al., 2016; Trong Tuan, 2017) and to adapt to citizen demands on how service and control should be delivered and maintained to fit

contemporary living (Bertot et al., 2012b). In addition, with the increased heterogeneity of culture and ideas, the public sector is experiencing complex problems (Bertot et al., 2016), which requires novel ways of organizing and solving problems (Damanpour and Schneider, 2009).

The advancement of digital technology not only transforms life and work but also the organization of firms and public sector organizations (Brynjolfsson and McAfee, 2012; Yoo, 2010). The transformative capacity of digital technology (Yoo et al., 2012; Nambisan et al., 2017) allows new types of resources to be integrated and more people to participate in transformations, which increases the potential for organizations to utilize digital technology for innovation (Lusch and Nambisan, 2015). Blockchain has been ascribed potential to drive transformation and innovation in the public sector; however, as mentioned above, we still miss use cases and scientific evidence for such claims. Transformation and innovation can be difficult to achieve when technology does not align with the logic of the organization it is used in (Berente et al., 2016). Misalignment is caused when the technology does not have right or sufficient features to meet the demand of the organization (Berente et al 2016) and can lead to a new round of trying to implement the technology or that the technology “drifts” away from the original idea of use and the organization lose control of it (Ciborra 2000). Misalignment can also give rise to tensions (Yeow et al 2016).

Three types of foundational logic guide governmental approaches to novel technology: control, service, and citizen participation (Bryson et al., 2014; Denhardt and Denhardt, 2015; Osborne, 2010). The logic of control is embedded in an approach to strengthen the power and control of government and increase (citizen) trust by relying on legislation, rules, and bureaucracy. Parallel to the controlling logic are ideas and practices related to new public management (NPM), “an umbrella term of management ideas from the business sector implemented in a public sector context” (Persson and Goldkuhl, 2010, p. 52). Even though NPM has been claimed to contribute democratic elements (for instance, reduced corruption, decentralization, and increased customer focus), Hood (1991) argues that NPM has never had an embedded component of innovation or a focus on rethinking and reinventing public sector through processes, engagement, ideas, and service. Linders (2012) argues that NPM does not empower citizens to participate and that the role of government in such an approach does not enable space for shared interests and responsibility. Finally, participatory logic operates in parallel to the two previously described government logics. This logic, referred to as an emerging approach (Navarra and Cornford, 2012), digital government (Janowski, 2015), or government 2.0 or 3.0 (Yli-Huumo et al., 2018) views citizens as an integral part of a “we-government” (Linders, 2012). Such a co-production perspective allows innovation processes to take place not only within the organization but also between and beyond the organization by a great number of participating individuals (Chesbrough, 2006; Von Hippel, 2005).

Method

Due to the novelty of the phenomenon studied and the explorative nature of our research questions, we took a qualitative research approach (Walsham, 2006). To understand the embeddedness of the social, organizational, and technological aspects of blockchain implementation, we chose a case study method (Leonardi 2013). In the following section, we describe the case we engaged in, how the empirical data was collected and analyzed and how we arrived at the findings and the theoretical discussion.

Case description

The case for this study is a middle-size municipality in Northern Europe. It is a young, fast-growing city with young citizens, and it has a well-developed start-up culture and an advanced digital scene. The region hosts an important annual tech startup event where private and public organizations come together to collaborate on concepts related to societal and industrial digital innovations. The municipality is part of an EU-financed project with the aim to learn about and develop blockchain technology in the public sector, so we knew this municipality had some experience piloting blockchain-based ideas. Blockchain has been implemented in the municipality through 6 pilots from 2016-2019: Pilot 1) Voucher system for individuals to participate in cultural and sports activities (proof of concept); Pilot 2) Digital vote-counting system for use during local/national elections (Proof of concept); Pilot 3) System for sharing of parking rights between individuals in a neighborhood (concept); Pilot 4) System for registering citizens who are in debt. Creditors have access to the blockchain and can check if potential debtors are already in debt (concept); Pilot 5) Application for citizen requests for subsidy (concept); Pilot 6) A system that enables

inhabitants with superfluous energy to sell it to lower-income inhabitants (concept). The pilots were small-scale projects with a few people involved; four pilots were on a conceptual level (concept) while two have been set up and run for some time (proof of concept). None of the pilots have been run with real users involved, and none have moved forward with blockchain technology as a technological solution. In those pilots, when the technology was developed and tested (proof of concept), the technical development was outsourced to external companies. In this study, we focus on the municipality managers who were involved in the pilots.

