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Towards Ecosystemic Stance in Finnish Public Sector Enterprise Architecture

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Abstract. Governments and organizations in both public and private sector are operating in fields of ever-growing uncertainty and complexity. To study this complex environment, the concept of ecosystems has been suggested, interpreting organizations as intertwined systems among layers of evolving ecosystems. While offering possibilities, operating in an ecosystemic environment might prove to be challenging, and the change from traditional governance structures might be difficult to manage, requiring holistic yet detailed view. Enterprise Architecture (EA) has been an interest of academics and practitioners for few decades, offering one of the most prominent solutions to managing complex organizations. Recently, it has been discussed that EA should further evolve to respond to the interconnectedness of organizations¹, thus extending the focus of enterprise architecting from intra-organizational to the ecosystems level. Based on data from 26 in-depth practitioner interviews in Finland, we discuss how EA should be developed to better support Finnish public sector ecosystems. Our data indicates that qualities such as organizational capabilities, holistic view, co-creation and needs-based utilization are essential features of public sector ecosystem EA.

Keywords: Enterprise architecture, Public sector, Ecosystem

1 Introduction

As the world alters towards networked and complex structures, the changes within the organizations and in the environment are becoming more frequent, yet more difficult to perceive. The underlying complexity is prone to increase, making it near impossible for governments to achieve public policy endeavors by dividing complex issues into smaller pieces [4, 13]. Contrariwise, embracing holism and the interconnections among organizations might be a key to solve some of the problems occurring, as ecosystems-enabled co-creation is seen as a key innovation in public service delivery [6]. To study this complex environment, the concept of an ecosystem has been suggested as “*the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize*” [1, p. 40]. Public administration structures and actors such as cities [58] and state [5] are increasingly interpreted as

service systems and ecosystems. As an example, [13, p. 110] argue, that “*the society could be defined as a complex set of relationships based on the continuous sharing of resources and on the combination of several expectations culminating in the building of new value*”, thus making society a domain which “*cannot be analyzed in the light of a mechanistic approach; it requires the adoption of a holistic perspective*”. Ecosystems have attracted interest in private and public sector, and both new models of public services delivery and new business models have been suggested. Ecosystemic perspective can enhance understanding of complex contexts with systems-level thinking [9] and could be beneficial in the public sector, bringing forth benefits such as avoidance of duplication, enhanced transparency, faster service delivery and increased flexibility [51]. Further, a United Nations e-government survey stresses the need for a holistic approach to governance, bringing forth ecosystemic stance as a crucial strategy to achieve holism. In the same vein, the World Economic Forum has envisioned some features of future world government, where the cornerstones are such as networked governance, interconnection and collaboration. [51].

Whilst interpreting public administration as an ecosystem could bring forth benefits, the transition from traditional government structures might prove to be challenging and difficult to manage, requiring holistic yet detailed view. As [9] note, prior research has found that while technology creates opportunities in ecosystem service innovation, its complexity is prone to increase, necessitating the integration on people, processes, technology and information. Here, Enterprise Architecture (EA) could have a vital role. EA has been an interest of academics and practitioners for a few decades, offering one of the most prominent solutions to managing organizations. EA is traditionally used in modelling of organizations in current and future states and has gained attention as an approach for achieving IT-business alignment [2], bringing numerous other potential benefits along (e.g. [19, 33, 55]).

