Navigating Landscapes for Digital Innovation: A Nordic Government Agency Case

Mikael Lindquist
Department of Applied IT,
University of Gothenburg
mikael.lindquist@ait.gu.se

Livia Norström
School of Business, Economics and
IT, University West
livia.norstrom@hv.se

Juho Lindman
Department of Applied IT,
University of Gothenburg
juho.lindman@ait.gu.se

Abstract

Nordic public sector organizations offer a rich context to understand activities related to digital innovation. In this paper, we report on a recent qualitative case study carried out in a Nordic government agency. We focus on the early-stage innovation activities at a case organization that investigates blockchain-related technology. We show how a concept of navigating landscapes can help to understand and theorize these dynamics. Our findings distill organizational activities into three types: 1) navigating need-solutions landscapes, 2) navigating organizational landscape, and 3) navigating competence landscape. These findings are of interest to IS scholars as well as practitioners interested in public sector innovation involving emerging decentralized technologies (EDTs).

Keywords: Decentralized Technology, Digital Innovation, Digital Service, Emerging Technology, Public Sector

1. Introduction

Nordic public sector organizations strive to be at the forefront of digital innovation. These organizations continuously engage in investigating novel types of public services using new, emerging technologies. These technologies and new digital services are challenging the existing logics of the public sector. Organizations need to be on the constant lookout for better ways to organize and deliver their services (Mergel et al., 2019). One set of emerging technologies, that we denote here as *emerging decentralized technologies* (EDT), has often been claimed to offer a high potential to transform the public sector. This set of technologies includes digital technologies such as blockchain and verifiable credentials (VCs).

Public sector organizations engage with EDTs in several different ways. These types of early-stage innovation activities and projects typically include high risk and long lead-times, but also potential to disrupt work processes in an organization or even threaten the status quo in the public sector (De Vries et al., 2016). When aiming to understand these technologies, it is imperative to also understand the constant flux around organizations and how specifically public organizations organize their innovation activities to counteract the potentially negative impacts of this flux. This is an important, but under-researched topic in the field of Information Systems and E-government. In this paper we conceptualize this organizational environment in flux and discuss how organizations navigate different types of landscapes. We build on landscapes as a formal search process to maximize performance (Baumann et al., 2019), but we follow a qualitative case study protocol.

This is a study of a Nordic state government agency. We investigate how this agency designs a novel digital service infrastructure based on emerging decentralized technology. The aim of the service is to fundamentally transform how company information flows between actors engaging in business transactions. The aim of this paper is to describe and explain the innovation process of designing this infrastructure. Our research question is *How can a government agency carry out innovation processes involving emerging decentralized technologies?* We respond to this question by in-depth investigation of our case organization and distil three types of organizational activities that are used to develop novel digital infrastructures with the aim to transform the public sector.

2. Related Research

Public sector innovation has increasingly attracted more interest, among practitioners as well as

scholars (Bekkers & Tummers, 2018; De Vries et al., 2016). Various studies have addressed why and how public sector innovation happen (or doesn't happen), for example by focusing on barriers (Al-Noaimi et al., 2022; Bloch & Bugge, 2013; Cinar et al., 2019), drivers (Al-Noaimi et al., 2022; Bloch & Bugge, 2013), antecedents (De Vries et al., 2016), actors (Tassabehji et al., 2016), or determinants (Hong et al., 2022). Reported influencing factors include environmental pressures—both demands from society or isomorphic pressure from similar organizations (Hong et al., 2022; De Vries et al., 2016), political influences (Bloch & Bugge, 2013; Hong et al., 2022; De Vries et al., 2016), regulation (Al-Noaimi et al., 2022; Cinar et al., 2019; De Vries et al., 2016), innovation culture (Al-Noaimi et al., 2022; De Vries et al., 2016), individual actors (Bloch & Bugge, 2013; Hong et al., 2022; Tassabehji et al., 2016), knowledge availability (Al-Noaimi et al., 2022; De Vries et al., 2016), and technical complexity (Al-Noaimi et al., 2022; Cinar et al., 2019). However, Al-Noaimi et al. (2022) emphasize the importance of contextual sensitivity when understanding influencing factors as "innovation in one PSO [public sector organization] may not necessarily support innovation in a different PSO or may not be possible within the original PSO at a different time" (p. 217).

2.1. Managing for Public Sector Innovation

Earlier studies of public sector innovation processes have investigated how these processes are organized and managed (Cinar et al., 2019; De Vries et al., 2016). Some common themes appear in related literature. First, there is a stream of research focusing on a balancing approach, where organizations handle an uncertain and ambiguous internal and external environment. Concepts used here are 'adaptivity', referring to an ability to deal with responses to potentially disrupting changes while at the same time protecting stability and the accountability of the organization (Janssen & van der Voort, 2016), and closely related 'ambidexterity', where focus is on the balancing act between continuous exploitation of existing opportunities and, exploration of new opportunities (Cao et al., 2023; Magnusson et al., 2020). Also related to adaptive capacity is the agile innovation management (Mergel, 2016).

