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Teemu Lappi

DIGITALIZING FINLAND: GOVERNANCE OF GOVERNMENT ICT PROJECTS

UNIVERSITY OF OULU GRADUATE SCHOOL;
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FACULTY OF TECHNOLOGY

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TEEMU LAPPI

DIGITALIZING FINLAND: GOVERNANCE OF GOVERNMENT ICT PROJECTS

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Abstract

Digitalization is a megatrend that also drives public sector reforms toward improved citizen service processes by adopting digital technologies. The digitalization of the public sector, also referred to as e-government transformation, is a strenuous institutional change process that starts with strategy and policy formation and is eventually carried out through individual information and communication (ICT) development projects and programs. ICT projects in the public sector still struggle due to challenges and complexities such as technological uncertainty. These project-level struggles impair e-government efforts that are already facing strategic and regulative difficulties, which, again, affect ICT project performance. How a temporary project is connected and contributes to the strategic objectives of a more permanent structure is the focus of project governance. In e-government context it can be applied to describe and elaborate on the ICT project alignment and control practices in and between different organizations within the e-government transformation.

The underlying academic motivation for this research is to improve the current understanding of project governance in e-government: how ICT project governance can be applied to enact the institutional change of public sector digitalization. The dissertation study follows a constructive research approach, using multiple qualitative methods on empirical data from the Finnish central government. By synthesizing the results from four individual research publications, this dissertation explores the ICT project governance practices and tensions that take place in different levels within the e-government transformation. The study contributes to the literature by elaborating how project governance is perceived in and affected by the e-government transformation and by providing new information on how flexible and collaborative project models, namely agile models and project alliances, are applied in the context. The dissertation proceeds to construct a multi-level model that indicates how the perceived challenges and tensions could be remedied, thus enabling managers and practitioners in the field to conduct the right ICT projects properly and, hence, support the e-government transformation.

Keywords: Agile, digitalization, e-government, ICT project, institutional change, project alliance, project governance, public sector

Lappi, Teemu, Suomen digitalisoituminen: Valtionhallinnon ICT projektihallinto.
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Tiivistelmä

Digitalisaatio on yksi megatrendeistä, joka vaikuttaa myös julkisen sektorin reformaatioihin, joilla tavoitellaan tehokkaampia asiakaspalveluprosesseja hyödyntämällä digitaalisia teknologioita. Julkisen sektorin digitalisoituminen, tai e-hallinnon muutos, on vaativa institutionaalinen muutosprosessi, joka alkaa strategisten ja poliittisten linjausten määrittelyllä ja toteutetaan lopulta yksittäisten informaatio- ja kommunikaatioteknologia (ICT) projektien ja ohjelmien kautta. Julkisen sektorin ICT projekteja haastaa edelleen muun muassa tekniset epävarmuustekijät. Nämä projektitason haasteet vaikuttavat myös e-hallintoon, johon liittyy jo valmiiksi strategisia ja hallinnollisia vaikeuksia. Tämä taas vastavuoroisesti vaikeuttaa yksittäisten projektien toimintaa. Projektihallintoa käytetään kuvaamaan, miten kertaluontoinen projekti liittyy ja vaikuttaa pysyvämpiin rakenteisiin ja niiden strategisten tavoitteiden toteutumiseen. E-hallinnon digitaalisen muutoksen yhteydessä projektihallinnon kautta voidaan esittää ICT projektien ohjaus- ja kontrollointikäytäntöjä eri organisaatiotasoilla.

Tämä tutkimuksen akateeminen motivaatio on parantaa nykyistä tietämystä projektihallinnosta e-hallinnon kontekstissa tarkastelemalla, miten ICT projektihallintoa voidaan käyttää julkisen sektorin digitalisoitumisen toteuttamiseen. Tämä väitöstyö noudattaa konstruktiivista tutkimusotetta, käyttäen useita laadullisia menetelmiä Suomen valtionhallinnosta kerätyn empiirisen datan analysointiin. Syntetisoimalla neljän osajulkaisun tulokset tämä väitös perehtyy ICT projektihallinnon käytänteisiin ja jänniteisiin eri organisaatiotasoilla digitalisoitumisen yhteydessä. Tämä väitös tuottaa uuttaa tietoa esittämällä, miten projektihallinto näyttäytyy ja vaikuttaa e-hallinnon muutoksessa, sekä kuvaamalla miten joustavia projektimalleja, kuten ketterä ja projektialliansi, voidaan käyttää tässä kontekstissa. Väitöstutkimus luo lisäksi monitasoisen mallin, jonka avulla havaittuja haasteita ja jännitteitä voidaan lieventää. Täten tutkimus auttaa käytännössä alan asiantuntijoita johtamaan oikeita ICT projekteja oikealla tavalla ja siten edesauttaa julkisen sektorin digitalisointia.

Asiasanat: digitalisaatio, e-hallinto, ICT projekti, institutionaalinen muutos, julkinen sektori, ketterä, projektialliansi, projektihallinto

All that is gold does not glitter,
Not all those who wander are lost
– J.R.R. Tolkien

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This dissertation is a product of a Long And Windy process that has perhaps been followed by yours truly but been made possible by many people and factors – even mechanisms, one might say. What started out in 2015 as a vague wish to "do something else for a while" turned into a personal Whiplash of pushing my limits. These have by no means been Wasted Years, even though in this case the Catch Was Better Than The Chase. Already in the beginning I occasionally felt if I really Can Play With Madness and many moments have since been spent Wandering and writing Under Pressure, or being Paranoid about the peculiarities of this Strange (academic) World. On the other hand, I had the privilege and joy to share and reflect my experiences and insights with my peers and during lessons with the students as well, which made it so much more rewarding. But this Journeyman made the Breakthru, with a Little Help From My Friends, and now it's not time for Noose or Mourn, but for No More (writer's) Tears, Absolution and Celebration Day!

My first and deepest appreciations go to my supervisor, associate professor Kirsi Aaltonen. Like A Spiral Architect you turned me into the "researcher" I am today by offering me constantly the Patience, help, insight and guidance of an academic Wizard. Without you I would have fallen Into The Void and this work would still be at Year Zero. Likewise, my other supervisor and executive, professor Jaakko Kujala – your Cornucopia of reassuring calmness, support and ping-pong Bombers Kept My Train A'Rolling. Many thanks to my other co-authors or Partners In Crime Teemu K, Lucy and Pasi. Official thanks go out also to associate professor Magnus Hellström for acting as the opponent in my defense Trial By Fire, and to professor Tomas Blomquist and Dr. Päivi Parviainen for your valuable pre-examination comments through the Eyes Of The Beholder. Money Talks also in academic research, so I'm a very grateful for the financial support provided by Tauno Tönningin Säätiö, Emil Aaltosen Säätiö and Tekniikan Edistämissäätiö.

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My relatives near and far away (especially my grandma Eila and host father Robert “Bob” Davis who passed away during this process – Rest in Peace), and Friends Who Will Be Friends kept rooting me Down To Earth instead of escaping to the Empire In The Clouds – Thank You a thousand times and *Sláinte!* Besides the excellent and modest genes, my Father (Christmas/Time) Timo and Mother Ritva have provided me with a solid, loving, and common-sense home and upbringing, and have constantly supported me during my entire (not-so) Still Life. Words cannot express the love and Gratitude I have for you for all what you are and have done. Furthermore, and equally without words for the same reasons, my Brother (In Arms), Dr. Rock Tuomas! You, Iron Man, have truly kept me safe from Fear Of The Dark and shown me The Thrill Of It All – Love you bro and Ride On! Ilmari and Tuuli, My Little Man and Cinnamon Girl, you are the Love Of My Life and my Centre of Eternity: You have taught me more about myself and life in general than any academic institution or work ever can. Finally, my wife Aino. Woman Of The World, Lady In Black, Free Bird and My Best Friend: We have Walked This Way, been between The Rock And A Hard Place, and gone Through The Never and quite some Changes, but It Was, is and will be Worth It All. I Love You All I Can. Forever.

Up the Irons, I Salute You!

In Oulu, April 30th, 2019 Teemu Lappi

Abbreviations

CIO	Chief Information Officer
EA	Enterprise Architecture
E.g.	Exempli gratia
Etc.	Et cetera
I.e.	Id est
ICT	Information and Communication Technology
JUG	Joined-Up Government
JulkICT	Julkisen hallinnon ICT (Finnish), Public sector ICT (department)
LIVI	Liikennevirasto (Finnish), Finnish Transportation Agency
MML	Maanmittauslaitos (Finnish), National Land Survey of Finland
NPM	New Public Management
PMO	Project Management Office
PPM	Project Portfolio Management
RQ	Research question
TEF	Technology Enactment Framework
VM	Valtionvarainministeriö (Finnish), Ministry of Finance

Original publications

This thesis is based on the following publications, which are referred to throughout the text by their Roman numerals:

I Lappi, T., & Aaltonen, K. (2017). Project governance in public sector agile software projects. *International Journal of Managing Projects in Business, 10*(2), 263-294.

II Lappi, T., Karvonen, T., Lwakatare, L. E., Aaltonen, K., & Kuvaja, P. (2018). Toward an improved understanding of agile project governance. *Project Management Journal, 49*(6), 39-63.

III Lappi, T., Aaltonen, K., & Kujala, J. (2019). Project governance and portfolio management in government digitalization. *Transforming Government: People, Process and Policy, Ahead-of-print*(Ahead-of-print).

IV Lappi, T., Aaltonen, K., & Kujala, J. (2019). The birth of an ICT project alliance. *International Journal of Managing Projects in Business, 12*(2), 325-355.

Three of the articles (I, II and IV) have been published in journals, and one (III) has been published online in the journal website ahead of print. All four articles have gone through a double-blind review process. The author of this dissertation has been the primary author in all the of the original publications. In Publications I, III, and IV, the researcher, as the primary author, was responsible for defining the research problem, reviewing the relevant literature, formulating the research questions, acquiring the empirical research data, analyzing the material, drawing implications, and writing the report. In these articles the role of the co-authors included supporting the empirical data acquisition and analysis, contributing to the literature background, and reviewing and commenting on the article manuscripts of the first author. In Publication II, the researcher was initially responsible for formulating a research proposal as requested by the journal, which included a draft for research design and assembling a multi-disciplinary research team. In the research execution and reporting process that lead to Publication II, the researcher was responsible for managing the research team toward agreeing on the research problem and question definition, research method selection, source data and sample selection, data review and analysis, and results synthesizing. The co-authors' roles included supporting the research designing, source and sample selection, data review, and contributing to the literature background, whereas the researcher, as the main author, was responsible for writing the introduction, research process, and consolidating and writing the results, discussion and conclusion parts, and finalizing and processing the article through the reviews.

Contents

Abstract
Tiivistelmä
Acknowledgements **9**
Abbreviations **11**
Original publications **13**
Contents **15**
1 Introduction **17**
1.1 Background and research environment ... 17
1.2 Objectives and scope ... 21
1.3 Research approach and position ... 24
1.4 Research process and dissertation structure ... 28
2 Literature foundation **35**
2.1 Public sector digitalization ... 38
2.1.1 Digital transformation ... 39
2.1.2 E-government: Concept, models and implementation ... 41
2.2 Project management ... 50
2.2.1 Agile project management ... 51
2.2.2 Project alliances ... 55
2.2.3 Project portfolio management ... 60
2.3 Governance ... 63
2.3.1 Governance in institutional change ... 65
2.3.2 Project governance ... 68
2.4 Synthesis of literature foundation ... 76
3 Results and research contribution **81**
3.1 RQ1: How project governance practices affect agile projects in public sector ... 81
3.2 RQ2: What is agile project governance ... 87
3.3 RQ3: How government digitalization strategy and ICT projects are connected? ... 93
3.4 RQ4: How project alliance model is applied in the ICT field ... 96
3.5 Result synthesis ... 101
4 Discussion **109**
4.1 Theoretical contributions ... 109
4.1.1 Contributions to public sector digitalization and e-government literature ... 109

4.1.2 Contributions to project and portfolio management literature 111
4.1.3 Contributions to governance and institutional change literature 115
4.2 Practical implications 119
4.2.1 Perceived tensions and proposed remedies 120
4.2.2 Proposed construct implications 125
4.3 Evaluation of the research 126
4.4 Recommendations for further research 130
List of references **133**
Original publications **153**

1 Introduction

1.1 Background and research environment

Digital transformation, or digitalization, is one of the global megatrends that drive private—and public sector—organizations' reforms through the adoption of information and communication technology (ICT) solutions to optimize operations and provide better services to customers—or citizens (Matt, Hess, & Benlian, 2015; Parviainen, Tihinen, Kääriäinen, & Teppola, 2017). In the public sector, the national digitalization effort is a strenuous process that starts with strategy and policy formation and is eventually carried out through ICT development projects and programs (Anthopoulos & Fitsilis, 2014), ranging from a simple agency-specific online portal to vast, multi-organizational operations management systems. The costs and benefits of public sector digitalization are very significant. In Finland, for example, the value of ongoing ICT development projects in both state and municipal organizations was estimated at two billion euros in 2015, and the annual ICT expenditure of the state government alone in 2016 was 780 million euros, or 1.43% of the gross domestic product. These figures alone draw public interest towards the e-government transition, but the considerable societal impacts, such as reduced bureaucracy and electronic service process emphasis, also increase the importance of this strategic transformation process, also referred to as e-government, in the eyes of citizens (Beynon-Davies, 2007; Karunasena & Deng, 2012; Layne & Lee, 2001).

Individual ICT projects in the public sector still struggle to perform due to organizational, managerial, and technological challenges and complexities (Brunet & Aubry, 2016; Janssen & Klievink, 2012; Walser, 2013; Wirick, 2011). These project-level struggles and tensions -competing demands, conflicts, contradictions and dilemmas (Smith, Erez, Jarvenpaa, Lewis & Tracey, 2017) - logically impair e-government efforts, which already face difficulties in succeeding on a higher, national level. These higher level difficulties, such as digitalization strategy formation, stakeholder and citizen inclusion, or applicable regulations and policies, also impact individual ICT projects, thus yielding a vicious cycle between the lower level projects and higher level public sector digital transformation (Anthopoulos, Reddick, Giannakidou, & Mavridis, 2016; Pedersen, 2018; Weerakkody, Irani, Lee, Osman, & Hindi, 2015). However, while project management research has characteristically been driven by conceptualizations of project success and

performance, empirical research has focused on failures and challenges (Ika, 2009; Jugdev & Müller, 2005; Pinto & Mantel, 1990). Especially in the e-government context of this dissertation (Anthopoulos et al., 2016; Kappelman, McKeeman, & Zhang, 2006; Walser, 2013), it is important to note early on that there are also several studies on success stories that provide evidence of factors that enable both public sector ICT project performance and e-government transformation. Collaborative and flexible project methodologies that embrace uncertainty and the inclusion and empowerment of all project contributors and benefactors are also proven to improve the performance and success of ICT projects in the public sector (Berger, 2007; Cecez-Kecmanovic, Kautz, & Abrahall, 2014; Misra, Kumar, & Kumar, 2009; Rosacker & Olson, 2008). Successful e-government transitions, on the other hand, are known to benefit from elements such as clear policy-making and leadership processes, a national architecture and other technological factors, and distinguished change management competencies (Altameem, Zairi, & Alshawi, 2006; Melin & Wihlborg, 2018). Generally, connecting a project and its contributions with an organization or its strategic objectives is the focus of project governance (Ahola, Ruuska, Artto, & Kujala, 2014; Joslin & Müller, 2016; Müller, 2009). In e-government, project governance can be applied to describe and elaborate on the connections and interactions between an individual ICT project that takes place on the operational level, and the higher, government and parliamentary, level strategic transformation process: public sector digitalization (Altameem et al., 2006; Brunet & Aubry, 2016; Fedorowicz, Gelinas, Gogan, & Williams, 2009).

The project management research stream is rich with a long period of studies on the characteristics, managerial practices and mechanisms, and contextual elements of single projects. However, only relatively recently has project governance, "the management of project management," gained enough attention in its conceptualization and focus from practitioners and academics alike (Garland, 2009; Müller, 2009; Project Management Institute, 2013; Too & Weaver, 2013; Turner, 2006). Project governance comprises the project delivery-related value systems, responsibilities, processes, and policies for enabling and empowering project organizations to execute projects and requiring assurance to monitor, control, and steer the project towards objectives (Joslin & Müller, 2016; Oakes, 2008). These elements and objectives of project governance connect the operational and strategic levels, i.e., temporary project organization and permanent organizational structures (Lundin, Söderholm, & Soderholm, 1995; Too & Weaver, 2013), and are performed through project-specific functions such as the Project

Management Office, which oversees project management and delivery capability (Too & Weaver, 2013; Unger, Gemünden, & Aubry, 2012), and Project Portfolio Management, which aims at the alignment, resource balancing, and value maximization of all projects (Meskendahl, 2010; Müller, Martinsuo, & Blomquist, 2008).

Until recently, project governance research has mostly been conducted in the context of traditional projects developed linearly and in project-based industries that rely on formal planning and control, such as infrastructure and construction projects (Reve & Levitt, 1984; Sanderson, 2012; Turner, 2006). However, the ICT projects that constitute an e-government transition are typically subject to fast-evolving technological and methodological complexities and uncertainty in project objectives, which causes tension between the project and owner organization, thus challenging the traditional plan-oriented project governance approaches. On a project level, software engineering practitioners have introduced agile methodologies to embrace change and uncertainty by relying on the iterative development of project deliverables (Fowler & Highsmith, 2001; Misra et al., 2009). Similarly, on an organizational level, the construction field has introduced different joint and integrated project delivery models that emphasize collaboration and transparency, such as the project alliance (Fernandes, Costa, & Lahdenperä, 2017; Lahdenperä, 2012). The first ICT project alliance known to research was introduced in Finland in 2016, which is rather curious since combining the agile methodologies with the project alliance model could have been justified already earlier by the shared underlying values and objectives of these approaches (Hobbs & Petit, 2017; Jefferies, Brewer, & Gajendran, 2014). Such novel, vanguard projects are also known to drive changes within and across industry fields and institutions (Frederiksen & Davies, 2008). There are still limits to our understanding of how project governance broadly affects the performance of different project types and how project governance practices and mechanisms take place within an e-government context, especially as a vertical process across organizational levels (Snead & Wright, 2014). Additionally, knowledge of how institutions such as the public sector adopt practices from different fields (e.g., the transfer of the project alliance model from the construction industry to ICT) can still be enriched for the benefit of transformation.

E-government research and discussion is founded on public sector reforms, such as New Public Management and Joined-Up Government (Arnaboldi, Azzone, & Savoldelli, 2004; Young & Grant, 2015), and has focused on the conceptualization and evaluation of public sector digitalization as a large entity.

Evaluations such as different maturity models define normative criteria for technological and organizational elements that should be met on each progress level. For example, the classic maturity model by Lee and Layne (2001) illustrates a stage-like model based on integration and complexity that starts from simple catalogs and ends in complex horizontal integration. Consequently, the following models have added more descriptive and elaborative elements, such as e-democracy as the most mature stage (Andersen & Henriksen, 2006; Asgarkhani, 2005). Discussion of e-government have focused primarily on different organizational and technological structures that describe, for example, the main architecture and data flow between functions, systems, and layers (Irani, 2005; Nograšek & Vintar, 2014) and the associated organizational interfaces (Cordella & Tempini, 2015; Fedorowicz et al., 2009). The e-government transformation is also mostly perceived as a strategic-level, institutional change process (Luna-Reyes & Gil-Garcia, 2014; Omar, Weerakkody, & Sivarajah, 2017). Finland has performed well in international e-government evaluations and is considered one of the top countries in adopting digital and online solutions and services (Vainio, Viinamäki, Pitkänen, & Paavola, 2017). Regardless of these accolades, however, Finland has also received critique on the strategy formation and governance of public sector digitalization (OECD, 2014; United Nations, 2018). Though some of the most recent research has identified the role of governance in e-government implementation (Melin & Wihlborg, 2018), information is still limited regarding the micro-level practices and processes of project governance and how they can be applied within and across different organizations and levels to ensure more effective ICT projects in public sector digitalization. The Finnish Ministry of Finance (VM) introduced PPM in 2012 to consolidate central government ICT projects, but its impact and utilization have not been analyzed properly.

To summarize the academic motivation for this dissertation, it is still necessary to improve the current understanding of project governance in public sector digitalization; How to do the right ICT projects the right way and how this contributes to the efficiency and effectiveness of e-government transformation. From a more detailed, managerial perspective, our understanding of project governance on different public sector organizational levels—the strategic governance level, the middle management level, and the operational project level—can still be increased by exploring and explaining through a construct or model how project governance practices change and connect between these organizational levels in the digital transformation process and what kind of internal and external tensions are involved. The societal motivation can be described freely by stating

that taxpayers will want to know how the elephant is eaten since they are paying for it.

1.2 Objectives and scope

The purpose of this dissertation is to explore the project governance practices that are applied to ICT projects on different public sector organizational levels, to highlight the challenges and tensions that affect the projects and their governance, and to propose a solution construct to these challenges. By exploring a unique empirical setting, the Finnish national digitalization, and analyzing research data acquired from it, this study aims to answer the following problem: *What are the governance practices and tensions that affect ICT projects in public sector digitalization?*

In order to address this problem better, the dissertation focuses on four different research questions (RQ):

RQ1: How do project governance practices affect agile projects in the public sector?

RQ2: What is agile project governance?

RQ3: How are government digitalization strategies and ICT projects connected on and between different organizational levels?

RQ4: How is the project alliance model applied in the ICT field?

These RQs are encompassed in four original research papers that constitute the body of this dissertation. An overview of the research papers and their connection with the abovementioned RQs are presented below in Table 1.

Table 1. Research paper overview.

Publication	RQ#	Publication title	Journal
I	1	Project governance in public sector agile software projects	International Journal of Managing Projects in Business
II	2	Toward an improved understanding of agile project governance	Project Management Journal
III	3	Project governance and portfolio management in government digitalization	Transforming Government: People, Process and Policy
IV	4	The birth of an ICT project alliance	International Journal of Managing Projects in Business

Three (I, III, and IV) of the publications are based on empirical studies that elaborate public sector ICT project governance through agile, project alliance, institutional theory, and project portfolio management (PPM) perspectives. One publication (II) is a conceptual paper on one specific governance topic: agile project governance. The dissertation study highlights the project governance practices and tensions affecting individual ICT projects and the consequent digitalization effort by synthesizing the contributions of the individual research papers. By elaborating on the results with relevant literature on governance, project management, and e-government, this dissertation study proceeds to construct a multi-level model that indicates how perceived gaps and tensions could be managed better. The progress of the research and the connections between RQs and contribution is provided below in Figure 1.

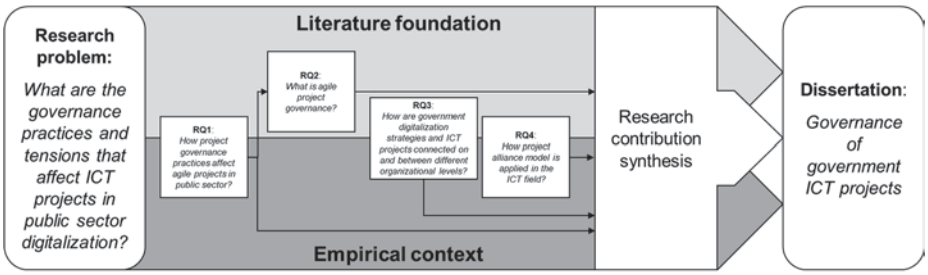

Fig. 1. Research framework.

The empirical context of this dissertation is the digitalization of the Finnish public sector. The Finnish public administration organization consists of the highest bodies of the state, central government, self-governed municipalities and church institutions, indirect state administration, and the autonomous Åland island. The central government covers twelve ministries under elected ministers and with various branch related agencies and both regional and local state administration offices, such as the Centers for Economic Development. Municipalities are self-governed and are responsible for regional municipal administration and cooperation, in addition to local state administration. Indirect state administration supports and complements the official duties of the country's public administration with independent institutions such as universities, the Bank of Finland, and publicly traded corporations. The national public sector digitalization initiative and governance is appointed by law to the Ministry of Finance (VM) with the following mission statement:

> "The Ministry of Finance steers the development of information management in both central and local government, supported by the Act on Information Management Governance in the Public Sector. The task of the Ministry of Finance is the general steering of public sector agencies' information management in accordance with the Act." (VM, 2018)

The scope of this research is the central government sector (Figure 2) as organizational position of VM is there and the access to research data from there was established. More specifically, this research focuses on the vertical axis between the parliament and agencies under the ministries' administrative sector, since the individual ICT projects are conducted mostly by and within the agencies and ministries, but the governance structure reaches the highest levels of the state.

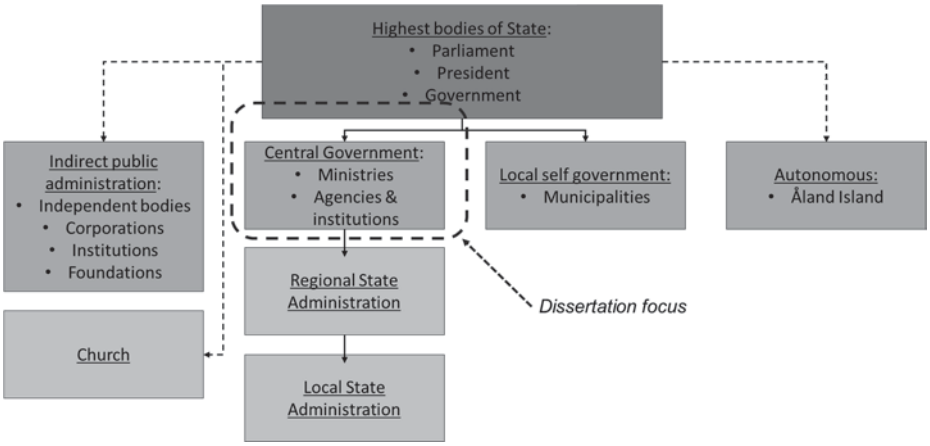

Fig. 2. Empirical context and focus of the dissertation.

The dissertation bridges topics from three literature streams. Literature covering project governance can be found mostly in organizational, project management, governance, and administration research fields. The dissertation contributes to this literature by elaborating the contextual elements of e-government and public sector digitalization, and by providing new information on how different project models and approaches, namely agile project management and project alliances, interact with project governance. By introducing explicit project governance models and vertical processes that connect individual ICT projects with public sector digitalization, this dissertation also contributes to the e-government literature. Though in this dissertation ICT is considered more as a contextual element than an

explicit literature stream, ICT research also benefits from this study as one specific contribution is the introduction of project alliance model to the ICT field. Finally, by analyzing the practices and tensions of project governance that affect the performance of ICT projects, especially but not exclusively agile project management and project alliances, the dissertation contributes to project management literature.