Changes in business-environments have sparked a discussion of further evolving EA to respond to the challenges related to interconnectedness of organizations [17]. While EA can be used to examine organizations and its elements, i.e. processes, systems and information, it has been argued, that current EA methodologies are not suitable in bridging internal and external environments, and in involving customers, supplier, business partners and other various stakeholders for building successful ecosystems [3, 18, 47]. EA might need a reconceptualization on methods and tools, to provide requisite coherence and adaptability in reacting internal and external change demands [32]. As the scope and purpose of EA seems to be expanding from mechanistic IT-business alignment to a holistic design of an organization in an ecosystemic environment (ibid), a systemic stance on enterprise architecture seems to have a growing interest among scholars and practitioners [10, 35]. Well-known scholars have explicitly stated the need to study the relations between systemic thinking and EA. As an example, Kappelman and Zachman [29, p. 93] state, that “[...] *the EA trend of applying holistic systems thinking, shared language, and engineering concepts, albeit in the early stages of their application, is here to stay*”. Further, Rahimi et al. [48, p. 138] discuss the “*importance of systems thinking and, especially, of adopting the open systems principle, for managing EA design and evolution*”. Recently, EA has been applied in networked [4, 14, 52] and ecosystemic [21, 38, 47] settings. Systemic and

ecosystemic stance on public administration, and government architectures have been discussed especially in the context of e-government [26] and smart cities [7, 27, 38, 39], as well as other endeavors [e.g. 15, 31]. Although EA has been used to enhance interoperability of inter- and intra-organizational IT systems in the public sector, the means of extending the focus of enterprise architecting from intra-organizational to the ecosystems level is an area not yet sufficiently studied.

EA in the public sector differs from the private sector context, due to differences in usage - while in the private sector EA is often used in one organization, the scope in the public sector is much larger. Especially in the public sector, EA initiatives seem to face challenges in practice. Thus, as noted in prior studies, further research about EA in the public sector is also needed [16, 50, 53, 56]. The somewhat mature usage of government EA makes Finland a viable area to study EA usage in the public sector. Finland introduced government enterprise architecture in 2006 and has since 2011 mandated the use of EA in public sector organizations. In 2017, Ministry of Finance, the key actor governing public EA efforts in Finland, published first drafts of ecosystems model for public administration EA. In Finnish public administration, the state government and local government co-exist, comprising 12 ministries, about 50 special agencies, and some 200 regional state agencies. Prevailing reform in Finnish Social and Health services aims at to form 18 counties and an ecosystem including shared IT services as the common platform for currently siloed and fragmented data resources.

Our research question: “How enterprise architecture should be developed to better support Finnish public sector ecosystems?” is answered with thematic analysis of data from 26 in-depth practitioner interviews, conducted in different levels of Finnish public administration. While EA is much used in the public sector, its power in organizational interoperability and coherence is yet to be seen, and new ways of designing, developing and governing public administration EA are needed. Our data indicates that qualities such as organizational capabilities, holistic view, co-creation and needs based utilization are essential features of public sector ecosystem EA.

The remainder of this paper is structured as follows. In the following sections, the main concepts of this study - ecosystem and EA - are briefly introduced. Section 3 explains the methods of this study, and in Section 4, we offer the results of our study. Results are discussed with concluding remarks in Section 5.

2 Background

2.1 Enterprise Architecture in the Public Sector

Enterprise architecture has been defined and used in manifold ways. An “enterprise” indicates to the scope of the examination, and can be defined e.g. as an organization, a part of the organization or several organizations forming a whole. According to ISO/IEC/IEEE 42010:2011, “architecture” is defined as “*fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution*”. Although the definitions of EA are numerous, with no common definition, it’s scope and purpose seem to be increasingly

extending from the purpose of IT-business alignment towards a tool of holistic organizational design and development in the system-in-environment setting [42].

Prior research discusses government EA as an efficient tool to overcome the challenges and problems related to e.g. interoperability, integration and complexity of e-government systems. [e.g. 19, 37]. In the public sector, government-as-a-whole architectures have been studied using various terminology, such as government architecture [24], government enterprise architecture [44, 51] and national enterprise architecture [25, 36]. [46] cites earlier studies, and states, that public sector policymakers initiate EA programs to enhance productivity, improve interoperability and improve the standard of service systems.