Second, when the need for more openness in public sector innovation increases, collaboration with external stakeholders becomes an important theme. One issue is that of network interactions (Al-Noaimi et al., 2022; Cinar et al., 2019; De Vries et al., 2016), which comes with important challenges, such as building trust and motivation, and aligning views and

values among the network participants (Bekkers & Tummers, 2018; Ojo & Mellouli, 2018). Other perspectives exist within this theme. For example, Klievink et al. (2016) posit as promising an outside-in approach using public-private digital platforms that, if it is successful, can address public sector's limited capacity to meet society's rapidly evolving challenges. Other themes regard knowledge and learning, such as the imperative of acknowledging "that societal and technology challenges are inherently complex" (Janssen 2016; p. 4), and entrepreneurship, e.g., the suggestion of a systemic entrepreneurship (Tassabehji et al., 2016). When systematically reviewing empirical literature on public sector innovation barriers, Cinar et al (2019) concluded a strong emphasis on the implementation phase of the innovation process.

A strong motivation for this research is the need to account for the special characteristics of public sector organizations (Buchheim et al., 2020; Damanpour & Schneider, 2009). There are several factors that differ between public and private sectors and that potentially impact innovation processes. As a starting point, public sector organizations do not in principle operate on a market and are therefore not driven by profit-seeking (Bloch & Bugge, 2013). The concept of value and its creation also comes out differently in the public sector context. Where value in private sector means higher monetary revenues, in public sector value equals public benefit (Kankanhalli et al., 2017). Unpacking value creation in public sector context further, three forms can be identified according to Bloch & Bugge (2013). First, value creation in services deals with increased efficiency, quality, user satisfaction, fairness, variation etc. Second, social outcomes constitute for example social cohesion, equality, wealth distribution, reduced poverty, better education, and improved health. Third, trust and legitimacy are about objectives that influence the citizens satisfaction with public services and the government's ability to reach broader societal goals. De Vries et al. (2016) use the term *publicness* to make a clear distinction between what is typical for public but not for private sector innovation. Bloch & Bugge (2013) analyze how frameworks developed in private sector context can capture public sector innovation and discusses the need for both an assimilation and a demarcation approach towards these frameworks.

2.2. Emerging Decentralized Technology

Traditionally, information systems, and the innovation paradigms associated with those, have been based upon ideas of administrative systems or individual tools (Tilson et al., 2010), or simply applications (Hanseth & Lyytinen, 2010). Now, we

see information systems that are becoming more and more complex, interconnected, heterogeneous, and without a clear boundary and alongside with new theories within IS research, that can account for these new type of digital infrastructures (Tilson et al., 2010).

Blockchain and Self-Sovereign Identity (SSI) are the emerging decentralized technologies (EDT) in center for the innovation processes studied in this paper and they fall under this infrastructure label. They are complex, undefined, emerging, and uncertain and they share visions regarding decentralization as a common ground. First, Blockchain originates from Bitcoin that was launched by the pseudonym Satoshi Nakamoto in 2008 (Nakamoto, 2008). The application was based on a new, innovative data structure that was to be called blockchain (Casino et al., 2019). The purpose of Bitcoin was to create a "purely peer-to-peer version of electronic cash" to allow for direct payments between two parties without the need for an intermediate third party (i.e., financial institution) (Nakamoto, 2008). Since the launch of Bitcoin, the technology has diffused into many new application areas, introducing many variations in the design space. Consequently, today blockchain cannot be perceived as one single technology, but rather a heterogeneous ecosystem of technologies (Preukschat & Reed, 2021). Self-Sovereign Identity (SSI) is much younger technology than blockchain, starting in 2015 (Preukschat & Reed, 2021). The foundational idea is decentralized identity and credential management. One way to illustrate it is how both public institutions and private companies issue physical credentials, such as identity cards, certificates, and passports. A holder of such credentials has the power to choose where to keep them and to whom he or she shows it (c.f. keeping an identity card in the wallet and showing it when wanting to prove identity). Important building blocks for SSI are these digital credentials, referred to as verifiable credentials (VC), and digital wallets (Preukschat & Reed, 2021). The latter, as it implies, are digital apps (can be mobile, desktop, cloud, etc.) that can hold verifiable credentials.

3. Navigating Landscapes

The word "landscape" has been used earlier in various ways in management and innovation literature. It has been used in formal analysis (Baumann et al., 2019; Fleming & Sorenson, 2003; Levinthal, 1997), as well as in more relaxed ways (Adomavicius et al., 2008; Henfridsson et al., 2018). The formal stream of research defines landscapes as a multiple set of dimensions reflecting choices that can be made, and a result vector that reflects how well a certain combination of choices will perform. When

illustrating these landscapes, the choice dimensions are reduced to two (X and Y axes), and the Z axis will represent performance (Baumann et al., 2019). The resulting landscape illustration shows different aspects of landscapes. For example, Fleming & Sorenson (2003) show how landscape topology differs between modular and non-modular product architectures, and Baumann et al. (2019) illustrates firms' development of new products and business models as engaging "in a sequential search process that can be usefully conceptualized as navigating a rugged performance landscape" (p. 312).