1.3 Research approach and position

The purpose of this research is to explore ICT project governance practices within a unique empirical setting and to propose a construct as a possible solution to meet the implied challenges and tensions. This objective requires an understanding of the subject context and phenomenon, based on which concepts and propositions are drawn in terms of their meanings and interpretations. These elements combined suggest a qualitative approach (Denzin & Lincoln, 2005; Eriksson & Kovalainen, 2016; Ketokivi & Choi, 2014). The objective of qualitative research is to 1) describe the studied phenomenon—public sector digitalization, 2) understand its underlying functions and mechanism—the project governance practices, and 3) to offer theoretically reasonable explanations of the phenomenon (Denzin & Lincoln, 2005; Eriksson & Kovalainen, 2016). Publications I, III, and IV form the foundation for this dissertation's qualitative approach through description and theoretical explanation of the public sector digitalization phenomenon, and publication II complements this by offering an in-depth understanding of the underlying functions of project governance. However, as the dissertation proceeds to offer an extended contribution by constructing a model that implies possible solutions to the explained empirical findings, the compilation part of this dissertation applies a constructive approach (Oyegoke, 2011; Piirainen & Gonzalez, 2013). The objective of constructive research is to apply knowledge to construct normative solutions to social and scientific problems (Kasanen, Lukka, & Siitonen, 1993; Oyegoke, 2011). A design science approach has strong synergies with a constructive approach and is especially used in information systems studies, which would also fit the context and purpose of this dissertation (Holmström, Ketokivi, & Hameri, 2009; Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007; Piirainen & Gonzalez, 2013). Both constructive and design science approaches aim at practically solving real-life problems in empirical environments through novel constructs. However, a constructive approach aims more at theoretical contributions based on existing knowledge, and design science emphasizes the

rigor of construct validation (Holmström et al., 2009; Kasanen et al., 1993; Oyegoke, 2011; Piirainen & Gonzalez, 2013), which makes a constructive approach more suitable for this dissertation.

There are always philosophical perspectives to doing any research. Even though the social researcher has perspectives and positions toward the research phenomenon or problem, the researcher must consider, for example, ontological, epistemological, and methodological elements since these directly impact the nature of the knowledge produced by the research and the process through which it was produced (Guba & Lincoln, 1994; Lancaster, 2005; Saunders, Lewis, & Thornhill, 2016). A researcher's position and beliefs toward reality itself and how the research object is perceived is referred to as ontology (Bryman & Bell, 2007; Saunders et al., 2016), and how the knowledge of this reality is produced is referred to as epistemology (Eriksson & Kovalainen, 2016; Guba & Lincoln, 1994). The approach toward these philosophical concepts laid the foundation for the abovementioned research purpose, and they were applied to direct the research process and to construct the research questions. The practical execution of the research, in order to develop valid knowledge, is the subject of methodology and it is discussed in detail in the next section.

Ontology provides the research pre-conceptions of the reality through which the studied phenomenon can be perceived and determines whether the reality is subjective or objective (Bryman & Bell, 2007; Guba & Lincoln, 1994). The subjectivist perception of ontology is that social phenomena and their meanings are continuously shaped by individual actors who view the phenomena subjectively. In subjectivist ontology, reality is thus derived from the perceptions of social actors (Bryman & Bell, 2007; Saunders et al., 2016). The objectivist end of the ontology axis perceives social reality as external to actors, i.e., the interpretations and experiences of social actors alone do no influence reality (Saunders et al., 2016). The subjective-objective axis is not exclusive but has complementary aspects of reality that can be situated between them; for example, social constructivism, or intersubjectivism (Cunliffe, 2011), approaches reality as being constructed through social interactions that can yield partially shared meanings among them, thus moving towards the objectivist end of the axis. Pragmatism perceives reality from a more singular (subjective) perspective with a notion that concepts are relevant only when they support action (Saunders et al., 2016). The publications of this dissertation view project governance as a concrete structural framework for safeguarding, controlling, and empowering practices and processes both internal and external to the temporary project organization, as proposed by, for example,

Ahola et al. (2014) and Too and Weaver (2013). Therefore, the ontological approach of the Publications can be perceived closer towards objectivism (Cunliffe, 2011) and as the dissertation compilation has a strong practical motivation to support improvement actions within a social setting, the dissertation itself leans more towards *pragmatism* ontology.

Epistemology provides the social research means to consider the form and acceptability of the knowledge; i.e., it seeks to answer questions such as "What is knowledge?" and "How do we gain it?" (Denzin & Lincoln, 2005; Saunders et al., 2016). Similarly to ontology, the epistemological philosophy of research or a researcher is generally viewed on an axis that has positivism on one end, and interpretivism on the other. Positivist epistemology is founded on natural sciences and states that only the knowledge and phenomena that can be confirmed objectively through senses can be considered knowledge. Interpretivist epistemology takes into account the notion that social sciences and phenomena differ from natural sciences, and therefore subjective, interpretative studies of the phenomena and subject matter are possible and even preferred (Bryman & Bell, 2007; Saunders et al., 2016). Positivism is consequently associated with objectivism, whereas subjectivism is with interpretivism (Eriksson & Kovalainen, 2016; Guba & Lincoln, 1994). As project governance and project management research lay in the field of social rather than natural science (Morris, 2013), it would be convenient to state that this dissertation leans towards interpretivism. However, as the reality of the research phenomenon, project governance practices, is concrete and not dependent on the interpretations of social actors' perceptions as much on the contextual and situational conditions, the more suitable epistemological position is *critical realism*, which is situated toward positivism (Eriksson & Kovalainen, 2016; Saunders et al., 2016) and is also the underlying epistemological position of the constructive research approach (Oyegoke, 2011).

There are also other philosophical elements to research that can be considered, such as hermeneutics and phenomenology, which discuss the connection between the researcher, knowledge, phenomenon, and context. However, as good qualitative research can be carried out even without in-depth contemplation (Silverman, 2015), these terms are not discussed further than acknowledging the subjectivity of the researcher, which is considered when assessing the results and contributions of this dissertation research (Denzin & Lincoln, 2005; Eisenhardt, 1989b; Guba & Lincoln, 1994; Kasanen et al., 1993).

Besides approaching the dissertation and knowledge produced exclusively through philosophical perspectives, it is also worth positioning the research among

others in the field based on the approach and purpose. Kasanen et al. (1993) proposed a framework that categorizes research based on whether the purpose is a theoretical or empirical contribution and whether the approach is descriptive or normative. Based on the defined objectives and strategy, this constructive research dissertation compilation is located in the empirical and normative corner of this framework (Holmström et al., 2009; Kasanen et al., 1993), while Publications I, III, and IV are empirical and descriptive. Publication II can be considered theoretical and descriptive, even though the source data of the systematic literature review is drawn from empirical studies. A more project study-specific and descriptive approach was provided recently by Geraldi and Söderlund (2018) that draws from Habermas's (1972) theory of knowledge-constitutive interests and complements it with a spectrum of analyses. The resulting framework has three levels to address the scope of the study, meso (society, organization), macro (project), and micro (individual/team); three types based on the Habermas' interests; and three on the understanding, empirical setting, and practical implications of the project study at hand. A Type 1 study has a technical interest in the project, perceives it as a controllable object, and produces prescriptive impacts, while Type 2 understands the project as an intriguing phenomenon and provides descriptive implications through the lived experiences. Finally, a Type 3 study has an emancipatory interest in projects as contemporary phenomena and aims to change the status quo through theoretical and practical implications. Drawing from this typology, Publication I can be considered a Type 2: Project study, as it contributes to the understanding of agile projects in the public sector. Publication II is a Type 1: Project / Team study and contributes to project studies by improving agile project governance practices on a project and team level. However, as the projects are consciously agile and not randomly selected, this would also justify classifying it as a Type 2: Project. The purpose of understanding the organizational and contextual perspective on PPM suggests that Publication III is a Type 2: Organization, whereas Publication IV is clearly a Type 3: Project, being a conscious single-case study that introduces the ICT project alliance. The dissertation itself is challenging to position due to using both qualitative and constructive approaches, and the results contribute to understanding and imply improvement actions on project and organization levels. However, as the empirical context itself has a strong impact on society, it is most feasible to position this dissertation in the Type 3: Society category, as seen in Table 2 below.

Table 2. Dissertation research level and type (modified from Geraldi and Söderlund, 2018).

	Type 1	Type 2	Type 3
Level 1 (society / organization)		Publication III (Dissertation)	Dissertation (Publication IV)
Level 2 (project)	Publication II	Publication I (II, Dissertation)	Publication IV (Dissertation)
Level 3 (Individual / team)		(Publication II)	

1.4 Research process and dissertation structure

The research strategy is directed by the purpose and philosophical approach and describes the means of reasoning, investigation, and methodological execution of the research process (Bryman & Bell, 2007; Saunders et al., 2016). First, the publications apply inductive reasoning to contribute to the understanding of a complex social phenomenon, as the researcher has empirically observed particular aspects of the phenomenon and induced general explanations from the observations. In this dissertation, inductive reasoning also has a deductive element to it as it draws implications on existing theory from findings but aims to explain events rather than validating hypotheses, as in deductive reasoning. This difference makes it more suitable for social research (Bryman & Bell, 2007; Johnson-Laird, 1999). The dissertation compilation part eventually leans toward *abductive* reasoning as the implications for most logical construct are drawn from the results of the publications (Ketokivi & Choi, 2014; Morgan, 2007; Saunders et al., 2016). Abductive reasoning is consequently one central element of a constructive research approach, distinguishing it from deductive-oriented design science (Piirainen & Gonzalez, 2013).

The manner of investigation in this dissertation is *qualitative*, which also directs the research process and methodology. A qualitative investigation and methodology are suitable when the researcher has little control over the research elements, the research focus is on a contemporary phenomenon in a real-life context, and the purpose is to examine and understand the events, actors, processes, and their consequences in this context (Denzin & Lincoln, 2005; Guba & Lincoln, 1994; Lee, Mitchell, & Sablynski, 1999). Qualitative reasoning and data also work well for constructive research (Oyegoke, 2011). A pragmatism-oriented researcher is likely aware of how to use multiple and mixed research methods (Morgan, 2007),

which are also preferred in constructive research (Morgan, 2007; Oyegoke, 2011). The focal research methods in this dissertation are qualitative because an inductive case study is mostly applied in the publications. A case study aims to draw exploratory and explanatory implications by analyzing raw data from empirical cases evidence through "why" and "how" questions (Dubois & Gibbert, 2010; Eisenhardt, 1989b; Yin, 2013). Qualitative research has its challenges, especially when a case study is considered. Its small sample sizes, researcher subjectivity, and limited generalizability of findings, which may hinder the theoretical contributions, are commonly criticized (Eisenhardt & Graebner, 2007; Ketokivi & Choi, 2014; Yin, 2013). However, even individual cases can help theory creation by pointing out existing gaps in current knowledge and providing significant understanding of underlying factors within an empirical phenomenon and context (Darke, Shanks, & Broadbent, 1998; Yin, 2013), which, when combined with a relevant theoretical foundation, may enable the proposition of a solution through constructive study (Kasanen et al., 1993; Oyegoke, 2011).

The dissertation research process started in 2015 when the author started formulating a generic research problem based on his empirical insights and experiences in the Finnish public sector digitalization, acquired by working on the supplier side for the past five years. While getting acquainted with the current literature on project governance, ICT projects, and public sector digitalization – and familiarizing himself with academia – the researcher participated in a research project that initiated the first publication. Publication I discusses project governance of agile ICT development projects in the public sector. The applied research method was an inductive multi-case study (Eisenhardt, 1989b; Yin, 2013) of evidence from three different public sector cases. The cases were selected because all three organizations had applied or were currently applying agile project approaches, represented different central government organizations, and provided accessible data. The data acquired consisted of 13 semi-structured interviews by multiple researchers and public and case-specific supporting material. The interviews focused on the current project governance arrangements of the three case organizations and particularly on the governance mechanisms they utilized in their agile software projects. The raw data, i.e., the transcribed interviews and support material, was analyzed by using NVivo software to reach an appropriate structure and to identify the salient thematic areas concerning project governance. As a result, six dimensions of project governance, or nodes, were identified, and the content related to agile project governance in each case organization and project was elaborated further.

Publication II followed the findings and proposals made in Publication I for conceptualizing agile project governance. As the topic was ambiguous and novel, a multi-disciplinary research group was formed. The group agreed that the most feasible research method would be a systematic literature review (Kitchenham et al., 2009; Rowe, 2014; Tranfield, Denyer, & Smart, 2003). The purpose was to synthesize a discussion about agile projects in high-quality software engineering and project management journals by applying a pre-defined project governance framework as a theoretical lens (Webster & Watson, 2002). This research started with a planning phase (Rivard, 2014) in which the researchers formulated the research problem and agreed on the scope and limitations of the study. The overall research process drew on Rowe's (2014) model and consisted of three main stages. After several review phases, the source data was eventually narrowed to 42 articles from 37 journals, as seen below in Figure 3. The data was assigned to the authors who applied the agreed criteria to identify and classify project governance practices found in the papers, which were then synthesized to conceptualize and describe agile project governance.

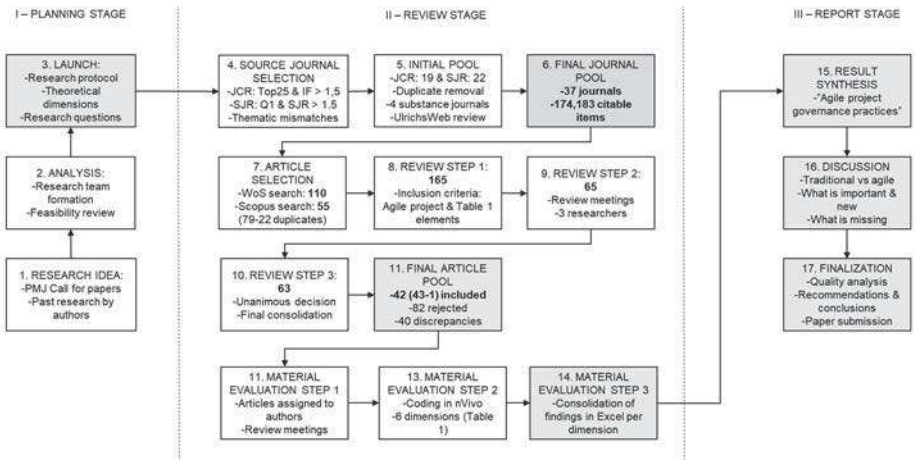

Fig. 3. Publication II research process (reprinted by permission from Paper II © 2018 Project Management Institute, Inc).

Publication III elaborates on the vertical connection between public sector digitalization and ICT projects by applying an inductive analysis on multiple empirical cases and public documentation (Sarker, Xiao, & Beaulieu, 2013; Snead

& Wright, 2014; Thomas, 2006). The acquired data consists of three main categories: (1) case-specific empirical data collected by the authors, (2) public documentation related directly to digitalization, governance, and projects, and (3) public documentation indirectly related to the topic. The cases were chosen to provide an objective perspective on as many different organizational levels as possible and are as follows:

1. The VM's Public ICT Department (JulkICT), the main governing authority of Finnish public sector digitalization, represents the strategic and executive levels. Under VM, the national architecture program (KaPA) was selected to represent the operational level.
2. VM's tax administration (VERO) and their product-based implementation project were selected to represent the executive and operational levels.
3. The Ministry of Agriculture and Forestry's National Land Survey of Finland (MML) has conducted two agile development projects which were included in the research for executive and operational level insight.
4. The Finnish Transportation Agency (LIVI) started the first ICT alliance project known to research in 2016, which was selected to represent the executive and operational levels.

The availability of data and supporting material and the timeliness of the cases were all considered. Supporting the inductive research approach, 11 semi-structured interviews with open-ended questions were conducted between 2015–2017 to provide in-depth descriptive input from respondents. The interviews were documented and accompanied by rich supporting material from the interviewees. The interview documents were examined between researchers to interpret the findings and to reduce personal biases (Thomas, 2006; Yin, 2013). The first category of public documentation consisted of laws, decrees, instructions, manuals, guidelines, and tools and templates directly associated with digitalization and ICT projects. The second category included different reports, reviews, and benchmarking guidelines providing insight into the topic. Over 1500 pages of public documentation were acquired from public administration websites and other public data repositories. The data analysis began with thoroughly reading the materials and constructing rough case descriptions with interesting findings and themes. Then the raw data were imported to and categorized in NVivo software. To guide the analysis and interpretation of data, the researchers constructed a descriptive analysis framework based on the literature (Darke et al., 1998; Thomas, 2006) that described the project governance structure and connection to PPM and

agreed on the unit of analysis: the organizational project governance practices. The practice-related coding criteria and interpretation rules were initially reviewed and agreed upon, then updated throughout the process. The raw data were analyzed in two phases. First, the evidence of practices was reviewed and coded against the theoretical lens to determine the appropriate governance function. In the second phase, the applicable organizational levels of the coded practices were determined. Finally, the coded findings were iterated among researchers to construct aggregated practices per organizational level under each framework dimension, thus resulting in a multi-level framework that describes the project governance structure and PPM assurance practices in Finnish digitalization.

The research process that yielded Publication IV was launched in 2017 by an opportunity to explore ICT project alliances. The research was conducted using the first alliance ICT project (Tiestötieto) in the context of public sector digitalization (Finland) to explore the activities that impact the cross-field process of transferring the project alliance model from the construction field to the public ICT field, and, furthermore, to analyze and illustrate the characteristics of an ICT project alliance. Therefore, to meet the aims of the research and gain an understanding of such a unique empirical setting, an exploratory single-case method (Jefferies et al., 2014; Sarker et al., 2013; Yin, 2013) was chosen. The case project (Tiestötieto) aimed to renew the road infrastructure information management system under the responsibility of the Finnish Transportation Agency (LIVI) and started publicly with a procurement announcement in early 2017 and had a preliminary budget of €8 million. The raw data, collected from early 2017 to November 2017, covered the front-end of the project, namely, the strategy and procurement phases. The data consisted of three main components: subjective, original material from semi-structured interviews and observation sessions (10 items), case project-related public materials, such as requests for quotation documents (79 items), and context-related public materials, such as laws and regulations on the Finnish public sector digitalization and project governance (21 items). The data analysis process began by first carefully reading through the acquired documents to get a comprehensive understanding of the context and case project. Then, all acquired raw data was digitally consolidated into the NVivo Analysis software and analyzed to find indicators related to the cross-industrial transfer process. The focus was on the different actors' activities and practices during and related to the transfer process, as the guiding assumption was that the transfer process is active by nature. Furthermore, distinctive elements of the ICT alliance project were coded from the data. These two themes were the focus of the first round of coding in NVivo. Three

researchers then reviewed the findings. During the second round of coding, each indicator related to the transfer process was further analyzed to find and categorize the activities that contributed to the transfer process. The results of the analysis produced a description of the project's early stage activities involved in the cross-field transfer process and presented the emerging ICT project alliance characteristics.

The author of the dissertation was the primary researcher responsible for the design, data collection and analysis, and reporting of the publications, although each publication and the studies they were based on had other authors and researchers who contributed, as well. A summary of the dissertation methods and data collection is provided below in Table 3.

Table 3. Research paper and data overview.

Publication	RQ#	Research method	Data collection
I	1	Multiple case study	Qualitative data from three public sector cases. Primary data: 13 semi-structured interviews with supporting material
II	2	Systematic literature review	42 articles from software engineering, computer science, and project management journals
III	3	Multiple case study	Qualitative data from four public sector cases and data repositories. Primary data: 11 semi-structured interviews with supporting material, and 1500+ pages of public documentation
IV	4	Single case study	Qualitative data from a single project. Primary data: seven semi-structured interviews, three non-participatory observation sessions, and supporting material
Dissertation	1–4	Constructive	Results of publication I–IV

To conclude, the dissertation is formulated as constructive research, using multiple methods on qualitative data from the digitalization of the Finnish public sector, and it applies pragmatist ontology and critical realist epistemology. The dissertation structure follows the research realization process and framework provided in Figure 1. First, the relevant and recent literature on governance, project management, and public sector digitalization is presented and synthesized to provide a theoretical foundation for the study (Eriksson & Kovalainen, 2016; Oyegoke, 2011). Then, the

results of the four publications are presented to illuminate the current status of project governance in digitalization. The following discussion section provides a construct that implies a possible solution to meet the identified challenges in the status quo, discusses the theoretical contributions (Oyegoke, 2011; Piirainen & Gonzalez, 2013), and closes by reviewing the research and suggesting future research possibilities.

2 Literature foundation

The following section provides a literature foundation for the dissertation by reviewing applicable research discussions and theoretical perspectives. The purpose of this research is to explore the project governance practices within public sector digitalization and propose a construct that can mitigate the perceived challenges and tensions related to project governance (DeFillippi & Sydow, 2016; Yeow, Soh, & Hansen, 2018). The underlying problem is empirically driven, which has, in part, motivated the use of a constructive research approach. Even though the main objective of constructive research is to propose solutions to existing empirical problems, there is also strong motivation to contribute to theoretical discussion (Kasanen et al., 1993; Oyegoke, 2011). The theoretical contribution of constructive (and qualitative) research can be perceived as a sandwich, in which the bottom layer represents the existing theoretical foundation, the middle layers are the data, and the top layer is contributions from the findings (Denzin & Lincoln, 2005; Pratt, 2008). Empirical, problem-driven constructive research on complex social systems calls for an open theoretical foundation rather than a closed one to ground the findings (Pratt, 2008; Thomas, 2006). Creating open theoretical frames involves both reviewing and critiquing the literature so that the researcher can delineate the boundaries of what has been written, and, at the same time, create a space representing the gaps in current research (Darke et al., 1998; Pratt, 2008). The theoretical foundation is sometimes also referred to as the "literature review" in dissertations (e.g., Ahola, 2009), but as this dissertation applies literature review as a research method (Rowe, 2014; Webster & Watson, 2002) in Publication II, this section is distinguished as the foundation. Moreover, as the concept and definitions of "theory" are ambiguous and controversial in social research (Gregor, 2006; Heeks & Bailur, 2007; Jones, Hesterly, & Borgatti, 1997; Morgan, 2007), the theoretical foundation has been replaced with a literature review to avoid semantic controversy.

The *literature foundation* of this dissertation is depicted below in Figure 4. The empirical problem of this dissertation research has been drawn from the public sector digitalization context. Public sector digitalization is most often discussed in e-government literature, where e-government concepts and constructs have been elaborated in, for example, Layne and Lee's (2001) vanguard proposal, which has been followed by maturity models (Andersen & Henriksen, 2006; Beynon-Davies, 2007) and technically-oriented constructs that highlight, for example, the role of architecture (Aagesen, Van Veenstra, Janssen, & Krogstie, 2011; Irani, 2005). The

digital transformation process towards e-government in the public sector is also a fundamental element of this study. This process—and its underlying success factors and challenges—has been researched both in e-government and public administration literature (Asgarkhani, 2005; Cordella & Tempini, 2015; Dawes, 2008; Gil-García & Pardo, 2005; Irani, 2005; Pedersen, 2018). It also recognizes the role of projects as methods of achieving change (Anthopoulos & Fitsilis, 2014; Jenner, 2010). As the research focuses on the concepts, constructs, and processes behind e-government, the literature foundation does not include elements such as citizen-perceived or public value (Cordella & Bonina, 2012; Karunasena & Deng, 2012) or the evolution, development, and implementation of individual electronic services (Luna-Reyes & Gil-Garcia, 2014; Sorrentino, 2007; Weerakkody, Omar, El-Haddadeh, & Al-Busaidy, 2016). The management of innovations and data are also discussed widely in the literature (Altameem et al., 2006; Fishenden & Thompson, 2013; Olsson & Bull-Berg, 2015; Rose & Grant, 2010), but these are also excluded to better focus on the connection between public sector digitalization and project governance.

Fig. 4. Literature foundation of the dissertation.

Public sector digitalization, similarly to most strategic changes, is eventually carried out through individual ICT projects (Anthopoulos & Fitsilis, 2014; McElroy, 1996). Therefore, the project management stream of literature is a significant

portion of the foundation of this dissertation. For this research, the most applicable perspectives from this vast stream of research (Geraldi & Söderlund, 2018; Morris, 2013) are the ones that are associated with the management of ICT projects (de Reyck et al., 2005; Sauer & Horner, 2009; Wateridge, 1998), especially—but not exclusively—the increasingly popular agile projects (Beck et al., 2001; Highsmith, 2009; Serrador & Pinto, 2015). The flexible and collaborative agile project methodologies are supported with the literature on project alliances (Fernandes et al., 2017; Lahdenperä, 2012; Love, Mistry, & Davis, 2010; Ross, 2003; Walker, Harley, & Mills, 2015), which discusses, for example, the contracting and communication issues related to collaborative project deliveries that have so far received limited attention in ICT project research. Finally, as this dissertation seeks to increase understanding on how to do the right ICT projects the right way, relevant literature on PPM is reviewed to explore and exploit knowledge on the alignment, prioritization, and control practices of ICT projects (Bridges, 1999; Meskendahl, 2010; Müller et al., 2008). The researcher acknowledges the research on project organizing, such as projects as temporary organizations (Lundin et al., 1995) and project networks (DeFillippi & Sydow, 2016; Hellgren & Stjernberg, 1995), but these are not applied in this foundation since the focus of this research is on the connection between the project and the more permanent organization or institution. The literature on the project's tangible product has also been excluded (Cooper, 2008; Kock, Heising, & Gemünden, 2015), since the purpose and objectives of the project are more relevant for this dissertation.

The third perspective on the research problem is founded on governance literature. The term "governance" is ambiguous and encompasses many definitions, objectives, concepts, and structures (Kersbergen & Waarden, 2004; McGrath & Whitty, 2015; Turnbull, 1997). This dissertation focuses on ICT projects in public sector digitalization. Therefore, the main stream of literature applied in this foundation deals with project governance, or "the governance of projects" or "the management of project management," not on other governance regimes such as corporate governance or financial governance (Garland, 2009; Müller, 2009; Too & Weaver, 2013; J. R. Turner, 2006). Project governance essentially connects the project to a more permanent setting through mechanisms such as controlling, safeguarding and monitoring (Oakes, 2008; Williamson, 1996), defines the purpose and objectives for the project (Crawford & Helm, 2009; Edkins, Geraldi, Morris, & Smith, 2013; McElroy, 1996), and enables and empowers the work of the project organization (Chiocchio, Kelloway, & Hobbs, 2015; Turkulainen, Ruuska, Brady, & Artto, 2015; Zwikael & Smyrk, 2015). These objectives are generally performed

through different processes and organizational functions, such as prioritization and project selection in PPM (Blichfeldt & Eskerod, 2008; Dye & Pennypacker, 1999) or capability building and auditing in the project management office (PMO) (Too & Weaver, 2013; Unger et al., 2012). The micro-level processes and practices that operationalize project governance have thus far received limited discussion, even though the governmentality of projects has been introduced (Klakegg, Williams, & Shiferaw, 2016; Müller, Pemsel, & Shao, 2014). Project governance has a wider scope on projects than project management, paying closer attention to crucial front-end activities such as project selection, business case creation and sponsorship (Edkins et al., 2013; Samset & Volden, 2016; Sanderson, 2012; Stewart, 2008; Sydow, Lindkvist, & DeFillippi, 2004), and the post-project utilization and benefits realization (Marnewick, 2016; Serra & Kunc, 2014; ul Musawir, Serra, Zwikael, & Ali, 2017). Project governance has been elaborated through many theories, such as agency theory (Eisenhardt, 1989a) or stewardship theory (Davis, Schoorman, & Donaldson, 1997), but in this dissertation, mainly through the institutional theory, with a focus on institutional change and entrepreneurship, (Dacin, Goodstein, & Scott, 2002; DiMaggio & Powell, 1983; Greenwood & Suddaby, 2006). Institutional theory was chosen as it addresses industrial and institutional change – the public sector digitalization in the context of this research - through elements common to project governance, such as legitimacy, thus providing a suitable view on the phenomenon.

2.1 Public sector digitalization

The purpose of the public sector is to serve a larger public and its members, such as individual citizens, corporations, or non-profit organizations. Public sector organizations can have a variety of definitions, ranging from enterprise setups that provide municipal electricity or water services on a self-supporting basis for the population to quasi-public institutions (e.g., state-supported universities) that are financially dependent on local funding to a lesser degree. Different public organizations' operations can be based on a mission to provide services, such as healthcare and education, directly to the public; to set standards or economic or environmental regulations for industries; or to supervise and support that other agencies operate according to laws, rules, and process requirements that are imposed upon the public sector (Wirick, 2011).