Although EA has been used in public sector in more than 20 countries [49], the efforts have not been only successful, numerous problems have occurred and many government organizations have performed poorly in their EA efforts. As an example, [16] discuss the problems and their root causes of EA in the public sector. They conclude, that previous research has recognized numerous problems, including problems related to the organization, EA project teams, EA users, and EA itself. Examples include complex structures, minimum collaboration among agencies, lack of broader understanding and guidance, lack of capabilities and skills, overemphasizing IT perspective, and lack of shared understanding of EA itself. [54] studied key issues in EA adoption in the public sector, concluding that there are three broad categories: resistance towards EA, relevant EA goals, and EA practices in use. These include issues such as lack of practical skills required in EA development, reluctance to adopt new ways of working and general image problem of EA, due to e.g. troublesome implementation and technical representation.

Public administration in Finland has been in continuous change as in all Western Countries, if not globally. Although EA has emerged as a prominent tool to manage the change, the proof of its success in organizational interoperability and coherence is yet to be seen. In Finnish public administration, the state government and local government co-exist, comprising 12 ministries at the state level, steering their branches along of about 50 specialized central agencies. The semi-independent local governments consist of about 300 municipalities, which are self-governing units by Constitution, with the right to tax the residents. The municipalities have formed collaborative networks and joint ownerships with third-party vendors, which creates a complex ecosystem per se. Altogether, the Finnish public administration forms a complex ecosystem of organizations of high complexity, diverse goals and services, as well as some common infrastructure. In addition to that, various cross-organizational management forms, such as policy programs, and other endeavors are ongoing via various forms of organizations. Prevailing reform in Finnish Social and Health services aims to an ecosystem that will include shared IT services as the common platform for currently siloed and fragmented data resources. 18 counties are to be formed, with the liability to produce social and health care service.

In order to enable and ensure the interoperability of public administration, The Act on Information Management Governance in Public Administration (634/2011) has since 2011 necessitated the use of EA in public administration. Finnish public sector authorities must plan and describe their EA and adhere to the created and maintained

EA, descriptions, and definitions of interoperability. Public sector organizations should use the Finnish national EA (FINEA) method and its guidelines in EA planning and management. In practice, the implementation and use of the method have been challenging [46, 54].

2.2 Ecosystems in the Public Sector

Having emerged from the field of biology, different types of ecosystems have been widely discussed in various academic disciplines, such as marketing, strategy, social sciences, innovation management, engineering and information technology, gaining popularity especially in recent years [28]. Ecosystem have been defined and classified in manifold ways, and different kinds of ecosystems include business ecosystem, innovation ecosystem, service ecosystem, ecosystem as a standalone concept as well as various others. Some common elements among different types of ecosystems include focal roles, co-specialization, co-evolution and co-opetition, interdependence, loosely coupled hierarchical structure, shared vision, system level business model and modularity [20]. Adner [1, p. 40] offers one definition for an ecosystem, that is both reasonably cited, and seems like a suitable metaphor for public administration: an ecosystem is *“the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize”*. In the public administration, diverse actors, i.e. state administration, civil service department, city officials and so forth come together, not to generate profit, but something of value - such as wellbeing of citizens. Similarly, [23] have identified three streams of ecosystems literature; business ecosystems stream, innovation ecosystems stream and platform ecosystems stream. While the first one centers on a firm in an environment and the second concerns an innovation or a value proposition among the constellation of actors supporting, the third discusses actors organized around a platform (ibid). So, the innovation ecosystems stream, discussing a focal value proposition, is focused on the system of service provision, not the individual enterprises.

As a structure, ecosystems can be interpreted in four nested and interrelated levels [40]: micro-, meso-, macro- and mega-level. At micro-level, service-for-service exchanges through actor-to-actor structures are allowed. Indirect interaction occurs at meso-level, involving actors in the same ecosystem. At the macro level, complex networks, such as institutional arrangements, arise, enabling or constraining activities at micro-, and meso-levels. Interdependencies between co-existing ecosystems occur at mega-level (ibid).