What shows to be common ground in the literature is that the landscape metaphor is about (combinations of) choices that can be made, with the underlying assumption that depending on what choices are made, you can expect different levels of performance, success, etc. Examples from literature also show that the metaphor can be applied to different domains within which choices are to be made, such as organizational forms (Levinthal, 1997), business models (Baumann et al., 2019), value generation and capture (Henfridsson et al., 2018), and IT investments (Adomavicius et al., 2008).

In this paper, we do not analyze landscape choices and performance per se. We do, however, acknowledge the overall assumptions that different combinations of choices within a domain are expected to give different performance outcomes, and that managerial decisions aim at maximizing these outcomes, hence landscape navigation. Thus, in analyzing our empirical data we are attentive to what domains are relevant to our context, i.e., innovation with emerging technologies in the public sector.

4. Method

We followed an interpretative case study protocol (Walsham, 2006), a suitable method when the boundaries between the case organization and its environment are blurred. We engaged in an extensive data collection effort to outline the early part of an innovation process. The data collection (meeting observations etc.) regards this entire 15-month project and it also covers events leading up to it. The case was selected as it presents a rare opportunity to study early-stage innovation on EDTs in a government agency.

4.1. Case Description

The innovation process in this case revolved around the development of an idea how to leverage EDT to transform the agency, in line with the agency's organizational strategy. In short, the idea consists of a service for firms (being an important client group of

the agency) which can be used to digitally share important document data with other actors. Examples of such documents are company registration, tax receipts and various forms of certificates. To this end, EDTs promise ways to increase the ability for actors to prove the authenticity of document data, hence increasing trust in business relations.

The idea is traced back to around 2020, where it was first sketched by one of the agency's strategists. Some months later, in the beginning of 2021, it was tested in a so-called design sprint, involving stakeholders from various parts of the organization. As it was assessed as promising, the idea's development entered a new phase, which we call the proof-of-concept (PoC) activity.

The proof-of-concept activity was a half year long activity during 2021, where the idea was developed into a demonstrable web application, hosted by a contracted technology provider. The proof-of-concept retrieved some positive attention, both internally and externally, and consequently the government issued a government commission stating that the agency was to deliver a more developed conceptual text within the next 15-month period, i.e., the project our research group chose to study.

For the 15-month government commission project, an external project manager was contracted, with an extensive and relevant background within government digitalization. A clear project methodology was established, with agile style elements such as 3-week sprints, Kanban software and frequent team coordination meetings (entire team had meetings at least weekly).

4.2. Data Collection

Data was collected throughout the case study (see Table 1 for an overview). With a few exceptions, the first author observed all meetings held with the entire project team, in most cases weekly briefing meetings and sprint ceremony meetings. Most meetings were online meetings, as project team members were in different cities. Meetings were tape-recorded but not transcribed, making it possible to turn back to interesting team discussions. Thorough notetaking with timestamps made this feasible. In addition to meeting observations, the first author spent several days on site, either in relation to physical workshops, or as visits in relation to planned interviews.

Data Type	Quantity
Meeting observations	93 (approx. 110 hrs.)
Full day visits	10
Interventions	2
Interviews	18

Table 1. Data collection

Observations were complemented with semi-structured interviews with all relevant project members, as well as additional individuals in the organization with important relation to the project (see Table 2). The interviews were tape-recorded and transcribed. Most of the interviews were conducted physically, but some had to be carried out digitally for reasons such as pandemic restrictions. Respondents were project members or persons with relevant relation to the project. Consequently, respondents corresponded to a variety of roles. Respondent roles are not presented in the table for anonymity reasons, but are listed here: *Director-General*, *Strategists*, *Digital Strategist*, *Innovation Leader*, *Chief Digital Officer*, *Technology Expert*, *System Developer*, *IT Chief Architect*, *IT Architect*, *Legal Unit Manager*, *Business Developers*, *Project Leader*, *Communication Support*, and *Business Owner*.

Respondent #	No of interviews	Length of interviews
R1	2	68+60 min
R2	2	59+51 min
R3	1	74 min
R4	1	31 min
R5	1	66 min
R6	1	59 min
R7	1	50 min
R8	1	49 min
R9	1	54 min
R10	1	55 min
R11	1	63 min
R12	1	31 min
R13	1	39 min
R14	1	31 min
R15	1	60 min
R16	1	28 min
	Total: 18	Total: 15h 29min

Table 2. Interviews

Lastly, internal, and external documents, as well as publicly available media, were collected to complement the above data types.