The strategy and objectives of a public sector organization differ from private sector financial- and investment-focused business and project organizations most

evidently because of the social responsibility, complexity of regulatory regimes, and the producer-consumer role in the public economy (Nisar, 2013). The public sector or government context is also subject to political pressures and issues related to public scrutiny and accountability (Crawford & Helm, 2009), which, when accompanied with economic factors related to cost-efficiency and increased citizen value delivery requirements, have increasingly driven reforms in the public sector since the 1990s (Barton Cunningham & Kempling, 2009; Brunsson & Sahlin-Andersson, 2000; Kearns, 2004). The past research in the public administration stream has produced several concepts for such reforms, but the most widely discussed are New Public Management (NPM) and Joined-Up Government (JUG) (Cordella & Bonina, 2012; Jenner, 2010). NPM is a market-driven reform that drives a "slim government" agenda by proposing structural or organizational choices that promote devolution, disaggregation, and single-purpose organizations, decentralized through a wide variety of alternative service delivery mechanisms (Cordella & Bonina, 2012). While NPM emphasizes independence and decentralization, JUG—and the following concepts such as the Whole-of-Government approach (Christensen & Lægreid, 2007)—proposes strong collaboration between and within governments to seamlessly produce value through public services while maintaining a market-driven and competence-emphasizing focus (Cordella & Bonina, 2012). What connects all types of public sector reforms is the application of ICT services and solutions that have been emerging with global digitalization (Asgarkhani, 2005; Cordella & Iannacci, 2010; Kamal, 2012; Kearns, 2004).

2.1.1 Digital transformation

Digitalization, or digital transformation, can be defined as "changes in ways of working, roles, and business offering caused by adoption of digital technologies in an organization, or in the operation environment of the organization" (Parviainen et al., 2017, p. 64). It is one of the major global megatrends that challenges institutions' and individuals' technological, organizational, and cultural mindsets and capabilities, and therefore has implications on process, organization, the business domain, and even society (Fitzgerald, Kruschwitz, Bonnet, & Welch, 2013; Parviainen et al., 2017). In the private sector, companies and businesses meet these challenges with strong alignment and strategic imperatives focusing on value creation and structural adoption (Kane, Palmer, Phillips, Kiron, & Buckley, 2016; Matt et al., 2015). In the public sector, these same challenges drive governments to

transform their policies and structures, re-engineer the service delivery processes, and streamline the two-way communication and interactions between public organizations and citizens. This vast, public sector, digitally driven transformation is widely regarded as *e-government* (Karunasena & Deng, 2012). The (digital) transformation from government to e-government is a complex and challenging process. A recent study by Pedersen (2018) reviewed past literature on e-government transformations and identified over 100 factors that impacted the transformation. These factors were aggregated in the following categories:

- Context: pressure for transformation, public sector requirements, governance. complexity, organizational integration, technical integration.
- Organization: structure, culture, processes, people, IT.
- Transformation: understanding citizens' capabilities, resources, approach.

In a similar vein, Nograšek and Vintar proposed in a preceding study (2014) that the organizational transformation process behind e-government consists of organizational culture, processes, structure, and people, all of which are connected and enabled by a fifth, central element: ICT. The development of e-government in this study is seen as a function of these elements and the depth of transformation, reaching from the workplace to an inter-organizational level (Nograšek & Vintar, 2014). The e-government transformation affects both technologies and organizations (Beynon-Davies, 2007) and is an incremental process (West, 2004) with distinctive main stages that are often are described as 1) policy-making, 2) strategic formulation, 3) program definition, 4) project implementation (e.g., Anthopoulos & Fitsilis, 2014). Quite often the e-government transformation is also described as a program (Luna-Reyes & Gil-Garcia, 2011; Rose & Grant, 2010), or even a single project (Irani, 2005; Sarantis, Charalabidis, & Askounis, 2011; Yildiz, 2007), but these concepts have specific typologies in project management and project governance research, which challenges the applicability. For instance, both projects and programs have an explicit lifecycle and organization (Garland, 2009; Project Management Institute, 2008), whereas an e-government transformation has neither (Pedersen, 2018; Savoldelli, Codagnone, & Misuraca, 2014). From theoretical perspectives (Bannister & Connolly, 2015), e-government transformation has been prominently elaborated through organizational change theories (Barton Cunningham & Kempling, 2009; Cordella & Tempini, 2015) but even more often through institutional theories (Dacin et al., 2002; Scott, 2013) to analyze, for example, the external and internal change pressures, (Micelotta, Lounsbury, & Greenwood, 2017; Weerakkody et al., 2016), adoption of

(managerial) practices (Guha & Chakrabarti, 2014; Kostova & Roth, 2002; Savoldelli et al., 2014), or the role of change agents (Tassabehji, Hackney, & Popovič, 2016; Zietsma & Lawrence, 2010) in the pretext of e-government transformation as institutional change within and of the public sector. Institutional theory is also the founding element of the Technology Enactment Framework (TEF) (Fountain, 2001), which has often been utilized in e-government studies to explain the relationships between technology and organizations and how organizations enact ICT according to their cultural, social, and institutional features (Cordella & Iannacci, 2010; Wijen & Ansari, 2007; Yildiz, 2007). TEF also emphasizes the role of the institutional entrepreneur, a government chief information officer (CIO), as the central figure in e-government transformation (Tassabehji et al., 2016), and allows studying how public sector organizations enact ICT according to their cultural, social, and organizational features by making a distinction between "objective technology"—e.g., the array of IT hardware, software, networks, the Internet—and "enacted technology" as the use and perception of technology in a particular setting (Fountain, 2001; Yildiz, 2007).

2.1.2 E-government: Concept, models and implementation

The concept of e-government was initially introduced in the 1990s and stood initially just for the use of ICT or other digital means to deliver public services to the people (e.g., Layne & Lee, 2001). E-government—and the rather synonymous e-governance (Dawes, 2008; Saxena, 2005), digital (Fishenden & Thompson, 2013; Janowski, 2015) or smart government (Gil-Garcia, Zhang, & Puron-Cid, 2016; Savoldelli et al., 2014)—concept has evolved since then to include the development of these services, the restructuring of policies and organizations for effectiveness and cost-efficiency for the public sector as a whole, and the introduction of e-democracy, as seen in Table 4 below.

Table 4. Definitions of e-government.

Source	Definition
(Layne & Lee, 2001)	"Electronic government refers to government's use of technology, particularly web-based Internet applications to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities"
(Moon, 2002)	"e-government is narrowly defined as the production and delivery of government services through IT applications"

Source	Definition
(Asgarkhani, 2005)	"Digital or electronic government (e-government) is the use of ICTs in general and e-technologies in particular, in order to: promote and motivate a more operationally efficient and cost-effective government; facilitate more convenient government services to citizens and businesses; enhance economic development; reshape and redefine community and government processes; allow greater public access to information; and make government more accountable to their citizens. In general, digital government can comprise electronic service delivery, electronic democracy and digital support for policy making and the policy process (digital governance)"
(Beynon-Davies, 2007)	"…e-government is seen as a lever for modernization. It is particularly seen as a lever for process change amongst government administrations with significant potential for performance improvement in the public sector... It is possible to identify at least five major forms of e-government in terms of the value-network: (1) Internal e-government (enablement of internal processes within the government body itself with ICT), (2) Government to citizen (form of external e-government since it is particularly involved in supporting the customer-chain of the government body), (3) Government to business (electronic enablement of the relationships between government bodies and the private sector), (4) Government to government (support intra-government cooperation and collaboration), and (5) Citizen to citizen (enablement of the community chain of government bodies with ICT)
(Yildiz, 2007)	"First, e-government is a concept defined by the objective of the activity (transfer of government information and services among governments, their customers and suppliers), rather than by the specific technology used, provider of the service/ information, or clear-cut activities of the related actors. Second, e-government is one of those concepts that mean a lot of different things… e-service delivery, e-democracy, and e-governance"
(Esteves & Joseph, 2008)	"eGovernment is about the changing nature of relationships from hierarchical command-and-control to an interactive collaboration among governments, citizens, businesses, public sector employees, and other governments. eGovernment provides a platform for multi-channel interaction and multi-service delivery options. Furthermore, eGovernment is about having centralized yet distributed operations to maximize efficiencies, productivity, and service delivery."
(Luna-Reyes & Gil-Garcia, 2011)	"Electronic government (e-Government) has been recognized as a powerful strategy for government transformation."
(Cordella & Bonina, 2012)	"ICT-enabled public sector reforms, often labeled as e-government…"

Source	Definition
(OECD, 2014)	"E-Government refers to the use by the governments of information and communication technologies (ICTs), and particularly the Internet, as a tool to achieve better government… Digital Government refers to the use of digital technologies, as an integrated part of governments' modernization strategies, to create public value. It relies on a digital government ecosystem comprised of government actors, non-governmental organizations, businesses, citizens' associations and individuals which supports the production of and access to data, services and content through interactions with the government"
(Guha & Chakrabarti, 2014)	"e-governments are networks comprised of a large number of actors who need to co-operate, despite having differences in goals, objectives and cultures. "
(Snead & Wright, 2014)	"E-government is entrenched as an accepted government activity with the potential to improve the effective and efficient delivery of government information and resources to citizens at different levels of government in many countries."
(Janowski, 2015)	"…Digital Government Evolution Model with four increasingly complex phases in the evolution of the concept: Digitization (Technology in Government), Transformation (Electronic Government), Engagement (Electronic Governance) and Contextualization (Policy-Driven Electronic Governance)"
(Tassabehji et al., 2016)	"…in 2020 digital government will not be significantly different from today's e-government, with a similar range of transactions and degree of interactivity that is currently available… E-government is a product of NPM policies and the drive for efficiency, effectiveness, cost savings and citizen centricity"
(Melin & Wihlborg, 2018)	"…e-government as a process of public policy-making and as an act of Information Systems Project Management"

The purpose of e-government is not only to provide information and services to citizens, which could also be provided by commercial firms. E-government can develop the strategic connections between public sector organizations and their departments and improve communication between levels of government (e.g., central, city, and local). This strategic connection and communication further enhance cooperation through facilitating the provision and implementation of government strategies, transactions, and policies, and also the better use and operation of government processes, information, and resources (Irani, 2005). The purpose of e-government has been illustrated (Figure 5) comprehensively by Luna-Reyes et al. (2012) by depicting the determinants, characteristics, and results of e-government.

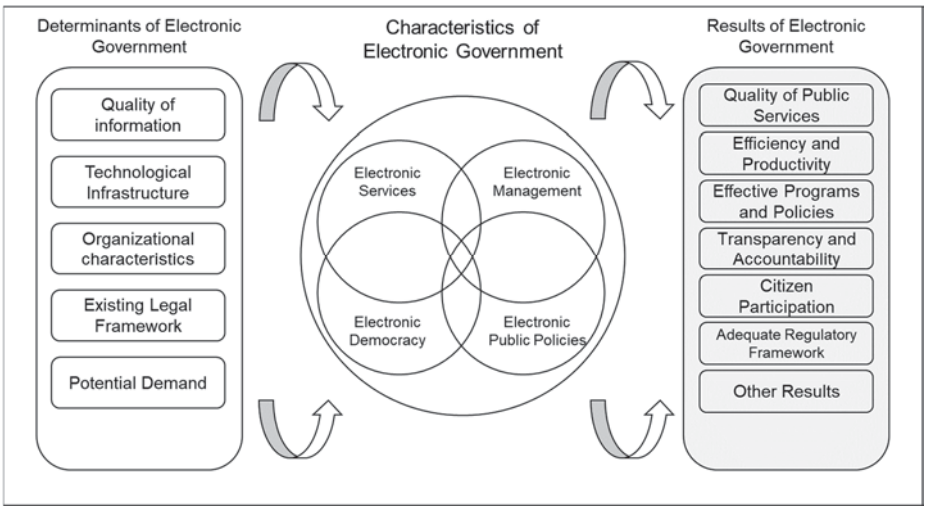

Fig. 5. Determinants, characteristics, and results of e-government (reprinted by permission from Luna-Reyes, Gil-Garcia, & Romero, 2012 © Elsevier).

Past research on e-government and digital transformation has introduced over a dozen models (Fath-Allah, Cheikhi, Al-Qutaish, & Idri, 2014) to support its implementation by describing the levels (e.g., Klievink & Janssen, 2009; Snead & Wright, 2014), scope (e.g., Rose & Grant, 2010; Weerakkody et al., 2015), stakeholders (e.g., Goldkuhl, 2016; Rowley, 2011), and functionalities (e.g., Altameem et al., 2006; Luna-Reyes et al., 2012) at different stages of e-government. The pioneering model was introduced by Layne and Lee (2001), which proposed e-government progress as a function of integration and complexity. In the lowest stage, cataloging, governments are merely present online and offer a catalog of forms. In the "Transaction" stage, these forms are supported with services and database integration, and in "Vertical integration," which is the third stage, the services and databases are integrated locally based on similar functionalities. Finally, in the "Horizontal integration" stage, a one-stop-shop for citizens would be introduced. This four-stage model does not, however, consider national vs. international or private vs. public levels and interfaces, which has led to the introduction of several complementary frameworks and maturity models. For example, drawing on Beynon-Davies's (2007) construct, Yildiz (2007) emphasized the communication interfaces, and Klievink and Janssen (2009) introduced a growth model that emphasized the explicit distinction between organizational and

national levels of e-government evolution that ended up in the international, demand-driven JUG stage. Andersen and Henriksen (2006) continued directly on the Layne and Lee (2001) model by developing a public sector process rebuilding model, which adds a more technical, customer- and application-centric approach to the stages. In 2010, Lee followed up on his and Layne's 2001 study by reviewing 12 different stage models in order to synthesize the themes, concepts, and functionalities on different levels (Lee, 2010). He aggregated the following metaphors for different progress stages:

1. Presenting (information in the information space).
2. Assimilating (or replicating processes and services in the information space with the ones in the real world).
3. Reforming (the processes and services in the real world to match the information space requirements, fitting for efficiency).
4. Morphing (changing the shape and scope of processes and services in the information space, as well as the ones in the real world, fitting for effectiveness).
5. e-Governance (managing processes and services in both worlds synchronously, reflecting citizen-involved changes with reconfigurable processes and services).

As seen in Figure 6, these stages connect the citizens and service functions with the operation and technology functions, thus providing a comprehensive reference frame for e-government.

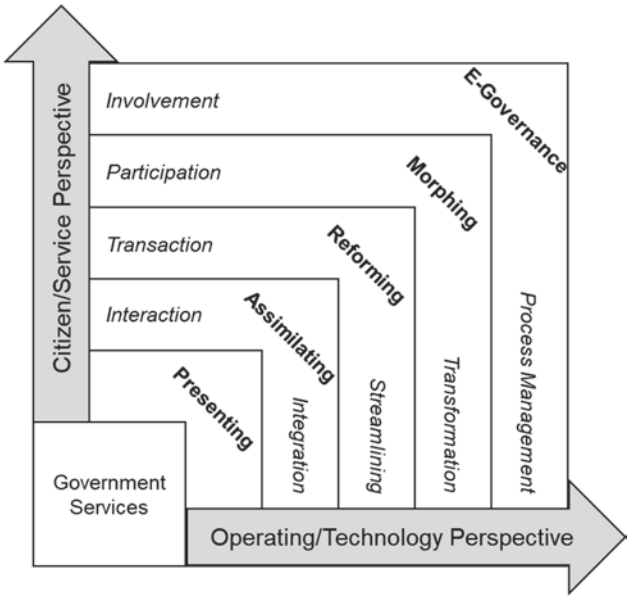

Fig. 6. A common frame of reference for e-government stage models (reprinted by permission from Lee, 2010 © Elsevier).

The content and scope of an e-government construct to be implemented is never homogenous but depends on the national determinants, settings, and objectives (Asgarkhani, 2005; Dawes, 2008; Sarantis et al., 2011; Vainio et al., 2017). The e-government construct is defined through the organization, citizen, and legal perspectives (Luna-Reyes et al., 2012; Nograšek & Vintar, 2014) and is determined by the technical framework (Azad & Faraj, 2008; Cordella & Iannacci, 2010; Lee, 2010). The technical framework is also referred to as enterprise architecture (EA), and it determines the future states of organization processes and capabilities in ICT and system architecture and data (the vertical data flow and system connections from data access interface through back-end operations to front-end services), and provides a roadmap for the organization to follow (Aagesen et al., 2011; Beynon-Davies, 2007; Janssen & van der Voort, 2016; Klievink & Janssen, 2009; Shanks, Gloet, Asadi Someh, Frampton, & Tamm, 2018). The e-government (enterprise) architecture defines the standards, infrastructure components, applications, technologies, business model, and guidelines for electronic commerce and interoperability among and between organizations that facilitate the interaction of the government (Gottschalk, 2009; Irani, 2005). Janssen and Klievink (2012, p. 31)

note the connection between EA and ICT development project investments as follows: "Architecture influences the design decisions and the investment behavior of an organization and in turn is influenced by behavior and design decisions." The significance of e-government architecture is in the integration between a government's existing technologies and essential applications and information systems required for e-government operations, as suggested by Irani (2005) in his study, which proposed an e-government architecture consisting of four layers:

1. Access layer—involves channels for government users to access various government services.
2. E-government layer—integrates digital data of various organizations into a web-portal of government services, in the form of a one-stop e-government portal.
3. E-business layer—focuses on using ICT applications and tools to harness a network of trust, knowledge sharing, and information processing that takes place both within and between organizations.
4. Infrastructure layer—focuses on technologies that should be in place before e-government services can be offered reliably and effectively to the public.

In order to describe the role and purpose of EA in managing government ICT, Hjort-Madsen and Gøtze (2004) complemented the above mentioned technical layers by constructing an EA framework that emphasizes the interoperability between layers from organizational and semantic perspectives, as seen below in Table 5. However, even though the application of EA in e-government provides many benefits, such as better business/IT alignment (Gregor, Hart, & Martin, 2007) and improved decision-making and communication (Janssen, Flak, & Sæbø, 2013), EA alone cannot advance the e-government transformation or implementation (Aagesen et al., 2011; Hjort-Madsen & Gøtze, 2004; Irani, 2005).

Table 5. An EA framework to manage government IT (redrawn from Hjort-Madsen & Gøtze, 2004).

	Organizational interoperability	Semantic interoperability	Technical interoperability
National (Government) level	Streamlining horizontally layered businesses common (or even consistent) across all public institutions	General agreement upon data definitions across all of government via a common global information model	Agreement on technical standards used and sharing of common services and high-level infrastructure components
Sector (Ministry/Branch) level	Coordinate the business processes that span entire sectors (with consideration for national principles)	A sector-specific information model including common metadata (with consideration for national principles)	Sector-specific technical standards and common services and infrastructure components (with consideration for national principles)
Institutional (Organization/Agency) level	Internal streamlining of business processes (with consideration for national and sector principles)	Institutional specific information models (with consideration for national and sector principles)	Agreement upon standards for the institution (with consideration for national and sector principles)

E-government transformation and implementation initiatives have been hindered by technological (e.g., data quality and security or complexity and interoperability issues), managerial (e.g., lack of competence by owners for managing digital services and the underlying technology, lack of common goals, or resistance to change and other behavioral aspects), regulatory (e.g., restrictive laws and one-year-budgets), and institutional (e.g., privacy concerns or political pressures) issues (Eggers, 2016; Gil-García & Pardo, 2005; Irani, 2005). Within the e-government transformation—on a single development project or program level—there are several critical issues that pertain to progress, caused by 1) program management (e.g., a lack of political support, decentralized funding and control, failure to pay attention to laws, policies), 2) customer relationship management (e.g., the involvement of all stakeholders is neglected, poorly defined roles and responsibilities), 3) product (e.g., non-compatible technologies, misestimation of usability, language and communication issues), 4) distribution (e.g., lack of main architecture approach, poorly designed user interfaces, availability issues), 5) promotion (e.g., citizens not educated and convinced), and 6) price (e.g., poor cost

and benefit estimations, funding options not considered) (Rose & Grant, 2010). On the other hand, technologies can become the carriers of e-government policies' strategy and aims, since the ICT projects that are designed and chosen to shape the outcomes of the reform are characterized by technologies embedded in the daily routines and operations of public sector organizations (Cordella & Iannacci, 2010). E-government implementation also has enablers and success factors, such as the initial proposal of organizational responsibility, awareness, funding, and organizational change (Becker, Niehaves, Algermissen, Delfmann, & Falk, 2004). Gil-García and Pardo also provided a means to counter the challenging elements they had identified in their 2005 study: in the technological challenge category, successful counterstrategies included a plan introduction and user inclusion. The managerial challenges can be met with competent project and ICT advocates and managers, stakeholder identification, and good planning and communication of objectives. Updated and purposeful ICT standards and legislation tackle most challenges in the legal category, whereas the institutional issues call for executive and political leader- and ownership. Klievink and Janssen (2009) provided a comprehensive analysis of governance and technology capabilities per e-government stages that enable the transformation, progressing from single system development capabilities in the lowest "Stovepipe" stage to collaboration, architecture, and service delivery competences in the highest JUG stage. In an earlier study (Altameem et al., 2006), a more a comprehensive, yet less descriptive, illustration (Figure 7) was introduced to depict the main success factors of e-government adoption under governance, organization, and technical categories.

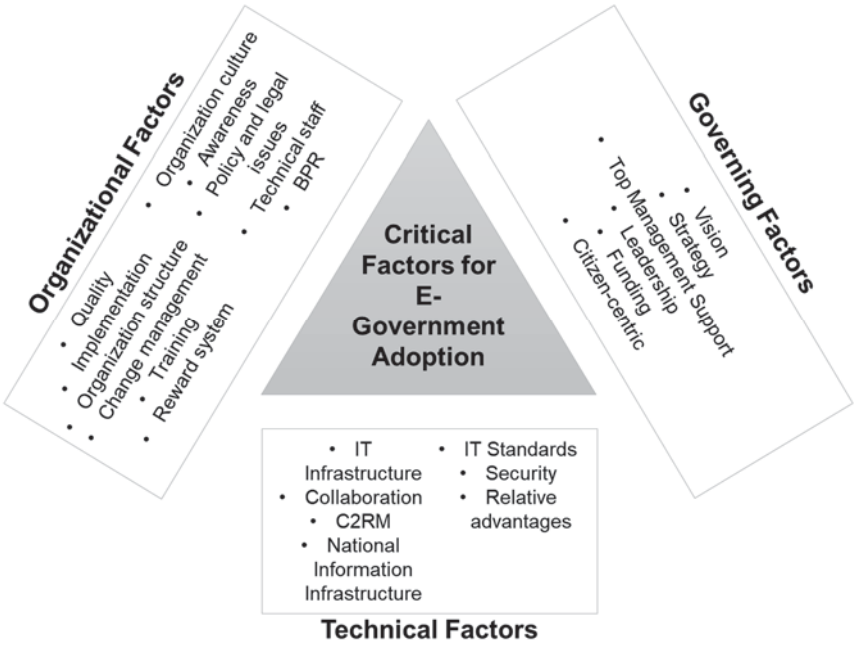

Fig. 7. Critical factors for E-government adoption (reprinted by permission from Altameem et al., 2006 © IEEE)

2.2 Project management

Projects, unlike the continuous processes and permanent functions of an organization, are unique combinations of tasks—performed by a temporary organization (Lundin et al., 1995)—usually aiming to achieve (strategic) change or to develop or deliver a tangible output such as a product or a construct (Artto, Martinsuo, & Kujala, 2011; McElroy, 1996; Project Management Institute, 2013; Turner, 2007). Projects have an explicit lifecycle with a start and an end, allocated resources, and specific objectives, and they are characterized by, for example, their temporal nature, uncertainty, complexity, organizational arrangements, and stakeholder expectations (Aaltonen & Sivonen, 2009; Karlsen, 2002; Morris, 2013; Winch, 2014). Project management refers to a social construct that drives the project work by integrating and controlling risks, human resources, procurement, and communication activities. The success of the project, and project management,

is generally evaluated and monitored through time, cost, and scope (Morris & Hough, 1987; Morris, 2013; Project Management Institute, 2013; Turner, 2007).

2.2.1 Agile project management

Traditional, plan-control oriented, project management conceptualizes projects through value creation, action process, and social process, but ICT projects are affected by contextual dimensions, namely the technical complexity, rate of technology change, importance of security, business change involved in projects, prevalence of virtual teaming, organizational instability, and interdependence with other organizations that have led to the emergence of ICT-specific project management (Gilchrist, Burton-Jones, & Green, 2018; Sauer & Horner, 2009). Stewart (2008) proposed a conceptual framework for ICT project management with an emphasis on the selection, implementation, and evaluation phases that extends the more traditional frameworks in order to meet the product project utilization-related concerns. These project product-related concerns have also yielded revised criteria for ICT project success that also focus on user satisfaction (Cecez-Kecmanovic et al., 2014; de Reyck et al., 2005; Wateridge, 1998). The other distinguishing key characteristics, besides the product-user centricity, of ICT projects are the complexity and uncertainty of the technology, development, and value delivery (Bardhan, Sugato, & Sougstad, 2004; Stewart, 2008; Wallace, Keil, & Rai, 2004), which has led to the introduction and evolution of *agile* methodologies and agile project management (Conforto, Amaral, da Silva, Di Felippo, & Kamikawachi, 2016; Hobbs & Petit, 2017; Karrbom Gustavsson & Hallin, 2014). The main cornerstone for understanding the agile methodologies and the principles of agile project management is the *Agile Manifesto* (Beck et al., 2001; Serrador & Pinto, 2015). The manifesto acknowledges that there is some value in processes and tools in software development. However, the manifesto clearly states most value exists in individuals and interactions. In addition, the manifesto states that "working software [is valued] over comprehensive documentation," "customer collaboration [is valued] over contract negotiation," and "responding to change [is valued] over following a plan" (p. 2). Consequently, a project's success should be primarily determined by customer satisfaction and the value the project provides the customer: "Our highest priority is to satisfy the customer through early and continuous delivery of valuable software" (Beck et al., 2001, p. 1).

Agile principles clearly encourage continuously questioning whether existing mechanisms, processes, and tools are sufficient and effective for delivering value

to the customer. This idea is one of the most fundamental misalignments between traditional views on ICT project management, processes, and tools. The main conceptual differences between traditional and agile development projects (Nerur, Mahapatra, & Mangalaraj, 2005) are described in Table 6.

Table 6. Traditional versus agile software development (reprinted by permission from Nerur et al., 2005 © ACM).

	Traditional development	Agile development
Fundamental assumptions	Systems are fully specifiable, predictable, and can be built through meticulous and extensive planning.	High-quality, adaptive software can be developed by small teams using the principles of continuous design improvement and testing based on rapid feedback and change.
Control	Process-centric	People-centric
Management style	Command-and-control	Leadership-and-collaboration
Knowledge management	Explicit	Tacit
Role assignment	Individual – favors specialization	Self-organizing teams – encourages role interchangeability
Communication	Formal	Informal
Customer's role	Important	Critical
Project cycle	Guided by tasks and activities	Guided by product features
Development model	Life cycle model (Waterfall, Spiral or some variation)	The evolutionary-delivery model
Desired organizational form/structure	Mechanistic (bureaucratic with high formalization)	Organic (flexible and participative, encouraging cooperative social action)
Technology	No restriction	Favors object-oriented technology

Ideally, empowered and cross-functional agile teams are solely responsible for determining the objectives (deliverables) and best ways of working on a software development project. For example, teams that use the Scrum method are described by Schwaber and Sutherland (2016) as follows:

> The Scrum Team consists of a Product Owner, the Development Team, and a Scrum Master. Scrum Teams are self-organizing and cross-functional. Self-organizing teams choose how best to accomplish their work, rather than being directed by others outside the team. Cross-functional teams have all competencies needed to accomplish the work without depending on others not part of the team. The team model in Scrum is designed to optimize flexibility, creativity, and productivity. (p. 5)

The Scrum Team is also, through the customer representing the role of Product Owner, responsible for integrating the flow of deliverables into achieving the project's desired output goal, and thus can be described as the core project team in typology of project teams (Chiocchio, Kelloway & Hobbs, 2015). However, in a large agile project there can be several Scrum Teams working simultaneously, which would mean that they could be also defined as component project teams according to the abovementioned typology.