Ecosystems have been studied, to some extent, in the context of public administration and service provision. As an example, [9] show with a case study, that national health information system can be interpreted as an ecosystem, where public and private health care organizations act in meso-level, and the whole ecosystem represents a macro-level. Systemic stance on government EA is further discussed by e.g. [26], who examine the use of EAs in the Dutch public administration from a complex adaptive systems perspective. Based on the analysis of 11 cases, they derive eight architectural design principles, including development of modular architectures, stimulation of sharing and formation of coalitions. Further examples include the study by [37],

who discuss developing a government EA framework to support the requirements of big and open linked data with the use of cloud computing. [8] provides an overview on different types of ecosystems and their characteristics and proposes views for the modelling of ecosystems with insights to three aspects: goal modelling, ecosystem modelling and platform modelling.

3 Methods of Study

This study is part of a longitudinal research project, researching the implementation of the Finnish national enterprise architecture method (the whole project is reported in [46]). The research constituted of two rounds of interviews, and the data used in this research was collected from 26 semi-structured interviews during the summer 2017. The selection of interviewees was based on purposeful sampling [45] in order to capture variation in the data in terms of both assumed information intensiveness and stakeholder population. The interviewees were asked to sign a written informed consent and were allowed to discontinue participating at any given time of the study. Transcribed interviews were stored securely, and the results of the interviews are reported anonymously. Further, the questions were presented in a manner that excludes interviewer bias [34]. The interviewees represented stakeholders from different levels and sectors of Finnish public administration and IT companies, with representatives from state administration (4), administrative sector (3), civil service department (4), cities (5) as well as managers (5) and workers (6) from private IT companies. The interviewees had an average of 15 years of experience in EA-related activities, ranging from 3 to 40 years.

The interview questions were divided into four parts: questions of 1) background information of interviewees, 2) previous situations 3) current situation and 4) future of EA. The questions covered macro- and micro-level issues. The past- and future-related questions covered issues of FINEA and the interviewees' perceptions of how it has affected their own work. The current situation questions were different for the interviewees from the public and private sectors. The interviewees from the public sector were asked questions about EA in the organizations they represented, and the interviewees from the private sector we asked questions about their public sector client organizations. To enhance repeatability (i.e. reliability), example questions are offered in the Appendix.

The interviews lasted from 36 to 100 minutes, the average being 63 minutes. The interviews were audio recorded, and transcribed. The quotations were translated into English and edited for brevity, thus removing hesitations, words and such, which were not essential for overall understanding of the data. We conducted a thematic analysis consisting of six phases: familiarization, initial coding, search of themes, reviewing potential themes, defining and naming themes, and producing the report [11]. The coding was done with the ATLAS.ti software, using both inductive and deductive approaches. To minimize the impact of individual bias, all authors did participate in the analysis, although no intercoder reliability was tested.

4 Results

During the data analysis, we were able to form four major themes of importance: co-creation, capabilities, holistic view and needs-based utilization. Summary of the themes and their incidence by stakeholder groups is presented in Table 1. There were also minor themes that were mentioned only few times. Among them were interoperability, cost savings, EA framework, digitalization and governance. Next, we explain the meaning of the formed themes and illustrate them with excerpts from the interviews.

Table 1. Themes considered important in developing public sector ecosystem EA

Theme	State	Administrative sector	Civil service department	City	IT company manager	IT company worker
Capabilities	●	●	●	○	●	●
Co-creation	●	●	●	●	○	●
Holistic view	●	●	●	●	●	●
Needs-based utilisation	●	●	●	●	●	●

○ = not mentioned, ● = rarely mentioned, ● = occasionally mentioned, ● = frequently mentioned.