4.3. Data Analysis

To analyze the data, we used an iterative approach where empirical data and theory were combined (Alvesson & Sköldberg, 2017). Fig. 1 shows the coding scheme that reflects the process. The first round of coding was entirely informed by the
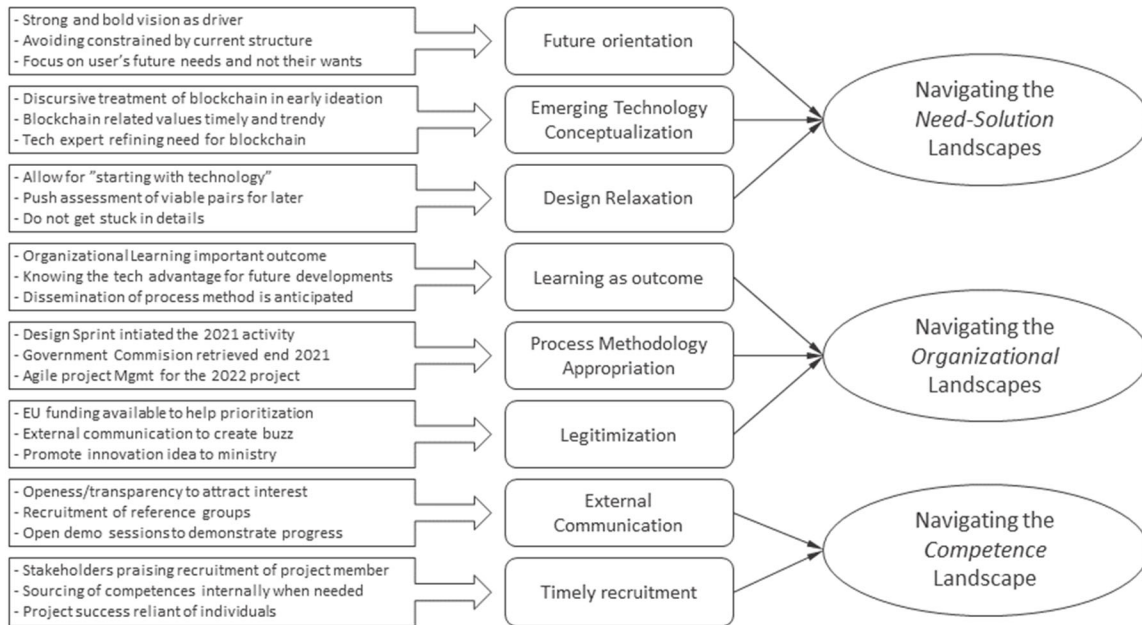
Figure 1. Coding scheme

empirical data. Second round themes where constructed both from the empirical data (i.e., round 1 codes) and from relevant theory. This was an iterative process that was ongoing throughout the case study. Round three teams emerged as high-level themes through theorizing.

5. Findings

Our findings illustrate how our case agency instantiates an innovation idea, a service solution for firms to share verifiable credentials more easily yet securely. Respondents believe that new processes for sharing this information increase efficiency, give firms better control over their data and information, and increase trust between them. The innovation idea is based on a bold vision that is broadly formulated as "*A business world where corporate information flows freely and creates value for society.*" This vision is intended to be disruptive in its nature and envisions something undefined, that is not yet there. Three themes especially stand out: i) The first theme describes their efforts to be future-oriented, inspired by ideas of emerging digital technology, and how they let go of conventional need-driven methods based on problem solving; ii) The second theme relates to how they develop organizational learnings about possible values that can be created and learnings about methods for innovation, and how they acquire legitimization for their continuous innovation activities; iii) The third theme describes how knowledge and competencies are attracted in a timely manner.

5.1. Future Orientation, Inspiration by Emerging Digital Technology, and a Relaxed Approach to Conventional Development Methods

Future Orientation. In the agency case, a way to drive innovation has been to let a strong vision guide the process rather than technological innovation promises (such as blockchain) or problem-solving activities. The vision is pointing far into the future, and it is challenging to understand it with current perspectives of government and technology affordances. The agency has worked through the vision thoroughly, and the Director-General shows a clear focus in pursuing it. These are important factors because they help give a clear direction, showing where the agency is heading in an innovation process, where there are many possible paths to explore. According to the agency professionals, being vision-focused helps keeping focus, and it creates an identity of being future-oriented: *"Yes, that [vision] becomes a driving force to be future-oriented. It helps us. [...] why would we like to work towards the future? I do not accept that we are solely an administrating agency. This is a vision that I have seen and anchored with the Ministry of ... "* (R1) *"So, that [the vision] is actually something that is extremely important because, successful innovation work is about having a company that has a clear vision that is very challenging and drives innovation in that area. [...] I mean, it's not at*

all what we do today, so it's clear that a lot of innovation is required to get there" (R5)

The idea with future-oriented innovation is that it is complicated to ask potential users and stakeholders what they think they need, as the innovation idea revolves around changing fundamental structures in a way that is difficult to comprehend. Future-oriented innovation puts focus on the future. The vision-driven approach helps the agency to think radically differently about the future and to avoid being restricted to the existing infrastructures: "*It would be so much faster if we built on [existing] APIs and connected everything instead [...] But then you would just add one or two layers of building blocks on top of the same thing and say that you are building something different.*" (R1)

Inspiration from Emerging Digital Technology. At an early stage, the innovation idea emerged as a response to what solutions would be developed to transform the agency toward the vision. At that time, the promises of blockchain seemed to fit well with the vision, and blockchain was on everyone's lips, thus focus was put on ideas about this technology. In that way, the conceptualization of blockchain at this point was at a discursive level. "*So, firstly, the fact is that blockchain has been kind of trendy [...] to think that it would be decentralized was really what drove the forward-thinking [...] It was precisely this control over one's own data [part of the vision] that made us see it as something that would be great and a useful use case*" (R1)