Although the Agile Manifesto principles are an important milestone and reference for defining the concept and the baseline for further research on agile project management, these principles are not actionable guidelines for how agility can actually be implemented in firms. For example, extreme programming (Beck, 1999; Wood, Michaelides, & Thomson, 2013) and Scrum (Rola, Kuchta, & Kopczyk, 2016; Schwaber & Sutherland, 2016) methods go into more detail, as they have specified closer to practical-level approaches to how agile software development should be performed. Empirical studies (e.g., Dybå & Dingsøyr, 2008; Rodríguez, Markkula, Oivo, & Turula, 2012) have revealed that these two methods are commonly applied in contemporary software development. Thus, today, sprints, daily-stand-ups, continuous integration, and pair programming form a baseline for the practices that are used in many software development projects. However, the implementation of agile practices has been identified as varying strongly between projects (Ståhl & Bosch, 2014).

The research on agility in organizations was very vivid even before the agile principles were first announced in the Agile Manifesto (Beck et al., 2001). In parallel with research on technical capabilities and development team level activities, there has been related research and discussions closer to agility in the business management discipline. Overby, Bharadwaj and Sambamurthy (2006) analyzed agility from the management point of view and divided enterprise agility into two main components: sensing and response. Following this was their definition of agile enterprise, according to which a firm has high sensing and response capabilities:

> Well-developed capabilities in R&D, IT, government relations, market intelligence, etc. allow the firm to detect environmental change caused by new technologies, legal/regulatory change, etc. Strong strategic and operating capabilities allow the firm to commit the appropriate resources to seize the opportunity in a timely manner. (p. 125)

Disconnects and handovers between business and development functions have been identified as a significant barrier to achieving organizational agility (Fitzgerald & Stol, 2017). To help cross the organizational chasm between business management and product development, the agile community has increasingly addressed topics related to a holistic understanding of agile principles and interdependencies between business management, development, and operational activities. The need for agility and the use of agile methods are often justified by market situations in which a rationalistic and plan-driven approach for project management and software development is not suitable. In ICT development projects, these situations are characterized by very little prior knowledge about real customer needs or knowledge of the problem that must be solved. Thus, problem-solving requires an exploratory approach and several iterations that aim for an empirical evaluation of the hypothesis, defined incrementally. Due to the increased unpredictability of markets and the complexity of rationalistic planning, some researchers question the usefulness of traditional views on strategic planning (Mintzberg, 2000). Moreover, sufficient control of risks in volatile, software-intensive ICT development projects must allow rapid changes in technologies, architectures, and the delivery content schedule (Shrivastava & Rathod, 2015).

Recent trends in software development paradigms, such as experiment-driven development (Fagerholm, Sanchez Guinea, Mäenpää, & Münch, 2017) and continuous deployment (Claassen & Boekhorst, 2015), involve a wide range of organizational activities, including a need to establish practices for continuous planning and decision-making (Fitzgerald & Stol, 2017). Some researchers recently described typical steps in the evolution beyond agile development, that is, a transition to a paradigm where the research and development function is viewed as an innovation experimentation system (Olsson & Bosch, 2014). In this way, the role of the development function is sharpened for conducting rapid experiments and validated learning cycles. Consequently, all key stakeholders, including product management, development, verification and validation, and the customer, are committed to collaborating in rapid iterative development and feedback cycles. In recent years, this research has evolved toward principles of lean manufacturing and involved lean software development, DevOps, continuous delivery, and continuous experimentation. Research on these topics is commonly acknowledged as closely related and relevant in agile communities. Many software engineering researchers and journals have lately referred to continuous software engineering (CSE). In software engineering domain, CSE is commonly considered to be a research agenda that allows companies to scale agility to the organization's level

and evolve beyond the agile era in developing modern digitalized goods and services (Bosch, 2014; Fitzgerald & Stol, 2017; Olsson & Bosch, 2014).

Finally, a survey conducted among Finnish information technology practitioners revealed that the majority (58%) of respondents were using some form of agile or lean practices in their organizational units (Rodríguez et al., 2012). Although empirical evidence and knowledge of agile methods (Dybå & Dingsøyr, 2008) have steadily increased in software engineering area, more recently, several other industries and communities have also shown increased focus on agile development. The global survey conducted by Conforto, Rebentisch and Amaral (2014) illustrates that even though the practitioners in the software industry (37% of a sample of 856) self-proclaimed the use of any agile method as high as 88%; they were accompanied by other industries such as financial services (15% of sample, 36% agile use), consulting (10%, 24%), and even the generally traditional metal (3%, 8%) and defense fields (2%, 7%). This information implies that the adoption of agile methodologies and agile project management has spread from software engineering to other industries and fields as well.

2.2.2 Project alliances

A *project alliance* is one form of collaborative project arrangement (Davis & Walker, 2009; Lahdenperä, 2012), which has been used most prominently in the infrastructure and construction fields, especially in Australia (Davis & Love, 2011; Walker et al., 2015). Early approaches to alliances and alliancing in project-based industries were strategic and involved sharing and collaborative activities related to technologies, product development, and services between organizations (Gulati, 1998). More recently, the concept of project alliances has also focused on the operational level of individual projects, and been defined, for example, as a contractual arrangement (Davis & Love, 2011; Jefferies et al., 2014), a procurement method (Plantinga & Dorée, 2016; Walker & Lloyd-Walker, 2015), or a delivery model (Fernandes et al., 2017; Ibrahim, Costello, & Wilkinson, 2013). The common elements in these definitions and concepts—joint organization and decision making, unanimous objectives, and "pain and gain sharing" mentality—also justify the rationale of using project alliances in projects that are characteristically uncertain, complex, and vast in scope, targets, organization, technology, or geographically (Chen, Zhang, Xie, & Jin, 2012; Cicmil & Marshall, 2005; Walker & Jacobsson, 2014). Similar characteristics and challenges have also been found in ICT projects in software industries (Flyvbjerg & Budzier, 2011;

Wallace et al., 2004). As presented earlier, the ICT field has introduced iterative and flexible development methodologies at the project delivery process level, namely agile approaches (Berger, 2007; Chow & Cao, 2008; Daneva et al., 2013). The organizational integration and collaboration mechanisms and capabilities have been the predominant focus in the infrastructure and construction field (Hietajärvi, Aaltonen, & Haapasalo, 2017a; Love et al., 2010; Walker & Lloyd-Walker, 2015).

A project alliance model can be perceived through three main dimensions: 1) management and support, 2) collaboration, and 3) knowledge and sharing (Love et al., 2010), or five key features: 1) joint liability and organization, 2) joint decision-making and problem-solving, 3) open-book communication, 4) team-building, meeting, and workshops, and 5) monitoring performance and job satisfaction (Fernandes et al., 2017). However, to illustrate the operational aspect of the project alliance model, more descriptive mechanisms—referred to either as principles (Ross, 2003), characteristics (Lahdenperä, 2012), indicators (Ibrahim et al., 2013), or critical success factors (Hietajärvi, Aaltonen, & Haapasalo, 2017c; Jefferies et al., 2014; Love et al., 2010)—are shown in Table 7.

Table 7. Project alliance mechanisms (reprinted by permission from Paper IV © 2019 Emerald Publishing Limited).

Construct	Description	Mechanisms	Sources
Best for project culture	Creating collaborative culture based on best-for-project and no-blame approach on decisions, open communication and continuous improvement	1. Mutual respect and good faith, 2. Commitment to improvement, 3. Unrestricted cross sharing of information, 4. No blame culture, 5. Common best-for-project mindset/culture, co-operative spirit, 6. Sound relationship, 7. Shared knowledge, 8. Open and honest communication - no hidden agendas	1.-2. (Lahdenperä, 2012); 3.-4. (Ibrahim et al., 2013); 5.(Hietajärvi et al., 2017a); 6.-7. (Jefferies et al., 2014); 8. (Ross, 2003)
Team formation and capability	Selecting and allocating the best available (capable, initiative) resources for the project as early as possible, with clear roles and responsibilities	1. Early involvement of key participants, 2. Team flexibility and responsiveness to change, 3. Encouraging initiative, 4. Appropriate and adequate resources, best people for project, 5. Flexibility and adaptability, 6. Learning climate, 7. Clear accountabilities and responsibilities within no-blame culture	1. (Lahdenperä, 2012); 2.-3. (Ibrahim et al., 2013); 4. (Hietajärvi et al., 2017a); 5. (Jefferies et al., 2014); 6. (Love et al., 2010); 7.(Ross, 2003)
Joint governance structures	Constructing an equal and shared governance structure with unconditional commitment and support from key participants that supports leadership and decision-making power	1. Equality of key participants, 2. Mutual liability waivers, 3. Collective understanding, 4. Joint governance structure (consensus decision-making), 5. Leadership, 6. Strong commitment by client and senior management, 7. Alliance structure, 8. A peer relationship where all participants have an equal say, 9. Visible/unconditional support from top level of each participant	1.-2. (Lahdenperä, 2012); 3. (Ibrahim et al., 2013); 4.-5. (Hietajärvi et al., 2017a); 6.-7. (Jefferies et al., 2014); 8.-9. (Ross, 2003)

Construct	Description	Mechanisms	Sources
Transparent alliance agreement	Forming a collaborative multi-party contract that includes equal incentives and risks, and enables transparent open-book financials and communication	1. Transparent financials, 2. Collaborative multi-party agreement, 3. Risk and reward allocation, incentivization, 4. Equity, 5. Commercial incentives, 6. Alliance agreement, 7. A primary emphasis on business outcomes whereby all parties either win or all parties lose, 8. All transactions must be fully open-book	1.-2. (Lahdenperä, 2012); 3. (Hietajärvi et al., 2017a); 4.-5. (Jefferies et al., 2014); 6. (Love et al., 2010); 7.-8. (Ross, 2003)
Shared objectives	Planning and agreeing jointly the project objectives and goals, enabling and encouraging innovation	1. Intensified early planning, 2. Jointly developed project goals, 3. Client care team, 4. Stretch targets, 5. Creativity, 6. Encouragement of innovative thinking with a commitment to achieve outstanding outcomes	1.-2. (Lahdenperä, 2012); 3. (Ibrahim et al., 2013); 4. (Jefferies et al., 2014); 5. (Love et al., 2010); 6. (Ross, 2003)
Coordination procedures	Measuring and aligning project outcomes and performance with objectives, and managing change and conflicts	1. Continuous learning and performance monitoring, 2. Joint process evaluation, 3. Effective coordination, 4. Compatible alignment, 5. Joint problem solving, 6. Collective responsibility for performance with an equitable sharing of risk and reward	1. (Hietajärvi et al., 2017a); 2. (Jefferies et al., 2014); 3.-5. (Love et al., 2010), 6. (Ross, 2003)
Teamwork facilitation	Building and facilitating the performance of an integrated, co-located team	1. Advanced information and communication tools, 2. Continuous workshopping, 3. Seamless operation with no organizational defined boundaries, 4. Integration: people (e.g. joint alliance office), processes, tools, design integration, 5. Facilitation, 6. Team building	1.-2. (Lahdenperä, 2012); 3. (Ibrahim et al., 2013); 4. (Hietajärvi et al., 2017a); 5. (Jefferies et al., 2014); 6. (Love et al., 2010)

Besides the construct features and mechanisms, the life cycle of a project alliance model also has some distinctive elements. The joint alliance organization will be involved throughout each project life cycle phase: strategy, procurement, development, and warranty (Hietajärvi et al., 2017c; Ross, 2003). Classic project lifecycle models consist of the front-end (pre-analysis, planning) and back-end (delivery and implementation) parts (Morris, 2013; Project Management Institute, 2013), which may have different organizations with different owners and objectives (Stewart, 2008; Williams & Samset, 2010). Whereas the first phases of both project alliance and more classical project models have similar targets and governance approaches, i.e., to strategically define the purpose and setup of the project by the owner organization (Davis & Walker, 2009; Williams & Samset, 2010), the following procurement phase has some fundamental differences (Walker & Rowlinson, 2008).

In a traditional customer-supplier project sourcing setup, applied, for example, to purchasing ICT services and projects, the customer organization defines the project specification, sources the most suitable supplier from the market, and proceeds to sign a relational contract (Gelderman, Semeijn, & de Bruijn, 2015). However, in project alliances, the procurement phase is already characteristically collaborative, transparent, and inclusive (Love et al., 2010; Walker & Lloyd-Walker, 2015). The procurement phase involves all key participants and consists not only of contractual and commercial elements but also contributes to mutual project objectives and planning (Fernandes et al., 2017; Plantinga & Dorée, 2016). Moreover, the resulting alliance agreement also includes all parties involved in the project and emphasizes equality, collaboration, and cooperation (Davis & Love, 2011; Jefferies et al., 2014). Contextual and governance-related features also have an influence, especially in the procurement phase of the early stages of both classic and alliance projects (Chang & Ive, 2007; Edkins et al., 2013; Kock, Heising, & Gemünden, 2016). In the public sector, for example, strict organizational and legal regulations and practices may challenge the procurement process by imposing limitations on the budgeting schedule, supplier selection criteria, and information sharing (Crawford & Helm, 2009; De Schepper, Dooms, & Haezendonck, 2014; Wirick, 2011). This practice is especially evident with agile ICT projects, which require more flexibility and technological capabilities from parties than formal control (Publication I; Rosacker & Olson, 2008).

The development phase has various scopes and definitions in research, but it essentially covers two main objectives: establishing the alliance organization with a defined management system and defining the initial project plan with a target

scope, budget, and schedule (Hietajärvi et al., 2017a; Love et al., 2010). One outcome of the development phase that is fundamental to the performance and success of a project alliance is the formation of a project alliance identity (Hietajärvi & Aaltonen, 2017). In this dissertation, the development phase also involves activities related to the actual development, delivery, and implementation of the project product, which is a common approach to ICT projects, delivering functioning software concurrently with the development (Publication IV; Ross, 2003), but sometimes the implementation phase is distinctly separated (Fernandes et al., 2017; Hietajärvi et al., 2017a). The warranty phase covers the post-implementation defects correction period, which in construction project alliances is usually five years. In ICT projects this phase can also include maintenance and further development of the delivered ICT solution (Hietajärvi et al., 2017a; Publication IV).

2.2.3 Project portfolio management

A *project portfolio* is a consolidated collection of an organization's projects or programs to be managed concurrently under a single umbrella. The projects and programs may be dependent or independent of each other but contribute to the same strategic objectives and share the scarce resources of an organization (Dye & Pennypacker, 1999). *Project portfolio management* (PPM), as defined by the Project Management Institute,

> Refers to the centralized management of one or more portfolios [collection of projects], which includes identifying, prioritizing, authorizing, managing, and controlling projects, programs, and other related work, to achieve specific strategic business objectives. Portfolio management focuses on ensuring that projects and programs are reviewed to prioritize resource allocation, and that the management of the portfolio is consistent with and aligned to organizational strategies. (2013, p. 9)

Therefore, in essence, PPM is a project management technique used to align and control a project according to the objectives and benefits of an organization, thus integrating project management and project governance (Serra & Kunc, 2014; Too & Weaver, 2013). PPM attempts to support managerial decision-making by answering project-related questions such as (Dye & Pennypacker, 1999): What should we take on? What should be terminated? What is possible? What is needed? PPM has three central objectives: 1. strategic alignment (ensure strategic direction

of projects), 2. balancing across projects (in terms of strategically important parameters, such as resources or risks), and 3. value maximization (in terms of company objectives) (Martinsuo & Lehtonen, 2007; Petro & Gardiner, 2015). Meskendahl (2010) complements these objectives by adding the use of synergies (reduce double work and enhance utilization regarding technologies, marketing, knowledge, and resources) to the list, and subsequently, de Reyck et al. (2005) emphasize the importance of risk analysis and management. In practice, the managerial activities related to PPM are 1) the initial screening, evaluation, and prioritization of project proposals, 2) the concurrent evaluation and reprioritization of individual projects, and 3) the allocation and reallocation of shared resources (Blichfeldt & Eskerod, 2008; Jonas, 2010). These managerial practices are conducted through decisions by portfolio owners and managers at certain process gates or portfolio management board meetings and must balance a multitude of conflicting goals in an organization. Decisions related to portfolio management are often described as choices of Go, Hold, or Cancel individual projects (Müller et al., 2008), but they are often affected by ambiguous or implicit elements, such as political behavior, intuition, and coincidence, common in the public sector (Nielsen & Pedersen, 2014).

The objectives of PPM are best conceptualized by reviewing some established PPM models and frameworks and the mechanisms within them. The strategic alignment of goals is based on the fit of projects with the organization's strategy (Meskendahl, 2010), a lack of which is not surprisingly one of the greatest challenges for the implementation of PPM (de Reyck et al., 2005). Goals can be aligned by using strategic buckets—which also serve strategy forming and resource allocation purposes—within the portfolio, as proposed in Cooper, Edgett and Kleinschmidt's (1997) Strategic Buckets Model. In the same paper, Cooper et al. also introduced the strategic check: a scoring, comparison, and check exercise, which also focuses on the spending structure of projects for strategic alignment. Strategic considerations during prescreening, analysis, and selection are essential elements of both the Larger Picture by Bridges (1999) and the Integrated Framework for Project Portfolio Selection (Archer & Ghasemzadeh, 1999). A specific ICT PPM model also adds technological alignment through architecture and providing support via standardized processes and software tools (de Reyck et al., 2005). Besides pre-screening prospect projects, the prioritization of ongoing projects also aids goal alignment by establishing formal and tacit criteria strategic fit, as promoted by Cooper et al. (1997) and further developed in the Strategy Table Model (Spradlin & Kutoloski, 1999).

Similarly to the alignment objective, the portfolio balancing goal first requires performance compliance (Blomquist & Müller, 2006), which consists of the monitoring, reporting, and controlling practices over the whole portfolio and projects. These practices are commonly conducted through a formal process, such as the famous Stage-Gate model, which supports PPM by providing integrity over the project deliverable information (Cooper et al., 1997; Cooper, 2008), one of the most important success factors of decision-making and PPM in general (Kaiser, El Arbi, & Ahlemann, 2015; Martinsuo & Lehtonen, 2007). In ICT PPM, the architecture also plays a crucial role when the interdependencies and integrations of ICT project deliverables are analyzed as a part of performance compliance (Bardhan et al., 2004). Also specific to ICT PPM is a dynamic nature, due to frequent changes caused by the arrival of new projects and uncertainty related to ongoing project deliverables, which calls for flexibility to re-assess projects and to re-allocate resources (Blichfeldt & Eskerod, 2008; Blomquist & Müller, 2006). Allocating and re-allocating shared resources over projects according to agreed priorities and performance is another main task under balancing (Jonas, 2010; Meskendahl, 2010). Furthermore, balancing needs to consider continuous risk-opportunity assessments of projects and deliverables, as described, for example, in the Project Portfolio Risk-Opportunity Identification Framework (Sanchez, Robert, & Pellerin, 2008).

Finally, the third central objective of PPM contains the practices that maximize the value and benefits of the portfolio for the organization (Müller et al., 2008; Teller, Unger, Kock, & Gemünden, 2012). Jonas et al. (2010) defined the portfolio value more explicitly as 1) the average project success over all the projects in the portfolio in fulfilling time, budget, quality, and customer satisfaction objectives; and 2) the exploitation of synergies between projects within the portfolio. Financial analyses and metrics, such as the net present value or return on investment are obviously important when assessing portfolio value maximization, as illustrated in the Integrated Framework for Project Portfolio Selection (Archer & Ghasemzadeh, 1999) and the Larger Picture (Bridges, 1999), but portfolio value is also generated through more abstract elements coming from, for example, product innovations (Killen, Jugdev, Drouin, & Petit, 2012; Kock et al., 2015). The value of a portfolio for an organization is also indirectly derived through the increased transparency, communication, collaboration, and team orientation, which has made PPM a technique that appeals to agile projects (Stettina & Hörz, 2015).

2.3 Governance

Several academics and regulatory institutions, such as the OECD, International Monetary Foundation, and World Bank, have discussed the topic of *governance* for decades from different perspectives, such as economic, corporate, and network (Kersbergen & Waarden, 2004; McGrath & Whitty, 2015; Robichau, 2011), but a dictionary (BusinessDictionary, n.d.) provides perhaps a suitably neutral, precise definition for governance as follows:

> Establishment of policies, and continuous monitoring of their proper implementation, by the members of the governing body of an organization. It includes the mechanisms required to balance the powers of the members (with the associated accountability), and their primary duty of enhancing the prosperity and viability of the organization (p. 1).

McGrath and Whitty (2015, p. 781) made a comprehensive literature review to synthesize the systems, linguistics and logic behind the concepts of governance and proposed the following definitions for different forms of governance:

- Govern—direct and control.
- Governance—the system by which an entity is directed and controlled.
- Government—an entity that controls a geographic area.
- Organizational governance—the system by which an organization is directed, controlled, and held accountable.
- Organizational governance arrangements—an entity's structure (component parts, inter-relationships), positions (roles, responsibilities, pay levels and numbers), rules (written and unwritten, including policies, procedures, codes, methodologies, and conventions), decision-making processes (including financial and other delegations, as well as approval processes), and reporting arrangements (annual, financial, progress, assurance, regulatory, stakeholder).
- Corporate governance—the organizational governance of a corporation; the system by which a corporation is directed and controlled and held to account.
- Project governance—the organizational governance of a project; the system by which a project is directed and controlled and held to account.

The abovementioned definitions represent the strong structural orientation of governance, which has led to the introduction of one additional term, "governmentality," used to describe the human side of governance in a similar manner to how leadership describes management (Clegg, Pitsis, Rura-Polley, &

Marosszeky, 2002; Müller, Zhai, Wang, & Shao, 2016). Furthermore, the phrase "governance of projects" is sometimes distinguished from "project governance" by noting that the former covers multiple projects, whereas the latter focuses on the governance of a single project (Biesenthal & Wilden, 2014; Müller et al., 2014).

From an organizational perspective, governance is a function of management or any entity responsible for overseeing and controlling the work of an organization and provides a framework for (ethical) decision-making and managerial action, which builds on transparency, accountability, and defined roles (McGrath & Whitty, 2015; Müller et al., 2014). Governance takes place on different levels of an organization. These levels are most commonly divided into three:

1. The highest level, also referred to as the strategic (Loorbach, 2010) or corporate or board of directors level (Kathuria, Joshi, & Porth, 2007).
2. The middle level, also known as tactical (Loorbach, 2010), business, or executive level (Kathuria et al., 2007).
3. The lowest level of functional (Kathuria et al., 2007) or operational (Loorbach, 2010) activities.

Corporate governance is a subset of organizational governance that is influenced by theories such as stakeholder theory (Freeman, Harrison, Wicks, Parmar, & de Colle, 2010), agency theory (Eisenhardt, 1989a), and stewardship theory (Davis et al., 1997) and describes all the influences affecting the institutional processes, including those for appointing the controllers and regulators, involved in organizing the supply (and sale of) goods and services—hence, also applicable to public sector organizations (Turnbull, 1997). The corporate governance system 1) defines the structures used by the organization, 2) allocates rights and responsibilities within those structures, and 3) requires assurance that management is operating effectively and properly within the defined structures. These managerial functions of corporate governance take place under five main areas: governing relationships, governing change, governing the organization's people, financial and regulatory governance, and viability and sustainability (Too & Weaver, 2013). The underlying objective of organizational or corporate governance practices or mechanisms is to align transactions within the organization economically, but in a more complex, institutional environment, these mechanisms—the "rules of the game"—become composite, aggregated systems instead of individual transactions (Williamson, 1996).

2.3.1 Governance in institutional change

Institutions, as defined by Scott (2001) "consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior. Institutions are transported by various carriers – cultures, structures, and routines – and they operate at multiple levels of jurisdiction." (p. 33)

These three categories of structures and activities, popularly referred to as pillars, emphasize different mechanisms, logics, and bases of legitimacy, as seen below in Table 8.

Table 8. Three pillars of institutions (reprinted by permission from Scott, 2001 © SAGE Publishing Limited).

	Regulative	Normative	Cognitive
Basis of compliance	Expedience	Social obligation	Taken for granted
Mechanisms	Coercive	Normative	Mimetic
Logic	Instrumentality	Appropriateness	Orthodoxy
Indicators	Rules, laws, sanctions	Certification, accreditation	Prevalence, isomorphism
Basis of legitimacy	Legally sanctioned	Morally governed	Culturally supported, conceptually correct

Organizations are generally understood as systems of coordinated and controlled activities that arise in an institutional context when work is embedded in complex networks of technical relations and boundary-spanning exchanges (Meyer & Rowan, 1977), or, in other words, "organizations are influenced by their institutional context" (Greenwood, Oliver, Suddaby, & Sahlin, 2008, p. 3). The institutional context or environment therefore defines and constrains the institutions of governance or organizations (Williamson, 1996). Organizations can become institutionalized (Meyer & Rowan, 1977; Scott, 2001), and institutions evolve over time as well (Dacin et al., 2002), through isomorphic change processes of coercive (political influence), mimetic (standardized responses to uncertainty), or normative (professionalization) natures (DiMaggio & Powell, 1983; Micelotta et al., 2017). Therefore, taking into consideration the aspects of governance connecting institutions and organizations (Kersbergen & Waarden, 2004; Scott, 2001), and the changing nature of both, this dissertation applies *institutional theory* to address how the change vehicles (ICT projects) are connected with organizations (central government ministries and agencies) and institutions (the Finnish public sector) through governance practices under a specific institutional change context

(e-government/public sector digitalization). Projects are also embedded in their institutional framework and this requires that institution-specific dimensions, such as political and legislative in the public sector, must be considered (Brunet & Aubry, 2016). The selected theoretical approach is by no means novel when the context and topic of this dissertation is considered. Institutional theory is among the most popular theories applied in project governance and e-government research (Ahola et al., 2014; Geraldi & Söderlund, 2018; Meijer & Bekkers, 2015; Snead & Wright, 2014; Turner, 2006), and has stemmed many intriguing applications, such as the previously mentioned TEF (Fountain, 2001) and the explanations of e-government phenomena through dynamic simulation (Luna-Reyes & Gil-Garcia, 2011)

Institutional theory has traditionally produced theories and models of how organizations and industries become similar by, for example, mimicking each other, and how processes become institutionalized, assuming that the role of human agency is minimal (Dacin et al., 2002; Meyer & Rowan, 1977; Scott, 2001). However, partly due to criticism about the persistence of views in previous studies, an increasing interest has been addressed over the years in the change of institutions and the conditions, drivers, and processes operating at multiple levels related to institutional change (Dacin et al., 2002; DiMaggio & Powell, 1983). Consequently, the role of agents in institutional analysis, *institutional entrepreneurship*, and change has received more attention in different streams (Dacin et al., 2002; Tassabehji et al., 2016; Wijen & Ansari, 2007). The concept of institutional entrepreneurship refers to the "activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones" (Maguire, Hardy, & Lawrence, 2004, p. 657). In a similar vein within project research, the traditional and dominant focus has been in examining how the institutional environments of projects both facilitate and constrain the management and organization of projects (Engwall, 2003) and how the organizational fields condition and affect the practices of project organizing (Manning, 2008). A field, or more specifically, an organizational field, can be understood here broadly as a set of diverse organizations that are engaged in a similar function (Scott, 2001)

A particular stream of research focusing on institutional entrepreneurship adopts the perspective of an active agency studying institutional change and deals with processes through which creative actors strategically shape or create new institutional structures through their institutional work (Lawrence & Suddaby, 2006). Institutional work requires skilled actors who can use discursive tactics to theorize change in a way to make it concrete and lucrative for different groups.