4.1 Capabilities

Capability concept was added in the latest FINEA version and is defined as combinations of: a) operations models and processes, b) employees and skills, and c) information and systems. Of these, the most mentioned in our data were resources that most often mean employees' time that they can use in EA. Interviewee from state government said: "Organizations should invest enough in it [EA], give enough resources, to see what the benefits in their own operations are". Without proper resources, the benefits will be modest. Skills and competence were also mentioned, and the interviewees emphasized both technical and business capabilities. While IT consultants mentioned capabilities often, the managers of the companies discussed capabilities only rarely. Moreover, while other public sector interviewees mentioned capabilities rarely or occasionally, city personnel gave no mention of this issue.

4.2 Co-creation

Co-creation has recently received a lot of attention in the public sector. In the beginning of the FINEA work, co-creation was quite unfamiliar. Especially, the stakeholders from civil service departments, cities and employees of IT companies have realized the value of co-creation in EA. A public sector representative said: "We have come far in ten years, and the need for co-creation has been recognized and under-

stood”. This theme constitutes of things like achieving a common understanding, communication, dialogue, co-operation and different kinds of groups for people doing EA. Senior specialist of a city describes their cross-sectoral operations: “We have got governance over the operations in our city. Without communication and forum, this work would be impossible. This is the biggest value.” In their city, EA is connected in the project management model and in the strategy. They have an EA group and architects do co-creation with operations personnel. Representative of another city mentioned that they do an operations model picture in cooperation with substance or process owner and this leads into understanding of what really needs to be done. When discussing about stakeholders and co-operation with private actors, one public sector representative stated that “[...] and then there are enterprises with which we have this ecosystem thinking. If we would not have mutual architecture, we could not have mutual and decentralized development.”. This viewpoint on co-operation was also shared by the private sector interviewees, one of which noted that: “I think that in public administration there is, at least to some extent, thinking of being this platform-type of platform for third party vendors and private actors”. Although many interviewees mentioned, that co-creation is of value, some felt that it has not been enhanced by EA: “The reality in cross-organizational cooperation seems to be more wretched than before and EA has not been able to bring anything to the table.”. Further, IT company managers gave no mentions about co-operation.

4.3 Holistic view

Holistic view is the big picture that comes through EA’s four viewpoints: information, business, information systems and technology. These four architecture domains are in FINEA framework and in many generally known EA models, such as TOGAF. Holistic view was the most often mentioned issue in our interviews. It was considered to have many benefits and potential uses, such as identify structures, understand different stakeholders, and help in co-operation, governance, risk management, and cyber security. Interviewee from the state government describes the idea well: “To be able to make a holistic view of this complex public administration and its functions that consists of different segments and their relationships. And to be able to give structure and understand different actors and co-operate with stakeholders. And the services and systems and to be able to form a holistic view, it helps in many ways in decision making [...] management [...] It has potential in this. And in my opinion, we need more of this [...] in this change in society [...] to make the complex whole simpler”. Another state interviewee continued, that: “We chose from the beginning to look public administration as a whole [...] it requires systematic and systemic thinking.” Further it was noted that “EA has been good in endorsing thinking of public administration as, in a way, one organization.”. Although the holistic view was recognized as one of the important aspects of EA, and public administration was regularly looked from this viewpoint, also organization-specific EA-work was valued: “On the other hand there are the things in common [in public administration], but also some that are organization-specific. It is kind of a buzzword, but there is an ecosystem.” When asked about different viewpoints of EA work in public sector, the state administration

interviewee noted that: “[we look at EA] rather in the macro-level. Of course, it is important to examine the architecture from the viewpoint on an organization. But we are more looking on what is shared in public administration [...] the strategic objectives of the whole-of public administration, at this moment, begins from digitalization and also from developing an ecosystems-model. We are developing the next version of the public administration enterprise architecture [...] it has been developed for a year with various stakeholders, and emphasis is on developing public, citizen-oriented services. It is about cost-efficiency, avoidance of overlapping and utilizing collected data at large”. Further, a private sector interviewee noted, that “The world is complex and always changing, these frameworks and their methods tend to age, and new ones are needed.”.