Especially one person, who came into the project when it had been running for a while, was influential in the understanding of *how* digital wallets could be fundamental in innovating at the agency: "*But we were not there [the idea about digital wallets did not exist] when we started, but when [X] came in, I saw that [X] understood that connection, because [X] has that background.*" (R1)

Relaxed Approach to Conventional Design Methods. In common software development practice, you start by focusing on a problem you want to solve, and then evaluate what technology solutions exist to address the problem. Instead, in this case the professionals rather used ideas of new technology (such as blockchain) as a starting point for reflection on innovation with the motivation that ideas about new technology can spur innovation. However, they emphasize the importance not to be deadlocked by the buzz of technological promises, and it is a challenge to stay mindful through the innovation process and not jump on all ideas. "*I don't like the approach of saying, now we have a technology, find a problem that we can solve with this technology. I think it's wrong at the same time that you need to explore technology to*

understand what it can do so that it's a little different thing". (R10)

Also, software development often assumes that if a technical solution meets a specific need, the developer should be able to explain *how* the solution will meet the specific need, and, that the proposed solution is the best solution to meet the need. In this case this scrutiny was not enforced in the idea development process. It progressed to a higher level, for the technical and the need side respectively, but without clearly linking them logically. Respondent R1 explains that it was imperative not to get stuck in detail, and that the timing of the explaining of the pairing between solution and need is more now, after the phase that they are currently ending.

5.2. Learnings, Methods for Innovation, and Legitimization

Learning as Outcome. Respondents stressed that learning is the most important outcome of the innovation process. As they cannot know whether the innovation idea will materialize or in what form, it is necessary to engage in innovation activities around a topic that is potentially essential for the future domain of the agency to create knowledge that will position the agency better if or whenever these solutions emerge. The learning involves both the technical side, e.g., digital wallets, and the business side, e.g., how the customer ecosystem responds to the idea: "*Innovation process for me means incorporating as many different perspectives as possible so that we really arrive at the transformative solution. [...] Of course, I really want us to come up with the big solution [...] but there are lots of things that I think we should also be proud of and we learn a lot of things. The innovation, 90% learning, 10% realization.*" (R5)

Another expected outcome is related to learning about the methods used for the future oriented innovation they aim at: "*It's also about increased awareness of the actual way of working, I think it's important and good just to work in a future-driven manner[...]*"(R1)

Process Method Appropriation. The development process was carried out in phases. The first structured phase started with a so-called *design sprint*, that summoned a set of people from different parts of the agency (business as well as IT) for a week to intensively work with idea generation. "*You have a technology without any definition around concrete solutions, needs and challenges, it will be really tough. [...] But then I thought like this. Then I use my future-driven innovation concept and then I add that to the design concept and I create my own method called future-driven design sprint.*" (R5)

Following this design sprint was a half-year-long activity that was carried out with no strict methodology. They tried different strategies during the activity, e.g., they challenge an established attitude that the agency should develop things themselves, and instead turned to the market to find a technical provider for the solution side of the proof of concept: "*I always thought [...] we must solve everything ourselves [...] everything must be handled by our own resources. Okay, yes, that's really nice and really good. But if we don't even know. [...] and then they actually start thinking about a consultant and bringing in... a consultant came in*" (R5).

The next phase, the government assignment, was set up in a project style, time boxed and with clear project goal (equivalent to the assignment from the government). An agile type of methodology was chosen. The choice of methodology was taken by the project leader with no requirements of following agency templates, such as the agile template for IT projects, which some believe would have been counterproductive due to its many constraints: "*I felt that there was a strong commitment, high competence in the group, but that there was a rather limited working form or structure. So setting up some basic forms for that I still saw as the most important thing to achieve from the start. [...] From my perspective, I saw that based on the experiences I have that there are some ceremonies, so to speak, that I believe you need to establish for this type of mission to succeed.*" (R2)

Legitimization. Internal legitimization of the idea development is needed for the development of the idea to continue. With poor legitimization, the organization will prioritize other initiatives. One part of legitimization is funding. In the case of this idea development, EU fundings have been successfully acquired in stages: "*Well, there were discussions and I tried because I thought, okay if I'm going to sit in this group and then there's money. There are announcements and so on. Then we must try*" (R3)

A technique sometimes used by an agency is to convince the ministry of the importance of an innovation initiative, and to have the government formulate a government assignment: "*In the end, we came to the conclusion [...] that we would do a workshop where we would develop use cases [...] We cannot just kind of sit and examine new technologies and then [innovation idea] comes along. And so then management thought, it was so interesting, so they talked to the ministry and we received a government commission related to it.*" (R3)

There has also been a strong focus on external legitimization. It has been important to be transparent in what is being done, and what is learnt, and it has also been a way to attract new knowledge and resources to the idea development. "*There are many who think marketing is ugly in the context of innovation management, but for me it is a necessity. It's like there aren't any, you can't do it without it. We have to get actors to work, we have to get the right people who we can get incorporated here and we have done that.*" (R5)