They use framing to justify new practices as acceptable and valid and can mobilize diverse actors and generate collective action to secure the acceptance of a change (Wijen & Ansari, 2007). Prior research has identified different tactics and strategies through which actors can contest existing institutions and legitimize new ways of acting and behaving, such as practice, boundary, and identity work (Hargrave & Van de Ven, 2006; Micelotta et al., 2017). However, one of the most salient challenges of institutional entrepreneurship literature has been its simplified portrayal of a limited number of institutional entrepreneurs as "heroic" actors who can easily transform institutions without any complexities. This approach has hence given little appreciation to the complex, collective, and mundane processes of institutional change (Micelotta et al., 2017). Institutional entrepreneurs have typically been identified as outsiders to the field or as members whose positions bridge the boundaries of two or more fields (Greenwood and Suddaby, 2006). In e-government research, the institutional entrepreneur, the "government CIO," has a considerably central role but with many cross-boundary responsibilities (Tassabehji et al., 2016). In particular, the cross-boundary connections allegedly play a central role in effecting change because of the access to novel ideas and practices, which contributes to more reflexive forms of action. However, detailed empirical portrayals of how cross-boundary connections and activities of institutional entrepreneurs affect the change and transfer processes are rare.

While the majority of the economic activities within project-based industries take place in individual projects, they can be considered salient and significant arenas for institutional entrepreneurs to modify and transform existing institutional arrangements that prescribe the appropriate organizational behaviors in projects. The role of temporary projects in changing how projects are executed has been discussed in project learning and capability literature in the context of individual project-based firms (e.g., Brady & Davies, 2004), in project network literature in how projects may change the inter-organizational relationships of permanent project networks (e.g., Ahola, 2009), and in project innovation literature, where the focus has been more on discussions of why it is challenging for innovations to spread within project-based industries and why learning does not take place (Bygballe & Ingemansson, 2014; Sydow et al., 2004). Much of the research has been addressed toward understanding and explaining the challenges and inhibitors of change and, consequently, the endurance of institutional logics within project-based fields. Discussions and theories regarding active efforts made by institutional entrepreneurship and purposeful institutional work across industry fields to

promulgate change in institutions, such as forms of organizing projects, have been rare.

Research on institutional change has only limitedly addressed the actual processes and activities related to cross-field transfer of different types of managerial practices across various industries. Instead, the transfers and translations of different structures and practices across different fields or institutional spheres have been addressed by political scientists who have examined how different policies are transferred and diffused from one institutional or national context to another (Radaelli, 2000). In this stream of research, the focus has been particularly on how the different policies are shaped, adapted, or recontextualized, and what factors affect this process. Furthermore, the spread of managerial practices in multi-national corporations has been examined within the field of international business studies. This stream of research has emphasized the role of the relationships between the parent organization and subsidiaries as one crucial factor that determines the success of the transfer (Kostova & Roth, 2002). However, in these studies, the focus has been primarily on one single organization and on the processes and activities inside its boundaries. The drivers of institutional change within one institutional domain or industry have also been addressed more recently (Micelotta et al., 2017). Here, the focus has been on understanding the reasons and processes of institutional change primarily in the context of one industry or institutional domain. This stream of research has traditionally emphasized the perspective that the impetus for the industry-level change typically comes from the outside and actors in the periphery. Instead, elite and dominant field actors seldom mobilize change processes if it is not necessary for their survival to do so (Greenwood et al., 2008). Institutional and boundary work into which the intermediaries and actors engage has been identified as one important driver in advancing change. Scholars focusing on industry structures and evolution have also studied how managerial practices, technologies, and innovations are spread and transferred across industries. In these studies, the institutional perspective has been largely dismissed (Abrahamson, 1991).

2.3.2 Project governance

Project governance is a multi-faceted concept whose inherent nature, conceptualizations, theoretical foundations, and key characteristics have been actively debated for quite a while by scholars in project management and other fields alike (Biesenthal & Wilden, 2014; Publication I; Müller, 2009;

Sirisomboonsuk, Ching Gu, Qing Cao, & Burns, 2018; Volden & Andersen, 2018). Project governance has been defined, for example, as "the alignment of project objectives with the strategy of the larger organization" (Project Management Institute, 2013, p. 553), "the framework within which project decisions are made" (Garland, 2009, p. 10), or as a model that—based on principal-agent theory—illustrates the roles, responsibilities, and interaction hierarchy of the main project network constituents: project funder, steering committee, project owner, project manager, and project team (Zwikael & Smyrk, 2015). Project governance comprises the value system, responsibilities, processes, and policies that allow projects to achieve organizational objectives and foster implementation beneficial to stakeholders and the organization itself (Müller, 2009; Turner, 2006). In other words, to ensure that organizations efficiently do the projects right. Besides the *how*, another important aspect governance of projects is the *what,* i.e., to ensure that organizations effectively do the right projects (McGrath & Whitty, 2015; Müller, 2009).

Project governance exists within the corporate governance realm, under the "governance of change" area in Too and Weaver's (2013) categorization, but the temporary nature of project organizations separates the governance of project organization from that of a permanent organization (Lundin et al., 1995; McGrath & Whitty, 2015). Project governance has certain features that distinguish it from project management. First, the time and lifecycle perspectives of project governance extend over the project management scope by emphasizing the critical front-end activities before the project's launch and on the long-term, post-project utilization of project output (Hellström, Ruuska, Wikström, & Jåfs, 2013; Samset & Volden, 2016; Sanderson, 2012; Serra & Kunc, 2014; Stewart, 2008). The concept of success differs between project governance and management, as the former perceives success through strategic, long-term benefits and contributions to the organization's objectives, whereas the latter traditionally sees success through more operational, short-term measures on cost, scope, and budget (Joslin & Müller, 2016; Serra & Kunc, 2014; ul Musawir et al., 2017). The scope of project governance is more on the outside of the organization and project by addressing the management project stakeholders and networks, as well as risks (Aaltonen & Sivonen, 2009; DeFillippi & Sydow, 2016; Ruuska, Ahola, Artto, Locatelli, & Mancini, 2011; Wirick, 2011; Zwikael & Smyrk, 2015). This scope has further led to two distinct approaches to project governance in the literature: an external view, emphasizing strategy and how the project fits into the organization, and,

subsequently, a more internal view regarding how projects are managed internally (Ahola et al., 2014).

The external approach views project governance as "the system by which a project is directed and controlled and held to account" (McGrath & Whitty, 2015, p. 781). This type of project governance ensures that the outcomes of the project are aligned with the larger strategy of the organization while also ensuring that the standards and rules that apply to projects are followed in practice (McGrath & Whitty, 2015; Müller & Martinsuo, 2015). In this view, project governance is an embedded part of the project's environment, which has a moderating effect on the project's methodology and success (Joslin & Müller, 2016). In the internal view, the governance of a single project is examined from the perspective of internal coordination, with a focus on ways to safeguard, coordinate, and adapt the interactions between the participants in the temporary project to ensure that they are working toward shared project goals (Ahola et al., 2014; Kujala, Aaltonen, & Gotcheva, 2016).

While project management focuses on rational planning and the technical implementation of a project from the perspective of central actors, project governance can be considered a subset of project management aiming to obtain information about the project's current status to enable steering and appropriate intervention and to ensure that the central coordination mechanisms and rules aligning the goals of project actors are followed in practice (Kujala, Aaltonen & Gotcheva, 2016). Project governance both integrates and delineates corporate governance and project management, as illustrated (Figure 8) in the framework below through, four key elements: 1) portfolio management that focuses on selecting the right projects and programs to undertake in support of the strategy, and terminating ones that no longer contribute value to the organization, 2) project sponsorship that creates a direct link between the executive and the project or program manager, focusing on the whole project lifecycle leading to the delivery of value, 3) PMOs that provide the oversight and strategic reporting capabilities on project deliveries, and 4) projects and programs that highlight the effective management of projects and programs, thus being the measure of an effective governance system (Too & Weaver, 2013).

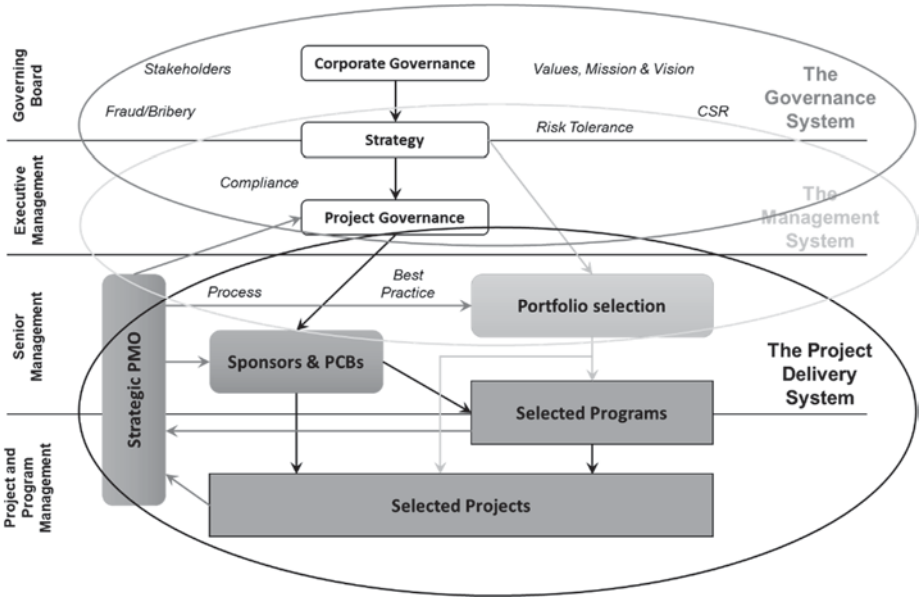

Fig. 8. The project governance framework (reprinted by permission from Too & Weaver, 2013 © Elsevier)

In the existing literature, the mechanisms and practices of project governance have been treated through the higher-level concepts of control in agency theory (Eisenhardt, 1989a), trust in stewardship theory (Davis et al., 1997), and relationships and relational contracting (Müller et al., 2016), which leaves room for more detailed micro-level examinations of actual governance practices enacted in the projects' daily lives. The practices and mechanisms are aimed at constantly aligning, revising, and communicating long-term and short-term project goals, and applying motivation and control to ensure that a project contributes to an organization's strategic objectives and that the performance of the project complies with these goals (Hrebiniak & Joyce, 1984; Srivannaboon & Milosevic, 2006; Too & Weaver, 2013). After conducting a systematic review of project governance in the project management literature, Kujala et al. (2016) suggested a framework for project governance, identifying its key mechanisms under six dimensions (Table 9), each representing an independent aspect of project governance. The first dimension (goal-setting) concerns consolidating business or other requirements and technical and organizational capabilities within the operational frame and project objectives. The incentives dimension aligns the project team and stakeholders' reward and risk-

sharing schemas with the project targets. Monitoring includes practical tools and mechanisms for measuring the project's performance. The coordination dimension deals with arrangements that steer the project's future actions and communicate decisions among the parties involved. Roles and decision-making are important for assigning the right people to the right roles with the right responsibilities and powers that support the project's performance toward its objectives. Finally, capability building involves the mechanisms that help identify and enhance the critical competencies required for projects and further develop them based on ongoing and past project experiences.

Table 9. Key dimensions and mechanisms of project governance (modified from Kujala et al. 2016).

Key dimensions and mechanisms of project network governance	Description of governance mechanism
Goal-setting	
Joint performance goals	High reliance on a contract as a legally binding document that ensures contractually determined outcomes or outputs are delivered on schedule, within budget, and as accepted behavior
	Early relationship-building meetings and workshops with key stakeholders can be used to agree on schedule planning and objectives
	In addition, long-term issues need to be considered in strategic decision-making concerning the project
	Conflicts over project objectives or lack of commitment are the main problems
Clarity of goals	Inherent goal orientation of actors
	Challenge of achieving relevance and sustainability of project objectives are unknown or misunderstood
Flexibility of goals	Front-end plan-driven approaches, flexibility for goals low
	Rendezvous clauses: revisiting parts of a contract by officially deferring decision-making on which agreement cannot be reached at the outset
	Flexibility in bid requirements to allow contractors to bring their skills and propose innovative solutions
	Sequential tendering of work to allow changes at a later stage
Incentives	
Rewards tied to performance (short-term)	In performance-based contracts, contractually defined incentives and penalties for defaults
	Bonuses for completing project ahead of schedule or fines for being late
	Using target cost and pain/gain share contract to drive performance
	Integrated project teams with financial incentives to stimulate innovation
Risk allocation	Choice of contract forms (e.g., lump-sum, cost-plus) can shift risk exposure between parties

Key dimensions and mechanisms of project network governance	Description of governance mechanism
	Risk/reward regime based on monetized key performance indicators
	Traditional risk-sharing approaches particularly in turnkey projects that bring up controversies between the project parties
Rewards tied to life-cycle performance (long-term)	Use of life-cycle approach in which project parties are paid by performance and availability of project product
	Reductions in payment due to performance (e.g., failure to maintain service standards will result in payment deductions or financial damages)
Ownership structure	Ownership structure/share in arrangements
	Creating sense of ownership for participating organizations and individuals (e.g., by retaining an ownership stake in the asset)
	Continuity of personnel
Reputation and future business	Publishing reputation scoring for individual organizations
	Reputation as an incentive to sacrifice short-term interests in exchange for long-term
Monitoring	
Formal control and monitoring	Behavioral and outcome control in terms of budget, time, and scope
	Contractually specified monitoring and reporting procedures, sequential approach
	Contracts setting out comprehensive performance measurement system, including key performance indicators
	Only realistic and monitored project milestones and performance targets considered useful
	Periodic progress monitoring
	Systems and mechanisms for monitoring, controlling, and reporting progress of the work
	Regular client inspections and site visits
	Steering group to oversee overall progress and to provide guidance
Third-party monitoring and auditing	Use of external parties to monitor performance
	Auditing mechanisms
Coordination	
Common project management practices	High reliance on contracts: contractually specified key principles and agreements among parties (e.g., budget, delivery deadline, quality standards, safety requirements)
	Strategy document outlining the project vision and organizational processes that will enable it to be achieved
	Formalized relationships such as boards and group structures that allow a degree of control over required outcomes
Shared culture, values, and norms	A shared set of values, objectives, and beliefs about how to coordinate the organization's efforts to reach common objectives

Key dimensions and mechanisms of project network governance	Description of governance mechanism
	A consciously designed project culture across key participating organizations
	Relational norms that define expected behavior
	Joint organizational development and training strategy to ensure cultural change issues are planned and delivered effectively
Communication and information-sharing	Regular meetings with project participants to confirm target schedules
	Meetings to facilitate communication and decision-making
	Information dissemination and communication systems
	Lines of communication
	Information transparency
Change management	Contractual terms associated with specified principles, tactics, organization structures, and processes for resolving unforeseeable events
	Communicating risk using a top-down approach or directly between project participants
	Flexible partnerships enabling changes to run smoothly
Conflict resolution	Court injunction to settle disputes legally
	Out-of-court negotiations to settle disputes
	Personal relationships between actors to resolve conflicts effectively
	Formal statement of values as a basis for resolving disputes internally
	Collaborative problem resolution methodology: a systematic approach with realistic timescales for resolutions
Roles and decision-making	
Role definition	Contractually defined roles and responsibilities for each party
	Organizational structures
Management structure	Creation of a suitable project management structure: establishing reporting lines to the top-level project board
	Roles and responsibilities of boards and management
	Clear governance structure, in which the work management team is responsible for daily execution of the project
Authority for decision-making	Equality between parties to create true partnerships
	Right decision at the right time: a form of active participation
	Competence and risk-carrying capacity as basis for allocating responsibility
	Delegation of power to project team
Capability-building	
Actor	Selecting people with experience and quality performance record
	Identifying necessary skills and expertise early and ensuring adequate attention to resourcing of project teams
	Learning lessons and recruiting managers capable of applying experience gained on other projects

Key dimensions and mechanisms of project network governance	Description of governance mechanism
	Tendering process to encourage innovation (optimized contractor involvement, “early enough”)
Training and continuous learning	Periodic learning
	Providing training to suppliers (e.g., safety culture)
	Systematic collaboration and practice development
	Exchange of innovation success and learning from failures
	Identifying, articulating, and codifying innovative practices for the future primarily at the end of the project

Project governance has mainly been perceived as a vertical construct and process (Müller, 2009; Oakes, 2008; Sirisomboonsuk et al., 2018; Turner, 2006) that takes place in different levels within an organization by shifting the scope and objectives between them. Too and Weaver presented in their 2013 study three levels that can be matched with the previously described governance levels: 1) the governance system (board of directors) level that focuses on the strategy and resourcing of the (project) organization, 2) the management system (executive) level for managing the entire (project) organization’s capabilities, objectives, and providing assurance to the governance system, and 3) project delivery system level that oversees all individual project systems responsible for deliverables and performance. Biesenthal and Wilden continued (2014) Too and Weaver’s proposal by conducting a systematic investigation of both general management and project management literature to synthesize the objectives, tasks, performance, and theoretical foundations of project governance in the three main levels similar to this research. An overview of this synthesis is provided in Table 10. The theoretical aspects of different levels were also acknowledged in the project management study categorization (Geraldi & Söderlund, 2018) that was applied to position this dissertation research earlier in the Introduction section. Furthermore, in a recent study (Brunet, 2018), the distinction between project governance (artefacts, concepts) and project governing (activities, practices) on different levels was elaborated by describing the forms of enactment practices—structuring, normalizing, and facilitating, respectively—and proposing a consequent “governance-as-a-practice” concept.

Table 10. Overview of different levels of project governance and proposed theories (modified from Biesenthal & Wilden, 2014).

	Governance objectives	Governance task	Performance	Governance theories
Organizational level (highest)	Governance of Project Management	Portfolio direction Project sponsorship Disclosure and reporting	Strategic Long-term (permanent) Competitive advantage	Stewardship theory Stakeholder theory
PMO level (middle)	Linking projects to organizational objectives	Portfolio and program management Developing PM capabilities Project evaluation	Operational Long- and short-term Organizational development and progress	Resource dependency theory
Project level (lowest)	Governance of individual project	Project management Project delivery Manage objectives, expectations and outcomes	Tactical Short-term (temporary) Goal directed	Agency theory Transaction cost economics

2.4 Synthesis of literature foundation

In this section, the applied literature is synthesized. The e-government transformation—public sector digitalization—is a continuous institutional change process that progresses through different stages of maturity. The transformation is enacted by applying technological, organizational, and governance factors into a multi-level project governance model that aligns, controls, and holds accountable the individual ICT development projects. The following construct is proposed (Figure 9) to illustrate this model.

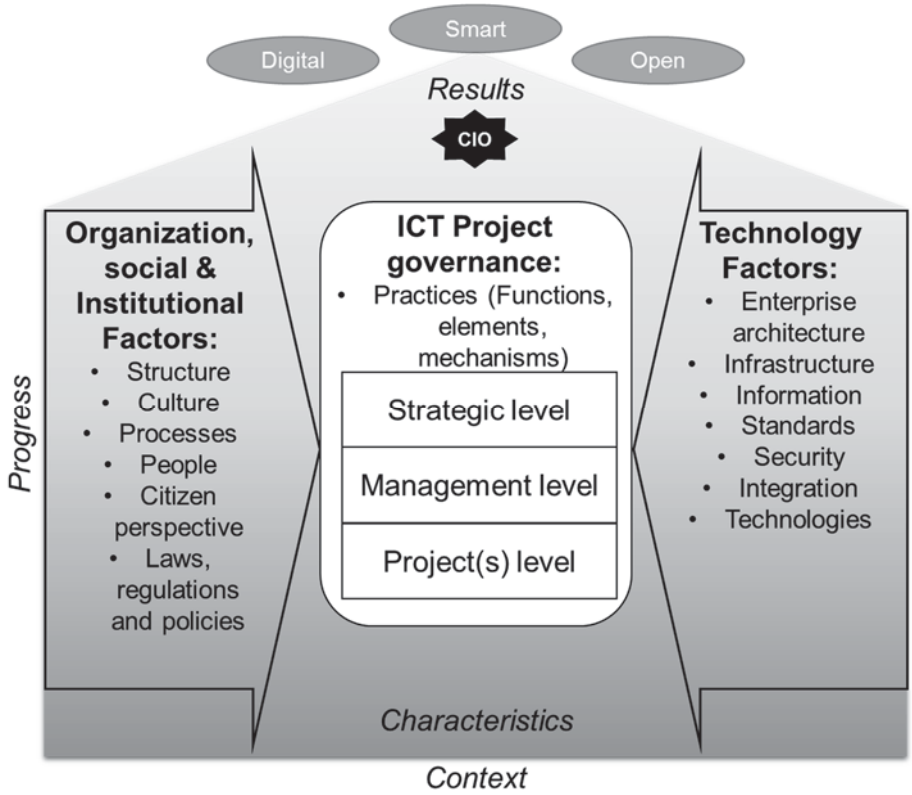

Fig. 9. A construct for ICT project governance in e-government transformation.

This construct presents the multi-level model for governing ICT projects affected by the technological and organizational, social and institutional factors (Altameem et al., 2006; Cordella & Iannacci, 2010). The project governance model includes three organizational levels: strategic (the highest), management, and project (lowest) with distinguished responsibilities, objectives, and performance scopes (Biesenthal & Wilden, 2014; Kathuria et al., 2007; Loorbach, 2010; Too & Weaver, 2013). On each level, project governance is conducted through specific practices that vary, connect, and interact between levels. The term "practices" encompasses all the different activities, procedures, and processes that are also described in the literature as functions (application of structures, allocation of roles and responsibility, and requirement of assurance), elements (PPM, PMO, sponsors, and projects and programs, as in Too & Weaver, 2013), and mechanisms (goal-setting, incentivization, monitoring, coordinating, roles and decision-making power, and

capability-building, as in Kujala et al., 2016). In this sense, the central *ICT project governance* concept includes the managerial artifacts and structures and leadership activities. Or, in other words, both *project governance* and *project governing* aspects (Biesenthal & Wilden, 2014; Brunet, 2018) of single and multiple ICT projects are included, as well as the *governmentality*, *project governance*, and *governance of projects* perspectives (Müller et al., 2014). The project level also considers the characteristics of different project types and models, such as agile and alliance (Conboy, 2009; Fernandes et al., 2017). The proposed ICT project governance model can be considered a framework for enacted technology in e-government transformation (Cordella & Iannacci, 2010; Fountain, 2001) that also invokes the introduction of the e-government CIO as an institutional entrepreneur to oversee the transformation (Tassabehji et al., 2016). The construct is also depicted through the maturity and progress stages (Lee, 2010), constituting characteristics, and results (Luna-Reyes et al., 2012), thus suggesting that the project governance model evolves with the transformation progress. The *context* element describes the interface between national and field characteristics and circumstances that impact the governance model.

To summarize the project governance challenges within the proposed construct, problems arise when the public sector administrative management possesses neither the necessary management qualities nor the appropriate instruments to control the projects by mediating between the business and ICT. In other words, the alignment between business requirements and technological capabilities is challenging when administrative departments and cadres lack the ability to govern and evaluate complex ICT projects and judge them competently (Walser, 2013). ICT projects often reach over several public organizational boundaries, which also increases the complexity and challenges for governance. EA, for example, can bridge the gap between organizational and technology aspects by defining and interrelating data, hardware, software, and communication resources, as well as the supporting organization required to maintain the overall physical structure required (Janssen & Klievink, 2012). Prior to this bridging, there has to be an alignment of stakeholder requirements and interests to get the business needs for the ICT project (Müller & Martinsuo, 2015). It has been noted that public organizations attach benefits and benefits realization to individual projects, irrespective of scope, cost, or importance, instead of analyzing the benefits in a wider group of stakeholders' and their interests (Marnewick, 2016). Two particular characteristics that influence project governance in the public sector are the disconnection between objectives and profit and difficulties in targeting the process user. Though private sector actors

also have a variety of business and project objectives, the central target is nevertheless shaped around the financial value to be gained. Public institutions, however, have difficulties forming and communicating a unified vision. Identifying the users of public sector processes can be challenging due to the complex and widespread organizational structures of public sector institutions that make it difficult to pinpoint an owner of the same process (Arnaboldi et al., 2004). In the public sector, a single ICT project's performance can be detracted by rigid decision-making processes, excess requirements of conformity, and strong organizational regulations (Wirick, 2011), but these political aspects of public sector management seem to connect PPM strongly, if integrated into existing decision-making and corporate management practices to avoid excess bureaucracy (Martinsuo & Dietrich, 2002). Studies concur with this observation on a local government level, where ICT PPM has been seen important to managing the organizational effort to reach the transformational stage of e-government (Hansen & Kræmmergaard, 2013).

3 Results and research contribution

3.1 RQ1: How project governance practices affect agile projects in the public sector

Publication I explores project governance practices in public sector agile software projects. The underlying motivation for this research was the limited knowledge about the organizational preconditions, processes, and project governance arrangements that affect the application of agile project management approaches in the context of the public sector. Hence, the research aims to integrate project governance research with agile studies in the ICT sector by examining current governance practices in public sector organizations and providing a way to categorize them. The study also aims to provide insight into tensions that governance practices form on agile projects. The research is based on qualitative research strategy and applies elaborative logic with analyses of three case organizations in the Finnish public sector.

The key findings of the research categorize the perceived project governance practices into six dimensions: business case, contracting, controlling, steering, decision making, and capability building. The results illustrate how these practices either support or detract from the performance of agile projects, as seen in Table 11.

Table 11. The impact of current project governance practices on agile projects (reprinted by permission from Paper I © 2017 Emerald Publishing Limited).