Data collection

Due to the novelty of the technology and its application we started this study from an explorative perspective with a broad approach to try to understand the whole process from the initiation of an idea to the end of the pilot program. We invited all managers in the municipality who had been involved in discussions, decision-making, or hands-on work with blockchain technology in the municipality to participate in a workshop about blockchain in the public sector. 7 municipality managers and three researchers participated. Three of the managers had hands-on experience involving blockchain; 4 were working with the initiation of blockchain in the organization on a more strategic level. The main aim of the workshop was to gain understanding of how blockchain had been introduced in the municipality, the drivers, who was influential in such work, the expected added value of using blockchain as opposed to other technology, the process of work from initiation to date, and the challenges. Discussion themes in the workshop were: (1) identified needs that blockchain can help support; (2) roles required to implement blockchain; (3) strategies for making design choices regarding blockchain architecture; (4) legislation; (5) data handling; and (6) transformational capacity, or how blockchain-based government service may change the role, need, and mandate of the public sector. Due to the lack of implemented use cases to which the respondents could relate, questions were open-ended to stimulate individual respondents' narratives and open discussions between the managers. A secondary aim of the workshop was to give the respondents a learning opportunity by meeting colleagues involved in blockchain-based projects and reflect on the pilots in the municipality, and blockchain technology in general in the public sector. The workshop lasted for three hours and took place at the municipality in January 2020.

After the workshop, we conducted 5 in-depth interviews with 5 of the workshop participants. In the interviews, we aimed to elaborate on the questions and answers from the workshop. We wanted to clarify why the managers thought blockchain technology was a suitable technology for their specified purpose, what role each person had in working with blockchain, who else was involved from initiation to the end of the pilots, how the collaboration worked out, and how they experienced the process of piloting. Since all 6 pilots were not scaled up or taken forward, an important question was also why they thought this was the case. The interviews were also a way to guarantee that each respondent could freely express their answers independently. The interviews were 30-70 minutes and conducted in January-February 2020 via a video conference tool. The workshop and the interviews were audio recorded and transcribed verbatim.

Data analysis

We used an abductive analytical approach to engage with the empirical and theoretical material (Alvesson and Sköldböck, 2017). An abductive approach means iteration between theory and empirical data; i.e., findings are realized through real-world problems (inductively obtained) in combination with influences from theory (deductively inferred). An abductive approach involves shifting between inductive and deductive reasoning as a way to continuously revise, sharpen, and reformulate the research design (Gregory and Muntermann, 2011). In the study underlying this paper, the abductive approach was important because we did not want to verify if the widely published benefits of blockchain technology in organizations could be realized (as we have no cases with users to try them on, only pilots with no users). Additionally, we did not want to discount the literature on blockchain, as we suspected that the managers were influenced by it. In workshop and interview situations and in the analysis of the data, we therefore balanced our queries based on respondents' narratives on blockchain in their organizations and the research literature presented in this paper.

The choice of research literature developed during the abductive reasoning. Since the municipality chose to work with technology with which they lack experience and the approach to piloting the new technology was what we understood as very explorative, we interpreted their approach as innovative, with the intent

to something new without clear goals. To understand these processes of experimentation, we went to the literature on public sector innovation. We further wanted to understand the respondents' rationales behind the choice to use blockchain as technology; i.e., why and how the benefits were perceived, especially since blockchain is novel technology that lacks use cases. We thus analyzed the respondents' thoughts and discussions on the perceived benefits of blockchain technology in relation to literature on public sector logic. We asked ourselves how their perceptions of blockchain matched or mismatched the logic of the organization; we wanted to understand their reasoning for using blockchain in relation to the contexts they were working in. The purpose of the choice of this literature was that we saw that they were trying to align the potential benefits with public sector values such as providing good service, being transparent, and reducing workloads and costs for administration.