4.4 Needs-based utilization

There is a constant struggle to get enough resources for EA work and development work in general. This is the main reason why needs-based utilization came up in all stakeholder groups. Needs-based utilization is an important issue in successful EA in the public sector. If EA project starts without setting proper goals and understanding of the problem area, the result is often excessive modelling which is waste of resources. In Finland the FINEA is mandated by law, which has led to EA work that is done to fulfil regulations. Hence, motivation is a problem. Many interviewees saw needs-based utilization as a means to motivate and to help in setting relevant goals for EA. Interviewee from state administration noted that: “This is the most important thing in EA work, do not start without answering a couple of why questions...then things get easier, you do better EA and know redundant work”. According to interviewees, it is important to think what are the problems that need to be solved with EA work and then use the method as a tool. Interviewee from the administrative sector says: “[...] rigid EA work, where current and future states are modelled similarly, textbook like, it is a lot of redundant work. And we have modelled many things that are insignificant in the big picture.”

5 Discussion and concluding remarks

Enterprise architecture has been one of the leading ways of modelling the structures of an organization, and based on the interviews, one that currently is used. Still, the results of this study indicate that new ways of designing, developing and governing public administration are needed. In addition, new ways of interpreting government EA are needed - ones that can justify themselves in the world of growing complexity, speed of change and interrelations among actors. As prior noted, Finland introduced government EA in 2006 and has since 2011 mandated the use of EA in public sector organizations. In 2017, first drafts of ecosystems model for public administration EA were published, replacing the formerly used domain-based model. The former model was described as rigid, siloed, hierarchical and such that it does not enable cross-domain co-creation [41]. Further, the domain-based model is described to “*not repre-*

sent the reality, as actors form ecosystems instead of hierarchies" [41, p. 6], and being unable to foster the forming of ecosystems. Although the new ecosystems model may better enable successful EA work in the Finnish public sector, it does not discuss in detail, how EA work should be done, and which qualities are important for public sector EA to be successful. Based on our data, we argue, that Finnish public sector EA should foster holistic view, co-creation, needs-based utilization and capabilities as prominent possibilities to successful EA-work.

Interpreting public sector as an ecosystem might enhance successful implementation and usage of EA. While holistic view of an organization has traditionally been one of the key features of enterprise architecture, it can be argued that it is not altogether clear what holistic means in the government EA, or in different levels and sectors of public administration. As prior discussed, [16] looked into the problems and their root causes of EA in the public sector, one of these being minimum collaboration among agencies, an issue also mentioned as a problem in the domain-based model of FINEA [4141]. The idea of ecosystems is exploiting the resources and capabilities of different actors in a given time. As stated by [1], ecosystems are "the alignment structure of the multilateral set of partners that need to interact in order for a focal value proposition to materialize". Similarly, our results indicate that capabilities, needs-based utilization and holistic co-creation have a vital role in public sector EA work. If the public sector is interpreted as an ecosystem, government EA could be adapted in co-created projects where the capabilities of different actors are exploited in order to materialize a given goal. When EA projects are done when needed, and connect to a focal value proposition, a lot of unnecessary modelling can be omitted

In practice, extending the scope of EA to the level of ecosystems has been prior discussed by e.g. [12, 17, 43], and our results are in line with these studies. [17] discuss the stages from EA to Extended Enterprise Architecture, to Collaborative Network Enterprise Architecture and Focused Business Ecosystem Architecture and, finally, to Business Ecosystem Architecture These ideas are further discussed by [43], who enhance ideas of Drews and Schirmer and conclude with a tentative management model for the government ecosystem architecture, and [12] who, by discussing four case studies and identifying six architectural perspectives, offer an ecosystem architecture metamodel.