5.3. Attracting Knowledge through Transparency and Recruitment

External Communication. During the phases of development of the innovation idea, there has been a strong focus on external communication. For example, every three months or so, open demo sessions were held to demonstrate progress. It has been important to be transparent in what is being done, and what is learnt, and also it has been a way to attract new knowledge and resources to the idea development: "*Then of course we need to communicate it [the innovation idea] and create a demand for this type. Now it's just a concept test, but if it's successful enough and you create a demand, it's possible, it will be a bit of lobbying.*" (R14). In other words, building relations to future users and others in the external world is vital: "*We have to do it with others and that includes us giving things out, bringing things out into the ecosystem so to say.*" (R5)

There has also been a high focus on recruiting external stakeholders, to be a bit more involved than just attending open demos. Various reference groups were sketched early in the project. Also, an external partner with knowledge in the technology have been important in the development of a runnable concept that could be demonstrated to external stakeholders to show how the technology works. R5 further discusses the importance of learning from different perspectives and bringing in different competence to the innovation process: "*We want diversity in our work. We don't want people who are exact, think exactly the same and think the same about the same experiences. We want to have a sort of a mix of skills and internal and external in this work so facilitating, arranging, structuring and thinking about that is also my role when approaching something*" (R5)

There are many great thinkers at the agency, according to R5, implying that there is much potential for innovation activity. Exemplifying with the innovation idea, R5 proposes that good ideas will not fly unless there is competence in packaging, structuring, and communicating the idea (e.g., value propositions) to relevant stakeholders. In the case of the studied innovation idea, people before R5 had proposed the idea for others in the organization during the year prior to the design sprint event, but without

being able to progress. *"If success is to be achieved, it must be packaged together so that it becomes comprehensible to someone outside this group. [...] Because otherwise we won't get people who find this exciting, interesting and: what does it mean for me? What does it mean to me, what does it mean to me? It's just what makes the world go round, after all*" (R5)

Timely Recruitment. There are several examples where informants stress the success in the recruitment of person A and person B. Regardless of the level of intentionality in this, it is fair to say that the timing and the specific people recruited throughout the idea development have been of importance for the outcome: *"An extra finesse has been that we had such a talented leader in [X] who has helped us see the possibilities around the agile way of working. [X] has had a very toned-down description of that working method. There are many others with us who talk a lot more about agile working methods. But what [X] does is [X] manages to implement it, [X] lives this way of working in a way that not everyone else does. I think it has been such a bonus effect."* (R1)

The project setup, backed by the legitimacy of the government assignment, was favorable in the way that it could find important competence internally when needed. One such recruitment was the two business developers that came in after a few months. Another was the technical expert, that got connected to the idea development process sometime before the government commission project started. This person had a crucial role in advising on the technology choices as the project was initiated.

6. Discussion and conclusion

We have investigated how digital innovation professionals at a state level government agency can instantiate innovation process on emerging decentralized technologies. To answer this question, we have distilled organizational activities into three types: 1) navigating need-solutions landscapes, 2) navigating organizational landscape, and 3) navigating competence landscape. The visions that have come with the recent introduction of Emerging Decentralized Technologies (EDTs) propose new ways of arranging data and information in ecosystems that really push the current reference framework. Visionary leaders may see potentials in this future scenario, but it is not obvious how to operationalize the visions, nor how to engage in innovation towards the visions. From our investigation we have identified three important types of landscapes that professionals at a state level government agency need to navigate in this operationalization, *need-solution landscapes*, *organizational landscape*, and *competence landscape*.

Below, we discuss these separately. This is not to say that they are isolated phenomena, indeed they are highly interlinked. These navigation activities are discussed in relation to the specific context of emerging technology, decentralization and state level, paradigmatic innovation to contribute conceptualization of early-stage innovation at state government level.

Navigating the Need-Solution Landscapes. The innovation process can be perceived from a design perspective by distinguishing between needs and solutions. This does reflect much of the language used in meetings and documents, e.g., building a technical solution, detailing use cases, and validating needs with user focus groups. Also, any course of action "aimed at changing existing situations into preferred ones" is an act of design (Simon 1996; p. 111). Now, in taking this perspective, we reflect on how the two sides are treated in the innovation process, and we conclude that in much of the early development of the innovation idea in the case study, the technical solution on the one hand, and the needs of the future users on the other side are analyzed and developed in parallel, with little detailed analysis on how the solution will meet the needs (c.f. *need-solution pairing*; Lindquist et al., 2023; von Hippel & von Krogh, 2016). E.g., how will the solution meet the needs, and why is the solution the best solution to meet the need. Deepening the understanding of this lack of pairing reveals that it is somewhat deliberate, as deep analysis requires a lot of work, and in early ideation it therefore makes more sense to keep discussion on a higher level. The downside of this is that it makes it more difficult to convince (especially technical) stakeholders evaluating the progress externally that the idea development is legitimate (see discussion on the organizational landscape). Related to the disagreement of other stakeholders that reflect on the innovation idea, is that the idea is described as a state in the future that is not "one step away". As many practitioners responsible for part of a current structure evaluate ideas departing from the presence, their approach is incremental, instead of a "jump" into the future that is needed. The interpretation of the informants of our study express that a "jump" is needed, and this *future oriented innovation* approach has thus been promoted from the start. Our study reveals an important area for research, and we suggest that future research consider the following research question: *How can state level actors develop processes that balance the need to explore new reference frameworks, while at the same time staying mindful of collective resources?*