Findings

In this section, we thematically present the respondents' considerations about using blockchain in their organizations. The respondents were influenced by the widely published promises of blockchain, so for the most part, their perceptions revolved around the same themes as those in the literature.

Decrease costs

One of the main arguments for implementing blockchain-based technology was that it was expected to increase efficiency of service delivery by reducing associated costs. This argument was put forward and criticized for pilots 1 and 2. Pilot 1 was built on an already existing system that had been used for some years. The system had many users and was working well but relied on many analog components and required heavy bureaucracy and paperwork: *“With (Pilot 1), there was a real need for improvement of the process. It was a very messy system, very messy work process. It used to be a very labor-intensive process with all these vouchers. Blockchain was perceived as a process that was more digital and involved less people.”* The need for improvement was identified by users and providers of the system: *“Increased customer satisfaction, I would say, and more effective work process.”* On the municipality's side, the system improvement was believed to ease the workload of employees: *“It's quite popular [referring to the application in Pilot 1], so if there's a problem, you could have 100 emails in a day, which makes our colleagues unhappy.”* Also, for pilot 2, the goal was to improve internal processes; in this case, to speed up the process of counting votes: *“Well, the big problem [in the municipality] is that during elections, the process of counting the votes is very labor intensive. The teams at the polling stations have to count by hand and they sit there all day—for like twelve hours. So, the thing is that with blockchain, you could eliminate or minimize the amount of counting done by humans. If you put it in a blockchain, you could effectively shorten the time [people spend counting] and ease the workload.”* One respondent was critical of the cost-saving argument described above, claiming that cost saving is not a valid argument to use blockchain technology: *“[The improved efficiency of operations in Pilot 1] has nothing to do with the blockchain. It would work exactly the same way with a normal database. Blockchain is not an effective way of storing data, it's slow—so if you do it just for that, it is not a very useful technology.”*

Preventing double spending

For pilot 1, an additional goal was to improve internal operations by preventing double spending of vouchers. In the case of pilot 1, users get a certain number of vouchers each year for discounts on municipal cultural and sports activities. In the previous system, users could use one voucher multiple times because the system did not keep records of previous operations. With blockchain, the system would check a blockchain ledger to establish that a particular voucher was unspent before accepting the transaction (vouchers are spent with a QR-code from a mobile phone): *“We wanted a clear overview of the transactions—that was the main problem. It was a total mess; people could register five times, they could reuse their tickets, so it was a mess, needed a lot of paper checks. So I guess that's what the big promise with blockchain was.”*

Immutability

In addition to reducing costs, the pilot 2 blockchain was expected to make the process of counting votes more accountable and reduce the risk of human errors in manual vote counting. The immutability of data

stored on blockchains can ensure that the voting data are resistant to tampering once votes are stored in the blockchain. Immutability can, however, be an obstacle when data needs to be erased; as, for instance, in relation to pilot 2, when a vote was recorded incorrectly and could not be revoked. Respondents also noted that by law, data would need to be removed. They refer to “the right to be forgotten;” i.e., individuals’ right to remove negative private information from internet directories, for example: *“For personal details, when it’s put in a blockchain you can’t take it out, [...] so if you have municipal services and the citizens say, ‘We want you to remove the data,’ it’s really hard to comply with because it’s in the blockchain and it’s there forever, at least that is my understanding. So you can’t really comply with a few [legal] things, the right to be forgotten and that kind of stuff.”* Another respondent had a similar reflection on the legal aspects of immutability: *“In some services, there is no right to be forgotten, like sometimes we are obliged by law to actually keep stuff in our archives and maybe we are also legally obliged to destroy those archives after fifteen years, for example. For Duo [a municipal service for students to take out diplomas], I think they gather the student data for fifteen years after you’ve graduated, and then it is destroyed.”*