	PROJECT GOVERNANCE DIMENSIONS AND MECHANISMS					
	A - Business case	B – Contracting	C – Controlling	D – Steering	E – Decision making	F - Capability and competence building
Agency A	Support: Compliance with central administrations customer strategy provides internal support Stakeholders identified and involved by project owner Detract: Fixed budgets Business and technology separated Laws and regulations determine main specifications beforehand	Support: Flexible contracting according to procurement law Laws also force scope control through Minimum Viable Product Detract: Owner (customer) bears all risks Suppliers work on hourly rate, no risk- or target-based rewards Result-based approach missing in general	Support: (Testing) Automation utilized as much as possible Detract: Extensive documentation contradicts with agile principles	Support: Common premises when possible Informal communication encouraged Solid connection between development team and Product Owner enables good communication Detract: Several ongoing projects to be coordinated, which burdens the steering resources	Support: Support functions (PO, architects, lawyers) play an important role Strong technical support from architects Well-defined roles Detract: Agile and traditional roles mixed (competence focus missing) Project manager is an administrator Decision hierarchy complex	Support: Basic agile training to project people beforehand External specialist utilization Substance competence equally important Detract: Organization still leans mostly on basic project know-how

	PROJECT GOVERNANCE DIMENSIONS AND MECHANISMS					
	A - Business case	B – Contracting	C – Controlling	D – Steering	E – Decision making	F - Capability and competence building
Agency B	Support: System lifecycle determines priority for projects Stakeholders identified by project owner and steering group Detract: No systematic business case method or tools Budget and solution concept fixed early on	Support: Procurement and contract models determine risk ownership Resource-based sourcing Benefits analyzed Detract: No result-based incentives	Support: Technology supports agile monitoring (Jira, Confluence) Product backlog main document Project reporting four times per year Detract: Measuring based on traditional cost, quality, time	Support: Communications technology helps break distances Team proximity preferred Detract: Key resource availability insufficient Documentation needed for steering group Terminology and common language mixed or missing	Support: Project owner = business process owner Common Product Owner team with external consultants Detract: Project managers in agile projects Budgeting by IT development program	Support: Basic training beforehand PMO owns and supports Detract: Competence development personnel dependent Project management not in focus
Agency C	Support: Utilization approach supports use cases VM case analysis tool used for pre-analysis	Support: Risks identified and monitored according to project manual Procurement law and process used to source resources Detract:	Support: Agile methods bring transparency and timeliness Detract: Project Manual describes basic procedures, but not agile	Support: Common sense and informality characterize communication within project team Working in same premises when feasible	Detract: Time required by ex-project business management reduces allocation of key resources	Support: Extensive agile training beforehand Substance competence valued Detract:

PROJECT GOVERNANCE DIMENSIONS AND MECHANISMS					
A - Business case	B – Contracting	C – Controlling	D – Steering	E – Decision making	F - Capability and competence building
Stakeholders identified systematically and involved in development Detract: Laws and regulations determine requirements Fixed budgets limit agile Project split to specification, delivery and maintenance	No result-based incentives Benefit validation not done after project	Resource allocation measurements missing Only traditional metrics	Successful projects enable freedom to plan new ones Detract: Several overlapping steering groups with same or different people VM ICT department acts as external supervisor	Several authority-confusing interfaces: Project owner vs. budget owner vs. process owner, and organizational boundaries vs. system architecture	No systematic methods to measure competence and development

Governance practices under the business case dimension focused mostly on goal-setting, i.e., pre-analysis and budgeting. The organizational process behind pre-analysis was somewhat common in each case, as all were basically initiated by the owner from the business side, though the setup of the analysis team varied to a certain extent. The involvement and impact of stakeholders were identified in each case agency, but the systematic process to do so was mostly absent. This lack does not necessarily support or detract agile project performance, as the product owner is the sole source for requirements, but it does illustrate the state of project governance in general. The contracting dimension also included risk, incentive, and sourcing practices. All case organizations had selected a sourcing model that was driven by Finnish procurement law and based on resource hiring, which was relatively light from the administrative perspective and supported the flexible resourcing of agile methods. However, all risks related to the project outcome were always carried by the project owner organization. Risk identification and management were conducted in all cases internally by permanent organizations. The project organization or project outcome was not included in the result-based incentives used in the case organizations. Interestingly, the data illustrated how the public sector organizations seemed to lack the result-based orientation in general. The controlling of project performance in all cases was primarily focused around the traditional project metrics: cost, quality, and budget. The long-term benefits of project deliverables were not assessed. Even though agile methods brought real-time accuracy and transparency in all cases, there were still requirements for extensive documentation due to internal procedures. Product and Scrum backlogs were the core documents on a project team level, but the higher-level steering bodies called for more traditional compliance. In the steering dimension, it was evident that there was disintegration between the owner organization and project teams when steering, planning, and communication practices were considered. This issue was characterized by the fundamental differences between agile and traditional project delivery procedures and preferences, on which the official procedures within the organization were based in all cases, even though all case organizations embraced the informal communication practices that are characteristic to agile development. Decision-making practices were affected clearly by the mix between the more traditional project delivery roles and procedures with those applied through agile methodologies, which was not seamless at all and caused overlapping and additional administrative work. This finding was clearly one of the strongest, detracting from the utilization of agile methodologies and negatively affecting the agile project performance. Decision-

making authority was also a vague concept, as project ownership was associated with several dimensions and perspectives such as (service) process ownership, project (budget) ownership, and technical ownership. Additional complexity was caused by organizational boundaries and interfaces, and the excessive segmentation of the main project into sub-projects according to delivery phases. Capability-building toward the utilization of agile methods was supported in all case organizations mostly through dedicated methodology training, but besides the necessary technical competence, the crucial role of substance competence relating to the business itself was also emphasized. However, project resourcing was still mostly conducted as an ad-hoc activity, left on the personal capability of the project manager, as all cases described the lack of measuring and managing the competences and availability of project resources.

The results show that agile project performance was mostly affected by governance practices applied under the business case and decision-making authority dimensions. The results also show that there are two contextual interfaces to the agile project itself, which create additional governance tensions: the public sector and technology. First, in the context of public sector ICT projects there are three underlying elements that affect the governance of agile projects: the characteristically stable organizational structure that is connected directly with the ownership and steering procedures; the regulative elements in general, namely, external laws and directives, and internal procedures and documentation; and the e-government strategy and initiatives that—combined with public attention and pressure—drives the digitalization and technical development of the public sector. Secondly, it is evident that the technology-related aspects of e-government strategy and EA control the agile project, but tension arises if the control exceeds the system functionalities. The stakeholder demands and preferences that are derived into agile project requirements and further to system functionalities are managed by the product owner. Therefore, the interface and associated governance activities between the EA of e-government and the agile product owner are challenging.

Previous project governance studies have thus far focused primarily on identifying and describing the higher-level organizational and process-related elements of governance, hence leaving room for studies that would examine the micro-level governance practices that take place within the project itself. The contribution of this study is that it combines the more traditional and fixed perspectives on project governance with the research on agile projects in order to develop a more holistic and integrative concept for the governance of agile projects. The research suggests that in this specific context governance can also be perceived

from technical and delivery method standpoints, besides the commonly used organizational and process perspectives, thus bridging the current gap between ICT and project management research. The results of this study will allow public sector project organizations to design appropriate governance mechanisms for agile projects and to identify the challenges and tensions that need to be considered and managed in the process.

3.2 RQ2: What is agile project governance?

Publication II explores and conceptualizes agile project governance. The research motivation, also identified in Publication I, is derived from the limited understanding and theorizing on how traditional project governance practices operate differently in the agile project context and what kinds of novel practices agile projects may require. The study is conducted as a systematic literature review of agile project studies published in software engineering, computer science, and project management journals. As a direct continuation of the research presented in Publication I, this research applies a previously introduced project governance framework with evidence from the literature, thus describing and categorizing the governance practices applied in agile projects. The study compares agile and more traditional project governance practices to illustrate the similarities and differences between these approaches, as well as highlighting the novel or missing elements.

The key findings of the research, the project governance practices applied in agile projects, are presented through six dimensions: goal-setting, incentives, monitoring, coordination, roles and decision-making power, and capability-building. The main discussion concerning the elements under the goal-setting dimension includes the close cooperation between customers and the empowered project team, which is critical to reaching a shared understanding of the project goals, requirements, and deliverable product vision—an agile-specific mechanism described frequently in the papers. It was generally accepted in the reviewed papers that project objectives could not be explicitly defined up front but rather evolved during the project life cycle. Contracts, a more formal mechanism, were discussed in the papers with the consensus that a flexible, billed-hour type of contract is preferred in agile projects, although customer commitment can be a challenge. The discussion under the incentives dimension was limited in the analyzed papers. Most of the research shares the underlying assumption that the nature and philosophy of agile work itself are the best incentives to get the agile team members committed to project work and to motivate them.

The most common monitoring practices for agile projects, described in the selected papers, were sprint/iteration reviews, in which the main goal was to test and validate deliverables against user story specifications, using automation when possible, and to get feedback and formal acceptance from the customer. The deliverables of the sprints, such as working software modules, were used not just for acceptance, but also as the inputs for project progress monitoring and measurement. Agile-specific metrics and key performance indicators that would enable monitoring in practice were seldom discussed. The metrics that were mentioned focused mostly on customer-centric speed and value. The main coordination practices found in the papers illustrated the methods and tools used for iterative planning and change management activities. In agile approaches, the project plan consists of backlogs that contain the prioritized features for each sprint and user story. The papers often addressed the role of visual and real-time communication with the support from applicable modern communication technologies as important coordination practice in agile projects.

The roles and decision-making power practices emphasized adopting an organizational structure that provides total autonomy in decision-making for the agile project team. Typically, the agile project team comprises different roles, including the customer, a cross-functional development team (product owner, developers, testers, architects, usability designers), and also, curiously, a project manager who would focus mostly on administrative activities such as project planning and reporting. The team relies strongly on informal roles and relationships, mutual trust, and involving the right people in the decision-making process. The main perspectives on capability-building practices in agile projects addressed the role of client capabilities in agile projects and the optimal capability composition of the agile project team and its various competence requirements and preferences. In addition, the processes and tools of learning and knowledge exchange within the agile project team, with other stakeholders, and projects within organizations and the role of the agile team's experience and capabilities in explaining agile project performance were given significant attention.

The results of this study indicate that the established governance-related practices used in agile projects are connected mostly with the goal-setting, coordinating, and roles and decision-making dimensions. The study also identified many ambiguous, cross-functional, and generic governance practices in agile projects that challenged the applicability of the strict, predetermined dimensions of governance. As described in Table 12, the findings of the research were elaborated by contrasting traditional and agile project governance practices in terms of which

traditional project governance practices apply to agile projects as such, which need to be modified for agile contexts, and what new project governance-related practices have emerged from agile project environments.

Table 12. Comparison of traditional and agile project governance practices (reprinted by permission from Paper II © 2018 Project Management Institute, Inc).

Traditional Practices That Can Be Transferred to Agile as Such	Traditional Practices That Can Be Modified to Agile	Emerging Agile-Specific Practices with No Regard to Traditional	Remaining Gaps Between Agile and Traditional Project Governance
Distinguished front-end phase for goal setting and business case	Scope setting is a visionary and iterative process, starting with product vision and user stories	Inclusion of customer within the project team for decision-making and validation efficiency	Linking and aligning the agile project objectives with organizations' strategy
Long-term post-project benefit realization	Short-term value realization through utilization of deliverables	Using validated—tested and accepted—deliverables as project performance and incentives basis	Connection between formal and flexible budgeting
Clear organizational and ownership structure	Flexible, value-based project budgeting and contracting	Change management is embedded into iterative planning and delivery	Impact of collaborative project models to agile project governance
External audits by third parties	Motivation through peer and team performance-related incentives	Agile philosophy and principles as project culture foundation	Conflict escalation and resolution within agile project
Project stakeholder management	Visual, real-time project monitoring through agile-specific and traditional measures	Project team empowerment for autonomy, flexibility, and decision-making power	Application and impact of formalized project governance structures in agile context
Project risk management	Product and sprint backlogs are the main planning and communication means	Project team composed of multitalented, self-organized, and cross-functional individuals, both experts and beginners	Project human resource and capacity management in agile method
Necessary documentation for external validation and communication	On-site, informal, and real-time communication (internal)	Agile mindset and technical capabilities as competence requirements	
Project capability management on organizational by PMO, HR	Project management daily activities are shared on a team level	Project manager role changes to administrative and facilitative	
	Sprint retrospectives used as interproject learning method	Agile coach and Scrum master manage agile project team performance	

The traditional project governance practices that can be applied to agile methods featured mostly practices from the goal-setting dimension. Formal compliance and assurance mechanisms, such as contracts and budgeting, are present in both traditional and agile contexts, even though the content, scope, and nature of the latter might focus on and enable flexibility. This study indicates that even though agile projects favor measuring and visualizing success and outcomes through short-term metrics and deliverables, the agile project's long-term benefits may also be of interest for the customer, sponsor, or owner organization, and should, therefore, be validated with means closer to those of traditional project governance. Granting appropriate decision-making power to, or empowering, the project team in traditional project governance is applied through ownership and resource allocation. This policy generally applies to agile projects. Agile software development projects require competences and know-how that are not featured among traditional project management skills, such as those specific to agile practices and SW development-related technical skills, but the management of these can be performed by external governance bodies similarly to traditional settings.

The project governance practices that need to be modified from traditional to agile are most evident in the coordination dimension. In agile projects, the focus of coordination and communication is to provide sufficient real-time information about the project's status to the empowered project team and involved customer representatives visually and in real time. For this purpose, agile projects prefer product vision and backlogs instead of a formal, rigid project plan. Traditionally, incentives related to project performance are determined by connecting the predetermined objectives with the actual outcome of the project once the project has ended. However, in agile projects, the project objectives are visionary at the best, whereas the content and targets of sprint deliverables are explicitly described and can be used to measure and monitor project progress and team performance.

The research also identified emerging, agile-specific governance practices. Customer involvement is not a feature exclusive to agile projects, but in agile projects, it is emphasized by both the inclusion of the product owner as directly representing the customer and by ensuring that the development team members have sufficient competence in the customer business or domain. In characteristically uncertain agile projects, constantly arising changes are not considered risks but addressed with iterative planning and prioritization, using real-time communication. Individual commitment, agile philosophy, and the principles themselves can provide a solid foundation for project culture and values, which has been traditionally considered a top-down organizational activity. Roles and

decision-making practices in agile projects focus almost exclusively on the construction of empowered, self-organizing, multitalented, and committed teams.

The research findings still left unanswered gaps between agile and traditional project governance. The short-term perspective adopted by agile projects toward measurement of project output, success, and benefits implies a weaker link to parent organization strategies than seen in more traditional projects. What remains a gap in the knowledge is how strategic connections can be established, managed, and understood at different levels in an organization that executes agile development projects and how the strategic alignment of objectives can be achieved. How agile approaches support or detract increasingly popular joint or integrated project deliveries agreements at a project level from a project governance perspective remains to be researched, as such examples were not discussed in the studies reviewed. The papers analyzed in this study did not provide evidence about what issues are considered conflicts in an agile context, if and how they are escalated, how they are managed, and how they might impact project performance. Allocating power through money is traditionally one of the most obvious and effective methods of empowerment. However, the results of this study do not suggest clear best practices for continuous budgeting.

The purpose of agile project governance is to ensure the team's ability to deliver working and valid software continuously, whereas the strategic and more structured governance practices that connect with the organization are often ignored on a project level. These results imply that the performance and the success of agile projects are best supported by practices that give project teams the freedom, authority, and capability to produce tangible value to and with the customer. Besides the comparison above, the study contributes to the literature by systematically distilling from a wide array of agile literature the portion that applies to project governance and makes this theme the subject of explicit, focused attention. The study thereby provides new knowledge for both the project management and software engineering fields. Managers across industries will also benefit from the insights offered by this study, suggesting how project governance can be adjusted according to agile characteristics and suggesting how this can impact the organization's performance and its transition toward agility.

3.3 RQ3: How are government digitalization strategies and ICT projects connected on and between different organizational levels?

Publication III explores the connection between individual government ICT projects and national digitalization strategy by researching how project governance and portfolio management practices are applied in an e-government context. Project governance- and management-related practices and processes, such as PPM, have not been widely discussed in the research streams covering public sector digitalization or e-government, even though public sector digital transformation is a vast strategic change that is carried out one ICT project at a time. The purpose of this study is to improve understanding of how project governance and portfolio management practices facilitate the vertical connection between ICT projects and national digitalization strategy across different government organization levels. The research applies a qualitative research approach through a public document review and empirical multi-case analysis on four Finnish central government cases. By constructing a multi-level governance structure with three main functions and applying this to the acquired data, this study describes and elaborates on the practices related to project governance, focusing especially but not exclusively on PPM. The study findings also discuss how these practices take place on and across different organizational levels and how this affects the vertical connection between ICT projects and national digitalization.

The key findings of Publication III describe the found governance in two respective sections. First, the governance subsection explores the digitalization and project governance practices through documentary and empirical analyses and consolidates the practices found in different organizational levels into three aggregated categories: the use of structures, allocating roles and responsibilities, and requiring assurance. The following PPM analysis explores and aggregates the PPM practices found from the empirical cases and public documents under the goal alignment and performance compliance categories.

In the first governance category, application of structures, the focus is on the practices that are associated with strategic guidelines, applicable regulations such as laws, decrees and standards, and different tangible constructs such as the architecture or governance model. The main strategic objectives are set on the strategic level through government agenda and very high-level proclamations about digitalization principles. These objectives have not connected well with levels below, as seen in Figure 10 below, and all administrative sectors (ministries and the

agencies under them) may create their own strategies, which they have already been doing for some time. Often, overlapping laws are considered central strategic governance mechanisms in Finland, but the terminology used is ambiguous and leaves a lot of room for subjective interpretation. The national service architecture defines the overall picture of digital infrastructure but does not support either the interoperability analysis of project deliverables or the empowerment of technical and project actors. Within the second governance dimension, allocating roles and responsibilities, the practices related to authority and empowerment, are presented. Money, namely budgeting, is the strongest governance practice related to both structural and responsibility dimensions, and virtually the most concrete way to govern organizations and projects. Assurance requirement-related practices are conducted mainly through reports and statements by direct supervising bodies such as the government and committees under parliament or audit organizations. However, assurance and authority seem to be characterized by goodwill and assumption. Although the structural complexity related especially to the roles and responsibilities category is recognized by actors themselves, all three governance categories seem to lead towards increased complexity in the system.

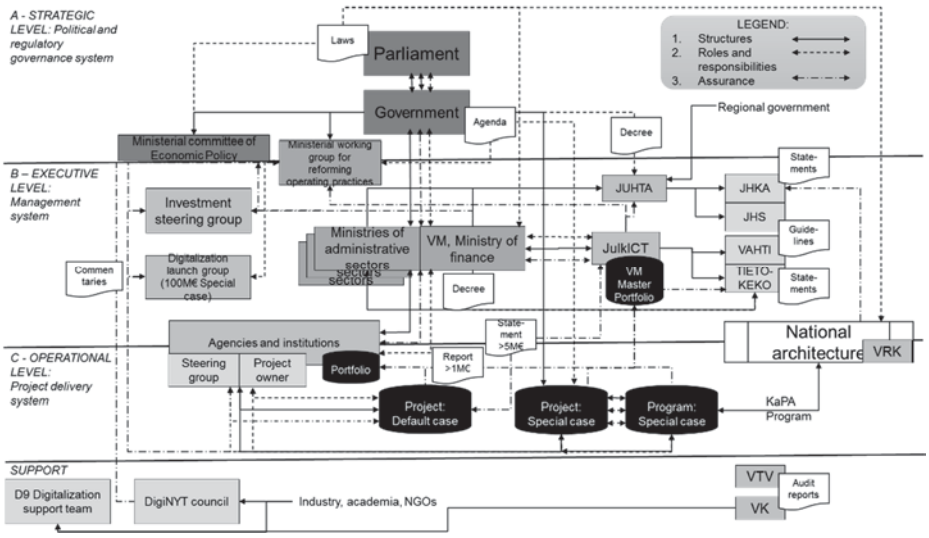

Fig. 10. The Finnish public sector digitalization governance system (reprinted under CC-BY license from Paper III © 2019 Authors).

PPM practices were analyzed as a subcategory for requiring the assurance function of governance and divided into goal alignment and performance compliance. Goal alignment practices under PPM refer to the review of the strategic and architectural fit of project prospects during pre-screening and to the constant evaluation, categorization, and prioritization of ongoing projects. The business case review during pre-screening is conducted in all cases, but only the significant projects (over 5 million euros) are subject to a higher governing body (JulkICT) statement process. The particular strategy to which the projects' fit is reviewed is the owning agency's or ministry's strategy, not the national digitalization strategy as this is perceived as non-existent. Similarly, the architectural review in the business case review is mostly superficial. At the executive or agency level, the applied project portfolios are good start for goal alignment, but if accompanied by a roadmap that sets program-like mechanisms, the result could be more structured and compatible with a master portfolio. On an agency level, the allocation of resources, especially budget, directly to the portfolio could empower the owner and increase motivation and delivery capability. However, if there is a conflict between portfolio structure and organizational structure, the governance and alignment chain clarity may be endangered. Performance compliance in a PPM context is mostly based on controlling and monitoring practices but also emphasizes the incentivization and motivation elements associated with how a project and portfolio are proposed. However, the motivation from incentives or rewards that would encourage both project level performance, reporting and compliance, and alignment with higher level objectives through portfolio did not take place in any cases, nor is there a formal process describing it. From controlling perspective there are no practices applied directly from master portfolio, but these practices are conducted through owner-organizations chain of command, i.e. the steering group and agency management.

When perceiving both governance and PPM on different levels, strategic, executive, and operational, the following findings can be distilled from the research. At the highest, strategic level, governance is dictated by politically driven, abstract digitalization strategy, and different laws and regulations used mostly for legitimization. The biggest gaps identified are related to the content and formation of a digitalization strategy. From a PPM perspective, this implies that connecting the highest master portfolio, and, consequently, the subordinating agency level portfolios with long-term shared goals is virtually impossible. At the executive level, governance aims at establishing patterns and structures, institutions, organizations and networks, infrastructure, and routines that are used by authorized

actors to execute and empower managerial activities towards pre-established objectives. Based on the findings of this research, the two dominant governance gaps in this level could be synthesized into excessive structural complexity and absence of authority. Assurance under PPM at the executive level aims to establish a process that enables the continuous balancing and value maximization of the portfolio and categorizing and prioritizing the included projects and their resources. Based on the findings, the capabilities and motivation to achieve these goals are in place, but the earlier discussed lack of authority rendered the master portfolio a mere reporting template. In the bottom, operational level, the governance focus is on assurance. The implications from the results were that the assurance of related ICT projects is characterized by a low amount of metrics and a high amount of reporting, both by the project managers in the case projects and by external auditors within the public sector administration. Regarding the operational level, the findings on PPM assurance show that controlling and measuring through portfolios does take place already, but it is conducted either only on agency-level portfolios and, in the explicit special project cases, sometimes also toward the master portfolio. However, as there was no evidence in either portfolio providing any steering constituted feedback, the motivation to report properly was low.

The study identifies and illustrates project governance on and between main organizational levels and elaborates on the governance practices under three main functions. The results also demonstrate how assurance can be facilitated by the application of PPM. By integrating PPM into a government digitalization context, the study contributes to project management, public administration, and ICT streams. The findings increase current understanding of the impact of project governance on individual ICT projects that constitute and contribute to a larger scale national digitalization effort. By describing the organizational practices related to project governance and PPM, this study provides implications for managers and practitioners working with government digitalization to do the right ICT projects right.

3.4 RQ4: How the project alliance model is applied in the ICT field

Publication IV explores the formation of an ICT project alliance. ICT projects, especially in the public sector, can be challenging due to organizational and technological complexities and uncertainties. Collaborative and cooperative project delivery models, such as the project alliance, can mitigate such challenges. However, thus far, these models have not been utilized in ICT projects. This gap

motivated the research of Publication IV, which aims to explore and understand the cross-field transfer process through which the project alliance model was applied to the ICT field from the construction sector. The research is carried as an inductive case study, and research data was collected from the early stages of the first known ICT project alliance and conducted in the context of the Finnish public sector digitalization.

The findings of Publication IV are twofold. First, they show how the activities of institutional entrepreneurs affect the cross-field transfer process between the institutional domains of the construction and ICT sectors during the ICT alliance project's early stages. Furthermore, the results illustrate the characteristics of ICT project alliances and compare those with more traditional project alliances implemented primarily in the construction field.

The early stages, or front-end, of the ICT project alliance consisted of two main phases: the strategy phase, with the main objectives of preparing the case organization to conduct alliance projects, identifying a suitable ICT development project and forming a business case for the alliance based on it, and initiating market discussions and training. The second phase, procurement, aimed at assessing the capability of potential suppliers, selecting the most potent partner, and reaching an alliance agreement with them. There were six distinctive categories for the early stage activities carried out by the institutional entrepreneurs: 1) gaining legitimacy, 2) persuading field-level audiences, 3) motivating key parties, 4) building capability, 5) adjusting existing mechanisms, and 6) stabilizing new mechanisms. The findings from these activities highlight the role of multitalented individuals, i.e., that institutional entrepreneurs in organizations who operate in multiple fields, incorporating practices from one industry to another, promulgate change. In particular, the ICT director of the Finnish Transportation Agency (LIVI) and the consultant at Company X (anonymized service provider) were able to combine their experience and understanding of the change within the construction field and replicate the construction sector's success with project alliances in the ICT field. The results also reveal the crucial role that individual first-of-a-kind or vanguard projects can play in initiating change in institutional arrangements within project-based industries. As the first alliance project in the ICT sector, the case project was an important field-shaker in the industry and provided a platform where established and institutionalized ways of organizing projects could be questioned with a reflective approach. It was evident that the transfer process and work of the institutional entrepreneurs were supported for two reasons. First, the adopted model was such that it dampened field resistance. The alliance model had already

exhibited a positive trend, and the collaborative and cooperative approach of the model needed mostly cosmetic adjustments to match with the ICT field. Second, the ICT field is generally flexible and keen to improve on both individual and organizational levels.

The results also provided interesting findings regarding the characteristics of the emerging ICT project alliance. Table 13 categorizes the emerging ICT-specific characteristics found in the case using the project alliance model and mechanisms. One of the founding characteristics of the project alliance model, both in ICT and more traditional models, is the cooperative culture and collaboration. The ICT field can be considered very receptive to such a culture since that is also an essential element of increasingly popular agile software development and project management approaches. One significant aspect derived from the inherent diversity of ICT and construction industries is the use of terminology. The stabilized terminology applied in relatively conservative construction businesses can cause issues for ICT alliance project communication and cooperation if not synchronized and discussed with the project management, and the ICT-related terms used by software engineering practitioners can cause other discrepancies. The ICT project alliance characteristics related to team formation differed mostly from construction alliances on the roles and capabilities of key personnel. Whereas construction alliances and projects have more defined and structured roles, in ICT projects—especially in agile projects—a more multitalented and ambidextrous approach is preferred. The primary element that distinguishes ICT project alliances is how they are connected with the project product. A construction alliance project product is ready and usable at the end of the implementation, but agile ICT projects deliver usable software after each sprint, cycle, and release train. There are substantial synergies in the embedded characteristics and principles that connect agile methodologies and the project alliance model, namely the emphasis on collaboration and empowerment, and contextual elements such as uncertainty and flexibility. On the other hand, there were two evident tensions in the same interface: the introduction and inclusion of new agile roles in the alliance organization and support for constant flexibility and value delivery in the alliance agreement.

Table 13. ICT project alliance mechanisms (reprinted by permission from Paper IV © 2019 Emerald Publishing Limited).