As prior noted, there were notable differences in terms of how often, if at all, the issues were mentioned by different interviewee groups. The city personnel did not mention capabilities and IT managers did not consider co-creation as a notable issue. Although, judging from the data, it is not evident, where these distinct differences come from, and especially, why the city personnel did not mention capabilities at all, some speculation is possible. In 2017, there was an ongoing trend of talking about capabilities in the context of EA, especially by some of the private sector EA consultants, which might have affected to the answers given by IT company workers. Also, Archimate is much used in the Finnish public administration, it is the recommended notation in FINEA. Capabilities as elements were introduced in Archimate 3.0, and were added to FINEA in spring 2017, just before our interviews. It might be possible that private sector interviewees were more familiar with the concept than those working in cities. State personnel might have been familiarized with the concept while

working with the new versions of FINEA. This may also reflect the different maturity levels of capability driven EA design in public and private organizations. As for the lack of discussion on co-creation by the IT company managers, less can be speculated. The differing opinions between private and public sector interviewees, as well as differences between public sector personnel are important, and should be further studied in a separate study. In an effort to contribute to stream of studies on public sector EA, as well as those discussing developing EA to be better utilized in ecosystemic environments, we answered the following research question: “How enterprise architecture should be developed to better support Finnish public sector ecosystems?”. We concluded that while EA is widely used in the public sector, new ways of designing, developing and governing public administration EA are needed. Our interviewees, 26 professionals from different levels of Finnish public and private sectors, recognized organizational capabilities, holistic view, co-creation and needs-based utilization as important factors in government EA. Based on the results, we propose the following guidelines to be used in the public sector ecosystem EA:

- EA work utilizes capabilities of organizations’ participating in the ecosystem
- Development work is done in co-creation mode
- Partners of the ecosystem form a holistic view
- EA modelling is utilized needs-based

The aim of the ecosystem is to create value to participating partners and citizens. This contradicts the traditional view of EA, as a structure of one organization. Instead the EA in ecosystem is based in the interrelationships and interactions of the participating organizations. We argue, that EA should be further developed with these thoughts in mind.

This study mainly concerns public sector EA in Finland, and the interviewees were based on a single country. Therefore, different aspects might be emphasized elsewhere, and there might occur differing opinions concerning important and redundant qualities of EA. As discussed, EA is used in public sector internationally, and is also mandated by law in some countries other than Finland. Although the findings of this study may have significance in other contexts, more research is definitely needed, for example in other countries. Especially constructive studies, as well as case studies, forming and testing new ways of conducting EA, would be valuable. Further, some features of EA in public administration ecosystem are probably common also in the private sector. The generalizability of our results in wider contexts is hopefully to be validated by future research.

Appendix

For background information we asked for interviewees: name, organization, job description, duration of work in EA field. We also asked them to describe their EA work and their viewpoint to EA work (government-as-a-whole or own organization). Second, we asked backward questions:

- What do you think about the public sector EA method?
- Have you used the method in your work?

- The results of the interviews ten years ago included 1. implementation ability and governance, 2. structures of government and 3. advancement of interoperability as key challenges. In your opinion, are these still challenges?
- Has EA work increased cross-sectoral co-operation?
- Are you familiar with the law that mandates the use of EA? Has the law affected EA work?
- Ten years ago, there was not a mutual understanding about what EA means and what are the main goals of the EA work. In your opinion, is there currently a mutual understanding?

Third, we asked about current EA work:

- Is EA work done in your organization/client-organization? Why/why not?
- What kind of strategic goals are set for EA work?
- What are the stakeholder groups of EA?
- In your opinion, what is important in EA work?
- In your opinion, what is redundant in EA work?
- What is learned from EA work?
- How does EA support the digitalization of the public sector?

Fourth, we asked about the future of EA:

- What are the next steps of EA work in your organization/client-organization?
- How should the EA method be further developed?
- How information security should be noticed in forthcoming co-operation and public information systems?
- In your opinion, what kind of future EA work has in public sector?

Last, we asked: Is there something you would like to add?

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