Cutting out the intermediaries

Blockchain technology can provide decentralized infrastructure where the network adds technical trust to transactions, making it safer to conduct peer-to-peer transactions without going through an intermediary (for example, Bitcoin relies on this logic). In that case, municipalities could let go of some control and let some services be handled in a peer-to-peer mode by citizens. The respondents also addressed this: *“Blockchain is the tool you need if you want to change the government into a more on the side and less in the process [talking about increased decentralization]”* One example of such an effort is pilot 3. The purpose of this pilot was to make it easier for citizens to share and transact parking rights in a neighborhood. The role of the municipality in this pilot was to enable citizens to exchange parking rights instead of relying on the municipality to organize and serve as an intermediary in the process. The pilot can be seen as a part of a bigger transformation to involve citizens in activities by strengthening them as a crowd, *“using the strengths of citizens [and] building that social cohesion, because if you do something [like that in] the neighborhood, then the interaction between people changes, ‘cause maybe they will start campaigning for their ideas and they will talk about it.”* The pilot was cancelled, however, when it became clear that the neighborhood did not have appetite to change established practices. *“It’s very complicated [context], you have all kinds of partners who work with the parking, who do the parking rights and this will also mean that you have to change the way inhabitants now work with it. So I think from the neighborhood, there was not too much enthusiasm to do this.”* In relation to pilot 3, the respondents further discuss whether blockchain should be viewed as a tool for efficiency or a philosophy to change the role of the municipality, enabling citizen participation and cutting itself out as an intermediary: *“If your [the municipality’s] goal is to cut out the middleman, then you can build this kind of process [referring to pilot 3]. However, is your goal to string processes to make it more efficient? That’s another philosophy. In our municipality, we are not here for ourselves, we are here for the people outside, so ‘the philosophy of blockchain is the thing that we want to do. We want to build processes without the municipality, right? So, is that our philosophy?”* One respondent was critical of blockchain in the municipality, as the municipality does not want to leave its role as a central actor (trusted third-party): *“Blockchain is essentially something with which you want to cut out the middleman, and we as a government always want to be the middleman. That’s a conflict of interests—if you make a system that will make yourself obsolete, that’s not so interesting, so we look at something that goes in a different direction.”*

Showing innovation capacity

Besides using blockchain in the municipality as described above, the respondents also talked about blockchain as a way for the municipality to show innovation capacity: *“So [pilot 1] originated at a tech event where there was a good idea from a certain track and our director here said, ‘Well I want that here because of blockchain, but I also think that it’s a good solution.’”* There is also a strong desire among certain individuals in the municipality to try new technology. A respondent explained how pilot 1 was initiated by the wish to renew the existing system (as described above) but also to try out new technology: *“So it was a mix, I think, of a political wish to improve that particular process combined with a—well, what was in the air—and those two things coincided and they were combined, and that was the start of*

the interest [in blockchain] in [the municipality].” The respondents reported on a common approach in the municipality when individual directors jumped on new, fashionable technologies with little support or anchoring in the rest of the organization. Even internal competition between directors in the organization was reported to be common. One respondent described a situation in which one technologically enthusiastic director started a project including blockchain, and right after, another director was inspired by the idea and wanted a similar blockchain project. Competition between municipalities was also mentioned as a driving force to start using blockchain: *“There is always some competition between municipalities.”* It is also crucial to have a sponsor high up in the organization who supports and legitimizes the project: *“But you need a sponsor, and sponsors are usually someone from the management.”* Another respondent agreed: *“Yeah, yeah, otherwise you don’t have the mandate to get it [developed] further.”*

Discussion

Despite the potential transformational impact of blockchain technology on organizations (c.f. Tapscott and Tapscott, 2018; Kshetri, 2017; Ølnes et al., 2017) empirical research on blockchain use cases is currently limited (Du et al, 2017; Rieger et al., 2019). In this paper, we have explored the introduction of blockchain technology in a municipality as an early attempt to provide empirical insights into how the promises of blockchain are engaged with in the public organizational context. We have identified 5 themes of considerations the managers make in relation to blockchain in public sector: decrease costs, prevent double spending, immutability, cut out intermediaries, and show innovation capacity. In the following section we discuss these considerations in relation public sector logic (e.g. Bryson et al., 2014; Denhardt and Denhardt, 2015; Villanueva, 2015) and the potential transformational impact of blockchain (e.g. Tapscott and Tapscott, 2018; Kshetri, 2017; Ølnes et al., 2017). We suggest three dimensions of blockchain engagement, targeting three different stakeholders. We argue that these dimensions represent three different processes of alignment and misalignment (Berente et al 2016) in digital transformation.