Navigating the Organizational Landscape. Proposals to start to develop an innovation idea, as well as to continue through new stages of

development, require a convincing story that the potential value of its initiation/continuation exceeds the effort it takes. Innovating with EDTs involves a specific difficulty in this communication, since the visions related to EDTs express infrastructures in ways that is not an incremental offset of today's infrastructure, but rather a more radical shift in reference framework. This means that there is a recurrent threat that those responsible for the resources, such as funds, or the public, to whom an agency needs to answer, lose confidence. One way to mitigate this risk is to pair the innovation process with thorough communication work, with the intention of explaining to those not working close to the process what it is about and why it is important. A cultural aspect related to innovation process that is helpful in motivating EDT innovations is the way learning is evaluated as a central outcome. Whatever comes out on the other side, the organization will know more about both the technologies involved and the domain related to the needs that were intended to be met. This, however, requires a strategy for capturing the knowledge that has been created. Hence, an example of a poor strategy would be one where too much of the work is outsourced to consultants and technical providers, as this usually means that important knowledge is lost when the project ends. Finally, as idea development progresses through stages, and where different stages might have different challenges, it is likely that the optimal process methodology will change over time. We argue that one important area for research is the relation between choices in organizational configurations and the effects of the ideation phase of innovation processes related to emerging technologies, and we suggest the following research question: *How can state level actors choose organizational configurations to secure legitimacy for innovation with EDTs and other reference framework pushing technologies?*

Navigating the Competence Landscape. As with emerging technologies in general, knowledge acquisition is a challenge. Finding the right competence at the right time is crucial. These competencies are not only technology related, but also related to innovation leadership, project management, etc. So, navigating the competence landscape is not trivial, not only because the relevant competence is often scarce, but also because many players exist on a market where there are other competing agendas (Swanson & Ramiller, 1997). Also, as a public actor, a government agency must comply with public procurements regulations, making this task even harder.

One way to address these issues, which was practiced in the case project, is through thorough external communication. In our case, the project communicated externally with high level of transparency, with the intention of letting the world out there know what kind of innovation was conducted, hoping that this would attract competence that want to connect or even join the project. This way, they avoided cumbersome public procurement processes, and by that also the risk of ending up with conflicting agendas (such as when large consultancy firms are contracted to drive innovation). We argue that the successful processes of early innovation with EDTs are highly dependent of finding right competences at the right time, and ideally this should not be left to serendipity. Hence, we suggest further research to address this issue with the following question: *How can state level actors find relevant and timely competence, through collaboration or recruitment, given that competence can be scarce, and given the risk of conflicting agendas?*

7. References

Adomavicius, Bockstedt, Gupta, & Kauffman. (2008). Making Sense of Technology Trends in the Information Technology Landscape: A Design Science Approach. *MIS Quarterly, 32*(4), 779. https://doi.org/10.2307/25148872

Al-Noaimi, H. A., Durugbo, C. M., & Al-Jayyousi, O. R. (2022). Between dogma and doubt: A meta-synthesis of innovation in the public sector. *Australian Journal of Public Administration, 81*(1), 201–223. https://doi.org/10.1111/1467-8500.12501

Alvesson, M., & Sköldberg, K. (2017). *Reflexive Methodology: New Vistas for Qualitative Research*. Sage.

Baumann, O., Schmidt, J., & Stieglitz, N. (2019). Effective Search in Rugged Performance Landscapes: A Review and Outlook. *Journal of Management, 45*(1), 285–318. https://doi.org/10.1177/0149206318808594

Bekkers, V., & Tummers, L. (2018). Innovation in the public sector: Towards an open and collaborative approach. *International Review of Administrative Sciences, 84*(2), 209–213. https://doi.org/10.1177/0020852318761797

Bloch, C., & Bugge, M. M. (2013). Public sector innovation—From theory to measurement. *Structural Change and Economic Dynamics, 27*, 133–145. https://doi.org/10.1016/j.strueco.2013.06.008

Buchheim, L., Krieger, A., & Arndt, S. (2020). Innovation types in public sector organizations: a systematic review of the literature. *Management Review Quarterly, 70*(4), 509–533. https://doi.org/10.1007/s11301-019-00174-5

Cao, L., West, B., Ramesh, B., Mohan, K., & Sarkar, S. (2023). A platform-based approach to ambidexterity for innovation: An empirical investigation in the public sector. *International Journal of Information*

Management, 68, 102570.
https://doi.org/10.1016/j.ijinfomgt.2022.102570

Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: current status, classification and open issues. *Telematics and Informatics, 36*, 55–81. https://doi.org/10.1016/j.tele.2018.11.006

Cinar, E., Trott, P., & Simms, C. (2019). A systematic review of barriers to public sector innovation process. *Public Management Review, 21*(2), 264–290. https://doi.org/10.1080/14719037.2018.1473477

Damanpour, F., & Schneider, M. (2009). Characteristics of Innovation and Innovation Adoption in Public Organizations: Assessing the Role of Managers. *Journal of Public Administration Research and Theory, 19*(3), 495–522. https://doi.org/10.1093/jopart/mun021

De Vries, H., Bekkers, V., & Tummers, L. (2016). Innovation in the Public Sector: A Systematic Review and Future Research Agenda. *Public Administration, 94*(1), 146–166. https://doi.org/10.1111/padm.12209

Fleming, L., & Sorenson, O. (2003). Navigating the Technology Landscape of Innovation.pdf. *MIT Sloan Management Review, 44*(2), 15–23.