Construct	Description	ICT specific emerging or adjusted mechanisms
Best for project culture	Creating collaborative culture based on best-for-project and no-blame approach to decisions, open communication, and continuous improvement	1."Best for the project" can overrule applicable ICT standards, 2. Best practices and knowledge shared during sprint retrospectives, 3. ICT-alliance terminology synchronization, 4. The appreciated role of capable suppliers in ICT field supports co-operation and collaboration already in the early stages
Team formation and capability	Selecting and allocating the best available (capable, initiative) resources for the project as early as possible, with clear roles and responsibilities	1. New roles need to be considered: Scrum master, product owner, end users, data providers. 2. Multitalented, ambidextrous competences required. 3. Utilization of existing technologies and preferences related to deliverables 4. Separate alliance organization for maintenance and post-implementation development
Joint governance structures	Constructing an equal and shared governance structure with unconditional commitment and support from key participants that supports leadership and decision-making power	1. Applicable information security, standards and regulations. 2. Insurances to cover rapid deliverables and outputs (agile). 3. ICT solutions warranty usually precedes and is included maintenance phase. 4. Development team empowerment
Transparent alliance agreement	Forming a collaborative multi-party contract that includes equal incentives and risks and enables transparent open-book financials and communication	1. Transparency of deliverables (including source code) in contract 2. Target pricing challenges agile methodologies. 2. Agreed IPR rights to deliverables and innovations during project 3. Incentive and risk model cannot follow stage-gate but project deliverables. 4. Alliance contract still less risky than construction

Construct	Description	ICT specific emerging or adjusted mechanisms
Shared objectives	Planning and agreeing jointly the project objectives and goals, enabling and encouraging innovation	1. Uncertain project deliverable and system requirements decreases formal planning and development and indicates iterative approach (agile) 2. Usability and end user involvement important (user stories + validation) 3. Legacy systems, architecture and technology preferences impact deliverables and solution 4. Innovation and new technology utilization emphasized
Coordination procedures	Measuring and aligning project outcomes and performance with objectives, and managing change and conflicts	1. Validation of deliverables through testing and acceptance (end user, product owner), 2. Uncertainty and change addressed within development team, contractual conflicts escalated, 3. Coordination through prioritization during iterations, 4. Deliverables used to monitor project and team performance
Teamwork facilitation	Building and facilitating the performance of an integrated, co-located team	1. Procurement phase & negotiation method initiates teambuilding and project scoping similar to agile, 2. Planning and development and implementation onsite / in common premises (big room) 3. Technical capability of key personnel advocates to use advanced communication and document management solutions

The results of this study contribute to the body of institutional research that is trying to understand how new practices and ways of organizing spread, are adopted, and become institutionalized (Lawrence & Suddaby, 2006). Furthermore, the analysis produces evidence of the driving role of individual pilot projects in initiating bottom-up change processes that may potentially produce changes in field-level structures and ways of organizing projects. By analyzing and discussing the specific characteristics of the ICT project alliance as well as what kinds of adjustments are required for it, the study builds an initial understanding of a novel form of organizing ICT projects and, consequently, contributes to project alliance literature (Walker & Lloyd-Walker, 2015). This study had a strong motivation and access to a novel empirical phenomenon. The practical implications of this study allow project business managers and consultants to understand the emerging characteristics of the ICT project alliance model when working with software and ICT companies and enable managers in the ICT field to adjust and prepare their organizations and processes for the application of the ICT project alliance model. This study set out to explore the birth of an ICT project alliance. The term "birth" was chosen on purpose, as it aptly covers the transfer process through which the project alliance model was introduced from the construction field to the ICT field, as well as the early stages during which the case project was born.

3.5 Result synthesis

This section synthesizes the key results of the publications into dissertation research contribution. The objectives of this dissertation are 1) to explore the project governance practices that are applied in public sector ICT projects on different organizational levels, 2) to highlight the challenges and tensions that affect the governance and projects, and 3) propose solutions to the tensions and challenges. To meet the first two objectives and to answer the research questions of this dissertation, the following table (Table 14) consolidates the key findings and contributions of Publications I–IV.

Table 14. Research contributions.

Publication	Research question	Key findings	Theoretical contributions	Managerial implications
I	How do project governance practices affect agile projects in the public sector?	Categorize the project governance practices into six dimensions: business case, contracting, controlling, steering, decision-making, and capability-building Identifies the project governance practices that support or detract from agile project performance Identifies the tensions that impact agile projects in public sector	Bridges the gap between ICT and project management research Combines the more traditional and fixed perspectives on project governance with the research on flexible agile projects to develop a more holistic and integrative concept for the governance of agile projects Implies that project governance can also be perceived from technical and delivery method standpoints.	Enables public sector project organizations to reflect on and design appropriate governance mechanisms for agile projects. Suggests how both practitioners of agile methods and managers in public organizations can identify the challenges and tensions related to the performance of agile projects.
II	What is agile project governance?	Identifies and categorizes project governance practices applied in agile projects Contrasts agile with more traditional project governance practices to elaborate the practices that can be transferred as such, need to be modified, emerge as agile specific, and are still unknown	Applies existing project governance techniques to the literature on agile approaches Isolates the elements related to project governance from the literature on agile approaches to project management, making this theme explicit	Suggests how project governance can be adjusted according to agile characteristics Describes the impact of agile project governance on an organization's project performance and transition toward agility

Publication	Research question	Key findings	Theoretical contributions	Managerial implications
III	How are public-sector ICT projects governed and aligned in different levels?	Describes the governance of government digitalization project through five thematic focus areas Constructs a three-leveled governance model of digitalization projects Describes how a project portfolio is applied vertically in different levels	Contributes to the understanding of cross-level governance and alignment processes in the public-sector digitalization context Integrates current knowledge from project governance stream with e-government stream Provides contextual insight into PPM research	Provides policy implications to address the perceived governance and alignment gaps Allows practitioners in public sector domain to gain insights into the micro-level practices that impact the ICT project performance and success from a digitalization perspective
IV	How is the project alliance model applied in the ICT field?	Illustrates and categorizes the micro-level practices of institutional entrepreneurs, which take place when project alliance model is transferred from construction field to ICT field Describes the emerging characteristics of an ICT project and compares those with the more traditional project alliance	Elaborates the micro-level practices associated with cross-field transfer process Builds initial understanding for a new model for ICT projects Combines project alliance knowledge from construction field with the project research knowledge from the ICT field	Allows project practitioners to understand the contextual elements that affect the ICT project alliance Enables managers to in the ICT field to adjust and prepare their organizations for the application of the project alliance model Enables practitioners working across different fields to understand in detail the activities by institutional entrepreneurs that contribute to the process of adapting a new managerial concept from one field to another

On a project level, the governance of public sector ICT projects is conducted mostly through practices that focus on monitoring and controlling. Bureaucratic, and often complex, reporting schemas provide the transparency and accountability that inherent to the public sector but, at the same time, burden the project. Especially in increasingly popular agile projects, the application of traditional reporting and monitoring practices detracts from the performance of the project team and burdens the project manager, thus creating an evident tension between the project and the permanent organization. The project performance and success are also affected strongly by goal-setting and related decision-making mechanisms such as a budgeting and organizational structures and authority, which generally take place above the project organization but create a resource and power framework for it. Different project models, namely agile and alliance, founded on collaboration and uncertainty require both authority and flexibility to perform according to the full potential and objectives of the project, in which case the traditional plan- and control-oriented governance practices are deemed to distract and cause tensions. One key mechanism here is the involvement of a customer representative on the team to ensure the fluent acceptance of changing project objectives and validation of project deliverables. The project-level performance is heavily reliant on the capabilities of the project team, which should be multi-talented and heterogeneously competent and have the mandate to share knowledge within and across the project organization. The project team's capability to perform also depends on the motivational aspects, which in the case of agile projects are derived mostly from the agile activities and inclusion but can be complemented with project-based incentivization—both risks and rewards—that support the nature of the ICT project product.

The management level of ICT project governance consists of both permanent organization and project steering and controlling (coordination) functions. Here, the most evident project governance practices are related to the assurance requirement, controlling, and capability building. On this level, the short-term goals and objectives of individual projects are also aligned with the long-term (strategic) and mid-term (executive) targets of the organization, generally through budgeting, which is also the main authority granting mechanism. The responsibilities of these practices are generally given to project portfolio and steering groups and business-level line organizations—or, in the empirical context of this dissertation, to the ministries of administrative branches and the agencies under them. Project portfolios currently seem to be mostly utilized as a reporting platform, but they can possibly address critical resource allocation and balancing practices, as well as

servicing the project selection and prioritization within an organization. This possibility would enable the alignment practice across different organization levels but would require explicit, long-term strategic objectives coming from a national digitalization strategy. Project steering and controlling according to the project progress and possible changes take place at this level, but currently, the used functions, namely the project portfolio, are not utilized to their full potential. Controlling also involves third-party validation and auditing mechanisms that take place on all levels, but the utilization of the audit results is the main responsibility of middle management. The auditing mechanisms also involve the technical review to ensure intercompatibility, integration, and fit-for-purpose when the (enterprise or national) architecture is considered.

Other management-level governance practices are the risk and stakeholder management, which involve the project organization as well but are generally performed by the permanent organization. Risk management tends to be performed via contracts, and stakeholder management is generally superficial and fails to involve the group that very critical to the project and deliverable: the end users. This hinders acceptance of the project product, thus creating a tension for long-term benefits utilization. Contracts are also the main mechanisms through which external resources are acquired to ensure project delivery capability. The contract considers the characteristics of ICT, agile, alliance, and other project-type specifics, not just for outsourcing the risks and responsibilities to external suppliers. For example, the applied terminology of ICT field, the risk and reward sharing of an alliance model, or the agile specific roles and responsibilities (e.g., Scrum master, product owner) can be explicitly described in contracts, as well as in the organization structures and other empowerment, controlling, and authority-related mechanisms. Otherwise, there is a high risk of detracting from the lower-level project performance. Capability-building in this level—usually a task of PMO—also involves the creation and development of technological and project type-related competences before, during, and after project execution through training and retrospectives. The capability practices are also affected by positive tensions coming from fields and industries external to a public sector digitalization context. For example, the success stories behind construction alliances drive the cross-field adoption process and the introduction of the project alliance model in e-government. However, this adoption process must be acknowledged and managed properly to support the governance of ICT projects.

On the highest, strategic level, the project governance of public sector ICT projects is mostly about the strategy and structures. More specifically, the strategic

digitalization objectives and targets at a national level and the applicable institutional and social arrangements such as laws, regulations, and policies. The digitalization governance system is created at the strategic level, and it provides the technical and organizational framework for the management-level organizations to manage individual projects and programs properly within the context. The national digitalization strategy sets the long-term objectives toward which the public sector organization strive. The governance system also establishes the organizational structure with clear roles and responsibilities to establish and execute digital transformation. This organization includes streamlining the structure and reducing overlapping functions. As the authority and decision-making power within and towards ICT projects usually go hand-in-hand with the budgeting process, there is an evident tension between power and responsibility that starts already from the strategic levels and descends further. Many parties are involved and interested in the digitalization and subsequent ICT projects, but only a few have the actual ownership over the performance and results in long-term. The strategic-level governance function is also responsible for the political and public accountability and communication over the digitalization and ICT projects. The institutional arrangements that affect the project governance on the strategic level also include the nationally and internationally applicable policies, laws, and regulations. As the public sector ICT projects are often ambiguous, complex, and cross several process-related and organizational boundaries, there are also regulations that need to be followed. Some laws address, for example, the sourcing processes within public sector domain, information security, or organizational responsibilities, which can often overlap, grant responsibility but not power, or be passive by the nature of the text. The clearer and less complex the applicable laws and regulations are, the fewer governance tensions there are for the ICT project.

In order to synthesize the ICT project governance practices described above, the following illustration (Figure 11) was created, applying the governance model from the literature foundation to present he project governance practices applied in the three organizational levels. The illustration also positions the findings from the individual publication according their respective levels and with the perceived tensions that affect the projects and their governance:

1. Bureaucratic and political mechanisms, such as the intermittent government terms.
2. Traditional vs. flexible and collaborative project types, describing the friction between plan-oriented project management approaches and characteristics of agile projects and project alliances.
3. Ownership, namely concerning the formal ownership and authority over the project and its deliverables and benefits across different levels.
4. Applicable laws and regulations, which can overlap and impair the project sourcing and delivery.
5. Other field success stories, which can positively drive change within the ICT project governance context.

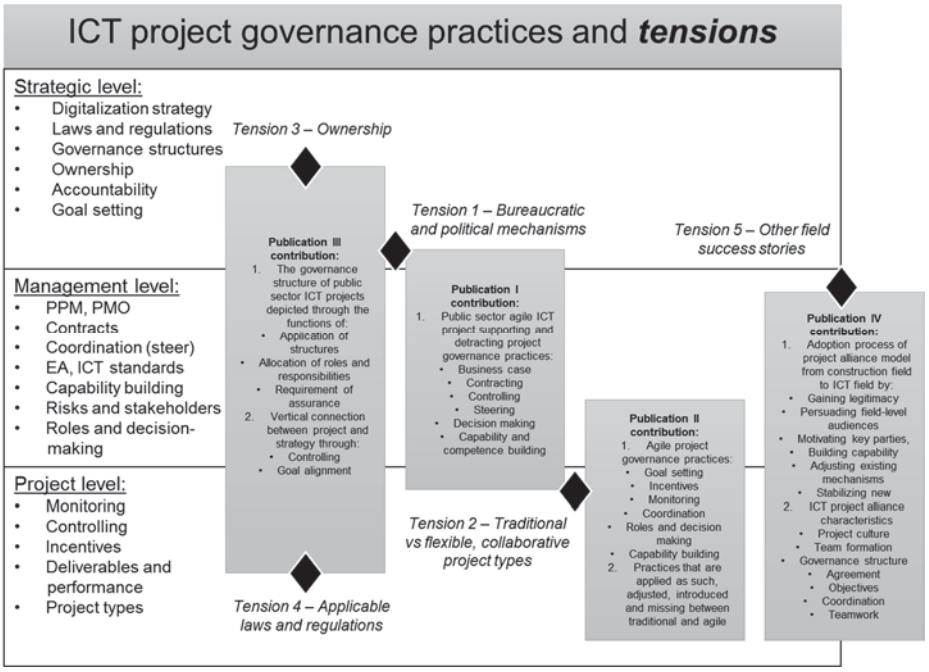

Fig. 11. The practices and tensions of public sector ICT project governance.

4 Discussion

This section summarizes and discusses the theoretical and practical contributions of this dissertation research, evaluates the quality and limitations of it, and presents suggestions for future research opportunities based on the findings and implications.

4.1 Theoretical contributions

This dissertation research contributes mostly to the governance and project management literature streams by deepening the current understanding of project governance practices that take place within and between organization levels and by providing novel insight on the tensions that affect the project governance and performance of individual ICT development projects in public sector digitalization context. The exploration of the empirical phenomenon—the public sector digital transformation—as an institutional change process and the provided construct allow this research to contribute to the public sector digitalization and e-government research field. Furthermore, this study bridges the abovementioned streams, thus providing novel, contextual insight and perspectives to the academic discussions within them. The underlying purpose and contributions of this research are not so much to create new theories but to elaborate on existing ones and provide actionable knowledge that can be utilized to improve the status quo both academically and practically.

The theoretical contributions made in Publications I–IV are presented earlier in Table 14, and the more detailed contributions made within the literature streams are presented below.

4.1.1 Contributions to public sector digitalization and e-government literature

Thus far, the research on public sector digitalization and e-government transformation has focused on the on the macro-level, social phenomenon and the factors that enable or distract from the transformation progress (e.g., Gil-Garcia & Martinez-Moyano, 2007; Lee, 2010) and on identifying the theoretical foundation that explains this phenomenon (Bannister & Connolly, 2015; Heeks & Bailur, 2007). Only rather recently the connection between the e-government transformation process and the individual ICT projects and acts of project management has been distinguished and elaborated (Melin & Wihlborg, 2018).

This research draws on this initiative and enhances understanding of how the ICT project management and e-government transformation can be integrated through project governance practices. The targets set for e-government transformation can be connected to individual ICT projects through forming a concrete strategic-level digitalization strategy to align the subsequent management-level strategies and objectives, and to prioritize projects within a different level portfolios. This can also enable the control and balancing functions on and between levels.

This research aligns with the previous discussion on how the digital transformation of the public sector can be perceived as a strategic change process that is enacted through technological, organizational, and institutional arrangements (Altameem et al., 2006). Many studies argue that e-government transformation is a project or program (e.g., Anthopoulos et al., 2016; Guha & Chakrabarti, 2014; Yildiz, 2007), but as the term e-government itself is fairly ambiguous (Table 4) and is complemented with more advanced concepts such as smart (Gil-Garcia et al., 2016) or digital government (Kim & Zhang, 2016; Zhang, Luna-Reyes, & Mellouli, 2014), this dissertation perceives the public sector digitalization to be a continuous process that can never be considered complete, as technologies and institutions evolve over time (Micelotta et al., 2017; Zietsma & Lawrence, 2010). The digitalization process is by nature complex and challenging in the public sector as well (Matt et al., 2015; Parviainen et al., 2017), for which research indicates the application of collaborative and flexible project models is a vehicle for change (Jenner, 2010; McElroy, 1996).

The ICT project governance model constructed in this study (Figure 11) suggest a novel, project-based approach to the enacted technology framework, thus deepening the organizational and governance aspects of the currently technology-dominant research that has applied the TEF (Cordella & Iannacci, 2010; Fountain, 2001). This study supports the earlier proposition that the transformation enactment involves an institutional entrepreneur as a change agent by noting the importance of clear ownership and mandate for a central body (Tassabehji et al., 2016). The proposed levels—strategic, management, and project—of this model provide a novel connection to the e-government scope and maturity discussion. When the scope is on regional and municipal transformation, as in studies by Hansen and Kræmmergaard (2013) and Gil-Garcia and Martinez-Moyano (2007), the ICT project governance practices such as project portfolios or technological reviews are more control-oriented and focused on the interface between management and project levels. However, when the scope of e-government transformation or public sector reform shifts to national or international aspects, as in the joined-up-

government concept (Kamal, 2012; Klievink & Janssen, 2009), this study suggests the application of more strategic-management-level project governance practices, such as national digitalization strategy and stakeholder management. The governance practices suggested in this study consequently echo with the organizational, semantic, and technological interoperability features in the institutional– or local–national dichotomy by (Hjort-Madsen & Gøtze, 2004). A similar hierarchy within the scope of project governance practices can be perceived to take place within the central government organization, starting from the highest bodies of the state and ending up to the projects and conducted by ministries and the agencies under there area of responsibility. The connection between different levels through project governance practices contributes to the demand for the elaboration on the vertical processes within a national digitalization context, as called for by Snead and Wright (2014). Similarly, if the e-government transformation is in the early maturity stages, such as presenting (Lee, 2010) or digitization (Janowski, 2015), the focus is more on the technological aspects like system integration or initial e-service development, which call for more lower level ICT project governance practices through technological standards or support for the application of agile methodologies.

To conclude, this study deepens the current knowledge on the different dimensions of e-government transformation by consolidating the previously proposed axes—local-international, intra-organizational, and maturity progress—and suggests how these are connected via a multi-level ICT project governance model that enacts the institutional change process.

4.1.2 Contributions to project and portfolio management literature

In this dissertation, the underlying perception of projects draws on the views made in earlier research that a project is not an independent or disconnected "island" but is connected to an organization or network and enables these more permanent structures to achieve their objectives, such as strategic change or transformation (Crawford & Helm, 2009; Engwall, 2003; McElroy, 1996). Project management and performance are conducted by a temporary organization (Lundin et al., 1995), have a short-term view on objectives, success, and life-cycle (Jugdev & Müller, 2005; Morris, 2013), and are affected by contextual characteristics, such as technologies, geography, or social settings (Arnaboldi et al., 2004; Manning, 2008; Müller & Martinsuo, 2015). This research supports these views by exploring the contextual factors of public sector digital transformation and elaborating how these

affect the ICT project performance and governance. As illustrated in Table 14, each of the Publications I–IV provide strong theoretical contributions to project management, especially ICT project management, literature.

In the context of this dissertation, previous research has dealt—usually separately—with strategic digitalization initiatives, namely e-government (Karunasena & Deng, 2012; Rorissa, Demissie, & Pardo, 2011), functional IT governance and business alignment (de Haes & van Grembergen, 2009; Gregor et al., 2007; Papp, 1999), and ICT project management (Sauer & Horner, 2009; Stewart, 2008). Some studies (De Schepper et al., 2014; El-Gohary, Osman, & El-Diraby, 2006) on project management also focus on, for example, the dynamics between private- and public-sector organization during the project partnership, thus opening grounds for the discussion on the integration between ICT project management and governance to which this dissertation contributes. By exploring particularly how PPM can be applied in different organizational levels, this research provides sought-after insight to the contextual elements of PPM (Müller et al., 2008).

At the strategic level of e-government transformation, PPM can be applied to interact with a strategic roadmap to get prioritized objectives and enable derive development plans from the national strategy and also facilitate the public accountability and institutional legitimacy aspects by providing a more complete picture of all strategic ICT projects and sub-portfolios of the lower levels (Hrebiniak & Joyce, 1984; Joshi, Kathuria, & Porth, 2003; Meskendahl, 2010; Scott, 2001). The middle-level PPM aims to establish a formal review process for the continuous balance and value maximization of a portfolio and prioritizing projects and their resources according to aligned objectives (Cooper, 2008; de Reyck et al., 2005; Müller et al., 2008). Based on this study, the capabilities and motivation to do so could be supported with clarified and stronger authority, a notion that resonates with how institutions gain legitimacy, or through what mechanisms central government constitutes power in digitalization, thus further connecting the project management and institutional theory discussion (Savoldelli et al., 2014; Scott, 2001; Weerakkody et al., 2016). On the lowest level, toward the ICT project itself, this research suggests applying PPM to support the pre-project screening and alignment, also technologically, and monitoring and coordination, which aligns the previous research on ICT project portfolios (de Reyck et al., 2005; Hansen & Kræmmergaard, 2013). A novel aspect that connects ICT project management and governance through PPM is the notion that the long-term benefits

realization throughout the project lifecycle could also be addressed through portfolios (Marnewick, 2016; ul Musawir et al., 2017).

The contribution of this dissertation also comes from exploring and explaining the connection between the increasingly popular agile ICT projects and governance. Previous research in the ICT and agile fields have tended to focus on the analyses of the actual technical software development process (Talby & Dubinsky, 2009; Vinekar, Slinkman, & Nerur, 2006) and team performance (Fontana, Fontana, Da Rosa Garbuio, Reinehr, & Malucelli, 2014), with only limited attention paid to the actual governance practices in agile projects. In earlier project governance studies, the focus has been on identifying and describing the higher-level organizational and process-related elements of governance, thus leaving room for studies that would dig deeper into the micro-level governance practices, such as deliverable validation, that take place in the agile project context (McGrath & Whitty, 2015; Pinto, 2014).

This study indicates that the established governance-related practices used in agile projects are connected mostly with the goal-setting, coordinating, and roles and decision-making dimensions of the governance framework proposed by Kujala et al. (2016). The study also provides insight into monitoring and capability-building activities in agile projects, although little evidence of practices related to incentives was presented. The study also identified many ambiguous, cross-functional, and generic governance practices in agile projects that challenged the applicability of the strict, pre-determined dimensions of governance. For example, the agile practice of integrating the customer as a product owner or as a member of the project team (Berger & Beynon-Davies, 2009; Conboy & Morgan, 2011) has implications for the goal-setting dimension, through product vision and deliverable determination (Augustine, Payne, Sencindiver, & Woodcock, 2005; Strode, Huff, Hope, & Link, 2012); the monitoring dimension, through immediate testing and acceptance of deliverables (Jahr, 2014; Tessem, 2014); and the coordination dimension, through deliverable feedback facilitation and shared decision-making practices (Chow & Cao, 2008; Drury-Grogan, 2014). Similarly, the agile practice of building empowered, versatile project teams can be discussed under the roles and decision-making power dimension via team autonomy (Conforto & Amaral, 2010; Persson, Mathiassen, & Aaen, 2012), or as capability building, based on its emphasis on enhancing multitalented competence development (Trkman, Mendling, & Krisper, 2016; van Waardenburg & van Vliet, 2013). By doing so, this study echoes previous research that discusses how the organizational setup and role definitions that are associated with decision-making authority can influence project governance both internally and externally. The project owner applies external

formal authority and control over the project team and sets the project targets and limits how the project team can act within the project (Ahola et al., 2014; Müller, 2009). According to previous research, project governance can help organizations to allocate and utilize resources during the project front-end phase to identify the best conceptual design, whereas traditional project management can improve tactical performance during the implementation phase (Samset & Volden, 2016). However, when applying agile methodologies fundamentally, this front-end phase is not distinguished as a separate stage of the project life cycle, but specifications and targets are processed constantly and iterated as the development progresses (Cohen, Lindvall, & Costa, 2004). The results are aligned with previous discussions on how the continuously iterative approach creates tensions in an environment where project targets, budgets, and system specifications should be determined beforehand in a traditional pre-analysis phase (Berger, 2007; Lee & Xia, 2010). The findings of this research also suggest that governance can also be perceived from technology enactment and delivery method standpoints, besides the commonly used organizational and process perspectives, which connects the technical dimension with previous governance discussion and thus bridges the current gap between ICT and project management research (Müller & Martinsuo, 2015; Vlietland, Van Solingen, & Van Vliet, 2016).

There are substantial synergies in the embedded characteristics and principles that connect agile methodologies and the project alliance model. First, the emphasis on collaboration and empowerment of the team is a crucial feature in both (Berger, 2007; Fernandes et al., 2017; Hietajärvi & Aaltonen, 2017; Misra et al., 2009). Secondly, the contextual elements such as uncertainty and flexibility are considered and welcomed as field-level characteristics and as enablers for empowerment instead of as risks to be planned for and controlled (Chang & Ive, 2007; Hobbs & Petit, 2017). The model does, however, pose a governance tension, or organizational paradox, as identified by Lüscher and Lewis (2008): an autonomous project and project team require both engagement and disengagement in order to connect the project with the owner organization, to perform appropriately, and to meet the project objectives. Lüscher and Lewis (2008) suggested effective communication and acceptance to overcome this paradox. Acceptance, however, is not related exclusively to the ICT alliance project but required in any project. In the public sector, authority and communication mechanisms are transparent by default, providing ample paths for synergy and acceptance. On the other hand, as most ICT projects are not solely about developing and implementing a software solution but also centered around process development and improvement, the acceptance and

benefits realization of an ICT alliance project outcome create strong governance-related implications for any organization aiming for digitalization (Marnewick, 2016; Matt et al., 2015; Wateridge, 1998). Software development and implementation activities at the same time provide strong synergy for applying project alliance methods to the ICT field: as most development is done on-site, especially when adhering to agile approaches (Drury, Conboy, & Power, 2012), the team co-location and associated teambuilding, facilitation, and coordination activities are easier to manage.

4.1.3 Contributions to governance and institutional change literature

This dissertation provides contributions to the institutional theory and governance streams by connecting the project governance practices with the institutional change and entrepreneurship perceptions of public sector digitalization. First, this research provides contextual insight and knowledge to the institutional construct discussion that was set forth by Scott (2001). Based on the findings of this research, the public sector as an institution is affected by regulative, normative, and cognitive structures and activities in digital transformation. For example, the motivation for national digitalization can be perceived as normative compliance activity due to the social obligation to keep up with peer nations in the global digital evolution, and cognitive actions can be seen when the public sector mimics and adopts successful practices from other fields. Moreover, the legitimacy and indicator mechanisms are presented in this study in a way that reflects the regulative and normative structures (Radaelli, 2000; Scott, 2001). The way the public sector as an institution evolves amidst the digital transformation can be perceived to follow mostly coercive and mimetic processes isomorphism (DiMaggio & Powell, 1983; Micelotta et al., 2017) as political accountability and influence fundamentally affect the governance structures and practices towards ICT projects and as actors within the public sector adjust to prevailing and emerging ways of conducting ICT development projects.