Dimension 1: Municipality organization - internal organizational efficiency. A recurring motivation for using blockchain is to decrease costs by increasing efficiency of internal operations. Blockchain is believed to cut out people from administrative processes, which is also an argument that can be found in the research literature (Yermack, 2017). The findings illustrate how managers’ focus on efficiency of internal operations, an innovative brand, media publication through external tech events, and competition inside and between municipalities. This perception of blockchains transformative capacity can be understood as a strive to align with the NPM paradigm (Persson and Goldkuhl, 2010) by making internal operations more efficient and measure performance. It is however doubtful how innovative this perception is since NPM is not believed to drive innovation (Hood, 1991). According to Hood (1991) it does not stimulate new thoughts, ideas and engagement and it does not support a rethinking and reinvention of public sector. Some managers seem to be aware of this and highlight the importance of pinpointing other aspects but the efficiency feature of blockchain technology when motivating use of blockchain in the public sector.

Dimension 2: Citizens - social welfare and democracy. Blockchain technology is also thought to make services easier for the citizens to use, thus representing an application of mechanisms of social welfare and democracy, such as economic support to fragile groups, transparency of democratic processes, and decentralization of citizen services to neighborhood communities. Two of the pilots are intended to support low-income citizens by offering vouchers to sports and cultural activities, one is aimed to propose faster counting and more transparent elections, and another to enable citizen participation to in the distribution of an everyday service (parking). These efforts to use blockchain for transformation towards more transparent, accountable and secure services are suggested by e.g. Moyano and Omri (2017) and Ølnes et al. (2017). Such perceptions are also in line with public sectors’ pressures to implement digital innovations and transform their activities to stay relevant to citizens (De Vries et al., 2016; Damanpour and Schneider 2009) and a citizen-oriented logic to create spaces beyond municipality boundaries to enable citizens to self-organize their services (cf. Chesbrough, 2006; Von Hippel, 2005; Linders, 2012, Navarra and Cornford, 2012). Pilot 3 is an example of such activities. Decentralization and reduced government control are concepts the municipality could bring forward in their further exploration of blockchain technology. Investigating these features of blockchain may be a way forward for public sector to utilize digital innovation (Nambisan et al., 2017; Lusch and Nambisan, 2015) for meeting demands related to contemporary living (Bertot et al., 2012).

Dimension 3: Industry - collaboration with firms and entrepreneurs. A third dimension of engagement with blockchain involves aspects of collaboration between municipality and the industry. A reason for introducing blockchain in a municipality is to support local entrepreneurs by offering collaboration opportunities. Lack of technological skills internally in the organization is also an argument for external collaboration. The hype around blockchain as a revolutionary technology for the whole economy is attractive for firms and entrepreneurs to explore. It seems that the contracted entrepreneurs have a lot of freedom to operate, especially considering the technical design of the blockchain-based service. Open up the organization for collaboration and innovation outside the boundaries of the organization is part of a participatory public sector logic of co-production (c.f. Chesbrough, 2006; Von Hippel, 2005). In this dimension blockchain is engaged with to collaborate beyond organizational boundaries, inspired by an open innovation paradigm (Mergel, 2018) and entrepreneurial organization (Scholz and Stein, 2018).

This paper has several limitations: focusing on one organization always means that more empirical work is needed to see whether the investigated processes are similar in some other organizations and contexts. We believe that empirical efforts to better understand innovation activity are very useful for academics interested in understanding the potential of blockchain, but even more importantly, for practitioners to reap the proclaimed benefits of technology.

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