Hanseth, O., & Lyytinen, K. (2010). Design theory for dynamic complexity in information infrastructures: the case of building internet. *Journal of Information Technology, 25*(1), 1–19. https://doi.org/10.1057/jit.2009.19

Henfridsson, O., Nandhakumar, J., Scarbrough, H., & Panourgias, N. (2018). Recombination in the open-ended value landscape of digital innovation. *Information and Organization, 28*(2), 89–100. https://doi.org/10.1016/j.infoandorg.2018.03.001

Hong, S., Kim, S. H., & Kwon, M. (2022). Determinants of digital innovation in the public sector. *Government Information Quarterly, 39*(4), 101723. https://doi.org/10.1016/j.giq.2022.101723

Janssen, M., & van der Voort, H. (2016). Adaptive governance: Towards a stable, accountable and responsive government. *Government Information Quarterly, 33*(1), 1–5. https://doi.org/10.1016/j.giq.2016.02.003

Kankanhalli, A., Zuiderwijk, A., & Tayi, G. K. (2017). Open innovation in the public sector: A research agenda. *Government Information Quarterly, 34*(1), 84–89. https://doi.org/10.1016/j.giq.2016.12.002

Klievink, B., Bharosa, N., & Tan, Y.-H. (2016). The collaborative realization of public values and business goals: Governance and infrastructure of public–private information platforms. *Government Information Quarterly, 33*(1), 67–79. https://doi.org/10.1016/j.giq.2015.12.002

Levinthal, D. A. (1997). Adaptation on Rugged Landscapes. *Management Science, 43*(7), 934–950. https://doi.org/10.1287/mnsc.43.7.934

Lindquist, M., Norström, L., & Lindman, J. (2023). Need-Solution Pairing and the Role of Emerging Technology in a Public Sector Innovation Process. *ECIS 2023 Research Papers*. https://aisel.aisnet.org/ecis2023_rp/375

Magnusson, J., Päivärinta, T., & Koutsikouri, D. (2020). Digital ambidexterity in the public sector: empirical evidence of a bias in balancing practices. Transforming Government: *People, Process and Policy, 15*(1), 59–79. https://doi.org/10.1108/tg-02-2020-0028

Mergel, I. (2016). Agile innovation management in government: A research agenda. *Government Information Quarterly, 33*(3), 516–523. https://doi.org/10.1016/j.giq.2016.07.004

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly, 36*(4), 101385. https://doi.org/10.1016/j.giq.2019.06.002

Nakamoto, S. (2008). *Bitcoin; A Peer-to-Peer Electronic Cash System*. Retrieved from https://bitcoin.org/bitcoin.pdf

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. *MIS Quarterly, 41*(1), 223–238. https://doi.org/10.25300/misq/2017/41:1.03

Ojo, A., & Mellouli, S. (2018). Deploying governance networks for societal challenges. *Government Information Quarterly, 35*(4), S106–S112. https://doi.org/10.1016/j.giq.2016.04.001

Preukschat, A., & Reed, D. (2021). *Self-Sovereign Identity: Decentralized digital identity and verifiable credentials*. Manning Publications.

Sedlmeir, J., Smethurst, R., Rieger, A., & Fridgen, G. (2021). Digital Identities and Verifiable Credentials. *Business & Information Systems Engineering, 63*(5), 603–613. https://doi.org/10.1007/s12599-021-00722-y

Simon, H. A. (1996). *The Sciences of the Artificial* (T. M. Press, Ed.; 3rd ed). MIT Press, Cambridge, MA.

Swanson, E. B., & Ramiller, N. C. (1997). The Organizing Vision in Information Systems Innovation. *Organization Science, 8*(5), 458–474. https://doi.org/10.1287/orsc.8.5.458

Tassabehji, R., Hackney, R., & Popovič, A. (2016). Emergent digital era governance: Enacting the role of the 'institutional entrepreneur' in transformational change. *Government Information Quarterly, 33*(2), 223–236. https://doi.org/10.1016/j.giq.2016.04.003

Tilson, D., Lyytinen, K., & Sorensen, C. (2010). Desperately seeking the Infrastructure in IS Research: Conceptualization of "Digital Convergence" as co-evolution of social and technical infrastructures. *2010 43rd Hawaii International Conference on System Sciences*, 1–10. https://doi.org/10.1109/hicss.2010.141

von Hippel, E., & von Krogh, G. (2016). CROSSROADS—Identifying Viable "Need–Solution Pairs": Problem Solving Without Problem Formulation. *Organization Science, 27*(1), 207–221. https://doi.org/10.1287/orsc.2015.1023

Walsham, G. (2006). Doing interpretive research. *European Journal of Information Systems, 15*(3), 320–330. https://doi.org/10.1057/palgrave.ejis.3000589