As presented in section 4.1.1., the role of the institutional entrepreneur in the e-government transformation and enactment (Greenwood & Suddaby, 2006; Wijen & Ansari, 2007) is highlighted in this study as the main owner and authority over digital transformation and ICT project governance across different levels. This research complements the introduced central government CIO role (Tassabehji et al., 2016) by suggesting the inclusion of concrete project governance practices in the role and therefore increasing the enactment leverage of the role, thus bringing the it more fitting for the technology enactment discussion (Cordella & Iannacci,

2010; Fountain, 2001). There exists a shared understanding among project management scholars on the impetus for using novel, relationally-oriented ways of organizing complex projects to ensure their success (Lahdenperä, 2012; Walker & Lloyd-Walker, 2015). However, prior research within the field of project management has not adequately addressed the processes of adapting new ways to organize projects, nor has it paid attention to how cross-boundary activities across project-based industries are carried out in practice and how such processes may affect the transformation and evolution of the forms of organizing projects. The findings of this dissertation indicate that such cross-field transfer processes are complex and involve the activities of institutional entrepreneurs over an extended period. In line with research on institutional entrepreneurship (Lawrence & Suddaby, 2006; Wijen & Ansari, 2007), this dissertation particularly highlights the role of multitalented individuals, i.e., as institutional entrepreneurs in organizations who operate in multiple fields, incorporating practices from one industry to another, promulgating change. The results of this research also reveal the crucial role that the ICT alliance project as a vanguard project (Frederiksen & Davies, 2008) can play in initiating change in institutional arrangements within project-based industries. The vanguard project can also be interpreted as a platform where institutional entrepreneurs could enact the boundary work across the construction and ICT industries (Zietsma & Lawrence, 2010). As such, the results of this study complement the current limited understanding of the role of projects in advancing institutional change in project-based industries.

This study implies the simplification of concepts and contextual elaboration of practices in governance research. The theoretical aspects, such as transaction cost economics, organization, or agency theory, that ground and explain the mechanisms of governance (Eisenhardt, 1989a; Freeman et al., 2010; Williamson, 1996) are to be acknowledged, but deriving actionable knowledge from these reflections can be questioned. Similarly, the confusion over the concepts and scopes of governance can distract from the application and development of insights within the field. Therefore, this study contributes to governance stream by proposing—through the constructed ICT project governance model—that *project governance practices* inclusively consider both all the formal documents, artifacts and structures, and all the formal and informal managerial and leadership activities in all levels that enable an organization or network to assure that the right ICT projects are conducted right for maximal contribution to strategic objectives and value during the extended lifecycle. This overarching proposal bridges and contributes to the previous works that have discussed the distinction between governing (activities, actions) and

governance (artefacts, frameworks) (Brunet, 2018; Garland, 2009), governance (management) and governmentality (leadership) (Clegg et al., 2002; Müller et al., 2016), project governance (single) and governance of projects (multiple) (Müller et al., 2014; Winch, 2014), ex-post (front-end, before project launch) and ex-ante (during and after project launch) governance activities and life-cycle scope (Maniak & Midler, 2014; Sanderson, 2012), external and internal project governance (Ahola et al., 2014), and the objectives and tasks on and between different levels (Biesenthal & Wilden, 2014; Clegg, Killen, Biesenthal, & Sankaran, 2018; Too & Weaver, 2013).

By exploring and explaining the technological and institutional factors of e-government transformation this study contributes to the particular stream of project governance that discusses how project governance practices and the performance of a single project are affected by the context in which they take place (Engwall, 2003; Manning, 2008; Müller et al., 2008). Project governance practices on the lowest level focus on monitoring, measuring, and controlling project performance and deliverables through predetermined metrics and documentation procedures by the project owner and steering bodies or independent auditors (Müller & Lecoeuvre, 2014; Pinto, 2014). This research implies that the assurance of projects related to ICT is characterized by a low amount of metrics and a high amount of reporting, both by the project managers and by external auditors within the public sector administration. The amount of project documentation and reporting in the public sector is currently both a burden and source of confusion for project managers due to the complex governance structure, a fact that especially detracts from the performance of agile ICT projects (Publication I; Nuottila, Aaltonen, & Kujala, 2016). Different project types, namely agile and delivery models such as alliance, have varying approaches to project deliverables and measurements (Love et al., 2010; Vlietland et al., 2016), which also affect another governance aspect of assurance—the post-project benefits realization (Marnewick, 2016; Serra & Kunc, 2014). The combination and integration of the main agile project deliverable, an ICT system or solution, with the overall EA can be challenging in the context of this research. Even though the EA is one of the core elements of e-government (Irani, 2005) that can, from a technical perspective, strongly affect the project governance of an agile project, it does, however, impose tensions between business and IT (Babar, 2009; Yang, Liang, & Avgeriou, 2016). From a project governance perspective—namely the overall business benefit, communication, and decision making—this study implies that organizations conducting agile projects should be given strong guidelines on the interfaces and integrations but at the same time be

empowered to develop the system according to the identified stakeholder demands and capabilities of the project team. However, technology in general is not just a factor detracting from agile project performance, as modern communication, data management and sharing, and software development tools clearly support flexible project delivery even in a geographically distributed setup.

In the middle level, defining clear roles and responsibilities is the prevailing focus of project governance (Blomquist & Müller, 2006; Too & Weaver, 2013). Based on the findings of this research, there are two dominant governance contextual factors that affect the governance and project: excessive structural complexity and an absence of authority. The technological complexities related to ICT are by themselves so challenging that adding external permanent or temporary organizations with ambiguous purposes and dubious authority to the project governance scope will only increase confusion and detract from the performance and decision-making efficiency of projects and governance. The lack of authority can also lead to the application of goodwill as an assurance approach, thus reducing control and assurance effectiveness (Andersen, 2015; Joslin & Müller, 2016; Olsson, Johansen, Langlo, & Torp, 2008; Walser, 2013). The study highlights how project governance, especially decision-making authority, and the organizational structure must be transparent and unequivocal to enable agile project performance, but the characteristically stable and bureaucratic public sector organization often fails to do so. The research found that the responsibilities are often vague and ambiguous as projects reach across process, organizational, enterprise architectural, and administrative boundaries. Besides causing confusion, this also increases the complexity, which challenges the salient responsibilities of the project owner and project sponsor—the parties that own the project results and grant the project the funding, respectively (Müller, 2009). Though not exclusively limited to agile projects, this complexity challenges the project governance. Previous discussions in public sector research have brought to light the importance of ownership and how the dynamic nature of agile projects calls for clarity of it to empower and support the project team (Andersen, 2015; Drury et al., 2012). However, this study elaborates that if the product owner role—a role that is characteristic of and salient in agile projects—is divided between business and IT due to public sector organizations owning procedures, this will affect the project negatively (Cao, Mohan, Ramesh, & Sarkar, 2012; Chow & Cao, 2008). The present study also suggests that the governance tensions and challenges toward a project are reinforced when people are assigned more traditional roles in an agile project, e.g., project manager, or do not have the critical technological, project delivery or

business capabilities—i.e., an understanding of customer business processes, environment, and requirements (Ruuska & Vartiainen, 2003)—that are to be managed by PMOs (Too & Weaver, 2013).

At the strategic level, project governance is dictated by politically driven digitalization strategy—or, as in this study, a lack thereof—and laws and regulations used mostly for legitimization (Scott, 2001). The national digitalization strategy is affected by various intermittent political statements and agendas that need to be consolidated and aligned into a tangible roadmap that enables a consensus and a shared understanding of the goals and priorities for the transformation (Bowman & Ambrosini, 1997; Fedorowicz et al., 2009). This study also indicates a contextual factor that affects the project and digitalization strategy: a project is already a temporary organization that should connect with permanent settings rather than a temporary, short-term political ambitions (Jonas, 2010; Lundin et al., 1995). In the parliamentary and democratic public sectors, laws are the most evident mechanism for establishing norms and policies at a strategic level. They are also the founding elements of corporate governance and corporate social responsibility, thus also affecting project governance in this level (Kersbergen & Waarden, 2004; Turnbull, 1997). However, the results of this study indicate two contextual issues with laws: they legitimize but do not give authority and often increase complexity by overlapping. On the other hand, laws can be used to maintain focus on viable project objectives and monitoring practices, such as scheduling, that support agile projects. This support can also be achieved by public attention (Crawford & Helm, 2009).

4.2 Practical implications

This dissertation research is founded on strong empirical and social motivations to understand and improve the status quo of the public sector digitalization through ICT project governance perspectives. By conducting constructive, qualitative research, this study provides explicit managerial implications for managers and practitioners working within and toward the context to identify and improve the ICT project governance practices on different organizational levels, as described earlier in Table 14. In other words, this study in its part helps the right projects to be done right—a feature that taxpayers might also consider valuable. Furthermore, the dissertation identified several tensions that affect the governance practices and, consequently, the performance and success of individual ICT projects. These tensions and suggestions for possible remedying approaches are elaborated later to

further increase the practical implications that are finally summarized to complete the construct proposed in Figure 9.

4.2.1 Perceived tensions and proposed remedies

Remedies to tension on bureaucratic and political structures

The tension regarding the effect of the bureaucratic and political elements on ICT project governance is derived from the complexity of applied structures—both institutional and organizational—and the temporality and volatility of the political environment. A digital transformation is characterized by entropy and should, therefore, be governed with steady simplicity.

First, a feasible approach could be to establish a fixed strategy process and artifact, in which the political impact from a temporary government agenda could be used to establish priorities and principles for vision setting. The objectives described in the strategy may hence be influenced with political elements but should nevertheless produce a concrete artefact toward which individual ministries and agencies can adjust their own agenda and objectives accordingly. However, the higher-level strategy formation process—with a current state analysis that includes both technological, such as the national architecture, and governance elements, e.g., the application of scalable project portfolios—should aim for a prioritized, scheduled roadmap of digitalization that would sustain over government terms but be subject to updates and changes from projects and technological advancements. The subsequent processes, programs, and projects should not be limited by election terms to efficiently and effectively contribute to the strategy. The content and consensus over the digitalization strategy could consider explicitly benchmarking peer nations and fields to ensure the application of the best practices available, which would further increase the acceptance and value proposition from a citizen perspective.

Secondly, to improve the effectiveness and efficiency of the project governance in general, starting from the strategic level, a structured yet simplified governance structure—with clear organization-, responsibility-, objective-, and task-related descriptions and indicators—could be introduced, as well. There are currently too many actors within the empirical setting, which increases confusion, complexity, and burdens on the project level. It must be taken into account that such simplification might call upon a more fundamental structural reformation of the

public sector, which would better support the vertical and cross-organizational processes and services for citizens. However, as the Finnish public sector is about to introduce yet another level in the local-national axis—a regional government focusing on the health and social care responsibility districts—this kind of reformation can be regarded inaccessible at the moment.

One practical implication here would be to scale and apply the project evaluation tool and review process to fit all project sizes and types, even though an escalated control and alignment process would still be applied only to the significant projects. This process would further support PPM and increase the transparency of digitalization, as the overall picture of all ICT development projects would become available.

Remedies to tension in flexible and collaborative project models

The tension regarding ICT project types comes from the mismatch between traditional, plan-oriented project management approaches and the flexible, uncertainty-embracing, and collaborative ICT project models—namely agile and alliance models.

When agile projects are considered, project governance practices should take into account the clarity of the decision-making authority and empowerment, especially in an interface where project governance transforms from external (organization) to internal (within project). In addition, control and monitoring procedures, even when regulated by many bureaucratic elements, should take into account the requirements and characteristics of agile methods. Second, an interface that causes tension can be found between technology and agile project. It is evident that technological standards and EA affect the agile project, but tension arises if the control extends from interfaces to system functionalities. The stakeholder demands and preferences that are derived into agile project requirements and further to system functionalities are managed by the product owner. Therefore, the interface between and the project governance toward the EA and agile product owner is challenging. Additionally, the other role definitions and responsibilities between technical and business functions within an agile project are subject to tensions. The capability and competence of an agile project team include both technology- and project delivery-related perspectives. Monitoring and capturing the lessons learned from both should be encouraged in the public organization.

Two agile elements caused tensions in the ICT project alliance construct. First, the new roles and responsibilities described earlier need to be determined and

embedded in the alliance team. Otherwise, the coverage of capability and competence requirements will fall short. Lüscher and Lewis (2008) suggested focusing on effective communication and acceptance to overcome the organizational paradox regarding the connection and disconnection of agile and alliance. Therein lies a possible solution for the abovementioned ICT project alliance tension as well: effective ICT project alliance communication requires first and foremost a common language and unified terminology. Second, the contract model should enable constant incentivization and value delivery through iterations instead of predetermined financial objectives and acceptance gates, and this should also cover the ICT-specific elements in the later stages of the project, namely maintenance and post-implementation development. Furthermore, the competence requirements—technological, substance, and project management—propose synergy in the ICT alliance project model, as the suppliers' role in the ICT field is characteristically stronger and considered more equal to the customer than in a conservative customer-supplier approach. These requirements enable better collaboration and a best-for-project approach during the procurement phase. However, to capitalize on such synergy, the scope, size, specifications, and pricing models in the project proposal or request for quotation (RFQ) must be lucrative enough to justify the relative strenuous procurement process and attract best-possible-prospects suppliers.

Remedies to tension in ownership

The tension regarding ownership interconnects directly with the first tension, as the ownership is an integral part of the governance structure.

The lack of authority has led to the emerging application of goodwill as an "assurance" approach, which could be mended with the law reformation described below—or by streamlining the budget process so that it flows through the actors that have the legitimacy and power to govern ICT projects. This emphasis and clarification of (ownership) structure would also mitigate the prevailing "satisfaction for less" mentality. However, this might consequently impose a balancing issue between centralization vs. decentralization of power (Janssen & van der Voort, 2016). However, as this study implies, the organizations that conduct projects (agencies) know best what to do in and with their projects. However, the overall digitalization project delivery capability of the central government could be nevertheless managed as a whole even if the execution and substance-specific know-how was left in the agencies. The shared and common practices related to

project delivery, such as sourcing and choosing an appropriate delivery model, could be included in the governance model, under a PMO, for example. Equally important aspects to be governed more centrally are the common technological elements related to digitalization and ICT projects, namely architecture, interoperability, and data (Irani, 2005; Janssen & Klievink, 2012).

Furthermore, the introduction and enforcement of the government digitalization CIO—the JulkICT or VM in general—role could be considered. Besides acting as an institutional entrepreneur or change agent, this role could readily facilitate the strategic-level master PPM by consolidating all applicable significant projects, portfolios, and portfolios from lower levels for alignment, prioritization, and balancing. Also, the central project delivery capability management responsibility could be reinforced through this role. One concrete technological factor under this CIO role could be the ownership and improved utilization of national architecture for better interoperability and integration.

If the ownership on a project level during and after the development phase is unclear, and even more so if the project is segmented per lifecycle, the benefits analysis becomes difficult. This study implies that this is already challenging as the projects are not required or motivated to conduct post-project analyses, and as there are difficulties to establishing determinants for the benefit or impact of ICT project products: the systems and services. Benefits cannot be realized if the users, either personnel of public administration or the customers, the citizens, do not use them, which leads to the aspect of stakeholder management. Citizens cannot be forced, but some "motivation enforcement" within the organizations, as indicated by the results of Publication III, could be applied.

Remedies to tension in applicable laws and regulations

If laws, a very formal and structured form of administration, are used to dictate project objectives or system specifications in great detail, there is little room for individual project team or owners to change them. The laws in Finland tend to go too deep into detail, as commented by a respondent in the MML case. This issue inevitably leads to a deeper scope for a single law, which restricts the applicability and comprehensiveness of the law. As the results of this study indicate, an individual ICT project has to comply with at least four different laws, depending on the scope of the project. Updating laws is a time-consuming parliamentary process that seriously restricts the fast-evolving digitalization and flexible ICT projects; therefore, it might be reasonable to imply that consolidation of the

applicable laws into one that would be comprehensive and robust enough, but actually authorizing at the same time.

Besides the external and institutional laws and regulations that start from international levels, such as EU directives, public sector organizations also have formal and stability-imposing internal procedures and regulative practices with which ICT projects must comply. Processes, project manuals, PMO procedures, and documentation, in particular, are generally seen as elements that detract from agility and cause tensions. These elements, in particular, were emphasized when these internal regulations were based on waterfall methods. Another internal control practice is the contracts, such as project contract, alliance agreement, or resource sourcing, which also facilitate risk management, incentivization, and delivery capability. Therefore, an evident implication is to ensure that at least these internal regulations and control practices support the performance of collaborative and flexible projects.

Remedies to tension on external field success stories

It was evident in this research that the transfer process of adopting project managerial practices from an external field and the related work of the institutional entrepreneurs were supported for two reasons. First, the adopted model was such that it dampened field resistance in the public sector and ICT context. The alliance model had already exhibited a positive trend, due primarily to positive experiences in the field, and the collaborative and cooperative approach of the model needed mostly cosmetic adjustments to match with the ICT field. Second, the ICT field is generally flexible and keen to improve on both individual and organizational levels. Following, utilizing, and developing new, advanced technologies has advocated for the acceptance of new ways of working that improve organizations' value delivery capability, whether in the private or public sector.

The combination of the model and field made it evident that the ICT project alliance had a relatively high integration capability, which is essential for project alliance formation and success (Hietajärvi et al., 2017a; Ibrahim et al., 2013). The ICT project alliance made sense to all parties from the beginning and enabled the formation of the key team that functioned well during the turbulence of the early stages of the project, especially when combined with the change caused by the introduction of the new model. This sense, along with the showcase status, enabled the project to overcome two more underlying paradoxes that Lüscher and Lewis (2008) identified: "Change and stability" (p. 231), and "acting when meaningful

and meaningfulness through action" (p. 231). Interestingly, this approach yielded field-wide, and potentially even society-level implications; the participants, especially at the LIVI, felt that this could be the new normal and they could have a role in spreading the understanding among the practitioners in both the ICT and public sector areas. Therefore, the capability to benchmark and adopt practices based on success stories and best practices from different fields and contexts, such as industries, nations, or managerial schools of thought (e.g., Lean), should be advocated by the CIO.

4.2.2 Proposed construct implications

The governance of public sector digitalization and projects seem to struggle with one underlying dilemma: to govern and align individual ICT projects with digitalization strategy would require more than just technological and mechanical project or ICT practices, namely the capability and willingness to govern and align the social, economic, and political elements such as processes and organization structures towards citizen- and service-centric transformation, as proposed, for example, in the classic NPM models (Cordella & Bonina, 2012). Should the focus still be inefficient silos or change toward effective customer service processes, bearing in mind, of course, the administrative restrictions or substance peculiarities, such as in the defense sector, for example (Gilchrist et al., 2018)? Hence, an interesting question, which we, however, leave for further consideration, would be to assess how governable the public sector digitalization and the key actors in it actually are (Müller et al., 2014) and how this could be perceived in maturity aspects of e-government (Andersen & Henriksen, 2006; Esteves & Joseph, 2008; Janowski, 2015). These aspects will not, however, be discussed in this study any further, but to synthesize this particular research, the following synthesing model is proposed. The model, as seen in Figure 12, illustrates the organizational, social, institutional and technological factors that impact the enactment framework, or the ICT project governance construct, and how they are founded on the criteria derived from the progress stages of the digital transformation. Within the ICT project governance construct, the previously introduced project governance practices are integrated with the implications to remedy the perceived tensions on different organizational levels.

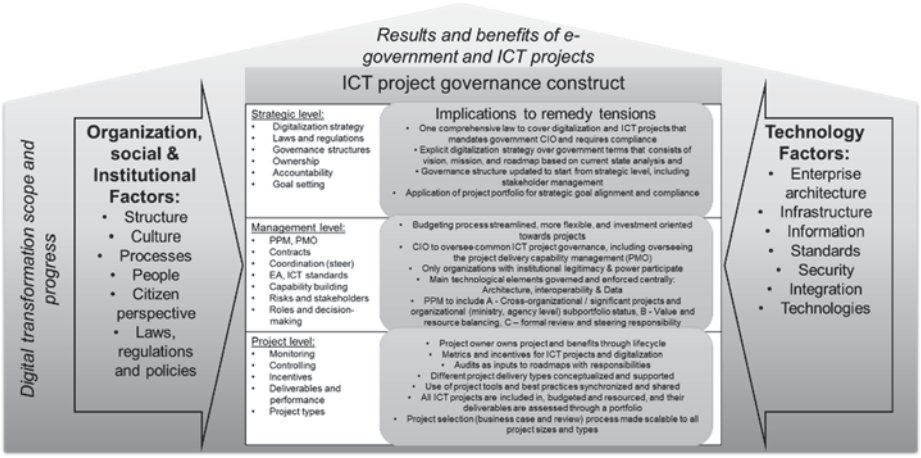

Fig. 12. Implications of the ICT project governance construct.

4.3 Evaluation of the research

This dissertation was conducted as constructive research using multiple methods on qualitative data from the Finnish public sector digitalization. Hence, to evaluate the research quality, the criteria applied generally to qualitative research is used. These criteria include construct validity, internal validity, external validity, and reliability (Denzin & Lincoln, 2005; Yin, 2013). Furthermore, the limitations of the research and researcher are discussed to conclude this section.

The construct validity aims to ensure that correct operational measures for the studied concepts are used (Müller & Lecoeuvre, 2014; Yin, 2013). In this dissertation, this topic also can be considered an evaluation of the validity of the proposed construct (Kasanen et al., 1993; Oyegoke, 2011). First, the issue of construct validity in qualitative case research can be addressed by using multiple sources of evidence and data acquisition methods, e.g., triangulation (Oyegoke, 2011). This dissertation applied both multiple- (Publication I, III) and single-case (Publication IV) strategies and a systematic literature review of explanatory nature (Eisenhardt, 1989b; Tranfield et al., 2003), in which the data was collected by several researchers from multiple sources, as presented earlier in Table 3. Publication I drew in-depth insight mostly from semi-structured interviews and case-dependent support material. Publication III applied a similar data acquisition approach but complemented it with a vast amount of publicly available documents on the research topic. Publication IV, as a single case study, also utilized an

observation method by three researchers. Secondly, the construct validity of qualitative research can be improved by providing a solid chain of evidence, or audit trail, that ensures the transparency of data analysis. This criterion is also fundamental to the systematic literature review (Kitchenham et al., 2009; Rowe, 2014), to which Publication II complied by providing a step-by-step description of process covering problem formulation, source selection, inclusion and exclusion criteria for sample selection, unit of analysis synchronization, and reporting. Also Publication I, III, and IV included detailed descriptions of the empirical case settings, data documentation and management (e.g., transcription of interviews) procedures, units of analyses, and interpretation and review principles that were applied to draw findings from the data. In all publications, the extant amount of supporting evidence, such as direct quotes or samples from documents, were provided to justify the analyses and results. The main criteria for assessing the validity of proposed solution in constructive research is to see and test that the construct works, i.e., the proposed innovation has solved the relevant real-life problem (Kasanen et al., 1993; Oyegoke, 2011). This weakness is the most evident one in this dissertation, as the proposed construct would require substantial adjustments to be made in the empirical setting and the validation via, for example, a strong market test, like witnessing improved results by the organization due to the implied solution (Kasanen et al., 1993), which would take a long period of time. However, the informants used in the empirical cases (Publications I, III, and IV) were also asked to review the reported findings and implications, which improved the validity of the construct. Also, as this dissertation is being written, Finland is introducing a new Act of Information Technology governance that echoes with the implications made in this study and can thus be considered a form of weak market test as the scope of the law correlates with the findings of this study (Kasanen et al., 1993).

Internal validity is applied to assess the causal relationships that explain how certain conditions can lead to another (Yin, 2013). As this dissertation and individual publications aim to explain the conditions of a specific phenomenon, the logical reasoning that informs the findings is concerned (Yin, 2013). Pattern matching and the application of logic models are two techniques that can improve internal validity, and these were applied in Publication I and II. A pre-defined project governance framework (Kujala et al., 2016) was applied systematically as a logic model to analyze the evidence from multiple empirical cases (Publication I) and the content of selected high-quality journal articles (Publication II), thus matching the patterns on the logic of reasoning. Explanation building is also one

method to achieve better internal validity, which was applied in Publication IV to logically build an understanding of the institutional work during the cross-field adoption process and the emerging characteristics of ICT project alliances. Furthermore, the internal validity of the dissertation and individual publications is improved by the double-blind review and revision process applied by the publication outlets, which allowed the research to be developed further based on the provided feedback.

The generalizability of the research findings within a certain domain is the aim of external validity (Yin, 2013). It is generally one of the main weaknesses and subjects of critique when qualitative research is concerned (Eriksson & Kovalainen, 2016; Pratt, 2008). On the other hand, the underlying purpose of qualitative research—and this dissertation—is to provide contributions through an increased understanding of a phenomenon instead of generalizable implications based on positivist cause-effect relations; this is not a critical flaw. However, the external validity of qualitative research can be improved by clearly defining the scope of the research, the empirical boundaries in which the research is conducted and by reflecting the findings with previous research and current understanding (Eriksson & Kovalainen, 2016; Yin, 2013). In this dissertation, the scope was clearly defined to focus on the project governance practices within a certain empirical setting, the Finnish central government digitalization. Applicable theories, namely institutional theory, and current knowledge from e-government, project management, and governance streams were applied to reflect the findings of this dissertation. In Publication II, the replication logic was applied to the pool of selected articles, whereas in the other publications the findings were grounded to previous academic research and knowledge, thus improving the external validity in general. Publications II and IV defined and introduced new concepts—agile project governance and ICT project alliance, respectively—to the existing streams, whereas the analytical generalization of Publications I and III is based on the elaboration and advancement of existing theories, concepts, and understanding.

Reliability is the extent to which research can be replicated by others using similar data and methods, and whether this would yield similar results (Guba & Lincoln, 1994; Yin, 2013). In other words, and reflecting the underlying purpose of this dissertation: is the research being conducted right or properly? In a similar analogy, the validity criteria discussed above would answer the question: is the right research being conducted? The purpose of reliability in qualitative research is to reduce the subjective biases of the researchers and to eliminate errors in the research process itself, not so much to emphasize the replicability of the cases (Yin,

2013). In all publications, a documented case study and research protocol were created and agreed upon by all researchers involved. These protocols involved the objectives of the study, research process guide, roles and responsibilities of the researchers, topics and protocols for interviews, tools and methods for data analyses and interpretation, and reporting format. With the exception of Publication III and the observation studies conducted for Publication IV, all interviews included more than one researcher. All interview and observation data were transcribed and consolidated with supporting material and analyzed systematically using NVivo software. The findings were reviewed by all authors, which reduced the research biases of the results. In Publication II, the research protocol also provided a detailed description of the search criteria for different databases, which ensured that the selection process could be replicated if necessary.

This dissertation research has several limitations that need to be addressed. First, as the research leans on qualitative case studies, the contributions to the theory are narrow at best (Eisenhardt & Graebner, 2007). The actionable knowledge provided by the practical implications allow this study to provide meaningful insight into improving a highly relevant, real-life social problem; therefore these limitations can be considered acceptable in the perspective of constructive research value (Oyegoke, 2011). Furthermore, by bridging several streams of research, namely in Publication II where the connections between traditional and agile project governance mechanisms are made explicit, this study does provide contextual contributions to individual research fields and concepts and theories applied within them. Even though Publication II had the strongest theoretical contributions, it was also limited by the fact that the research was based on the literature, not on empirical evidence. The scope of Publication II was also limited to studies done in the information systems and software development contexts. These studies are mostly published in outlets representing software engineering and computer science disciplines. This contextual focus is clearly another limitation to Publication II, as studies on project governance practices—and agile and agility too—can be found also in other disciplines, such as in organizational and psychological discourse. Contextual elements were also limitations to other publications and this dissertation as a whole. The research scope has focused on projects in digital transformation but has excluded factors critical to e-government transformation, such as data management and governance (Irani, 2005; Kim & Zhang, 2016). The research is based solely on the data from limited cases in Finnish central government digitalization context, which limits the validity and generalizability of the findings, similarly to the case study method itself (Darke

et al., 1998). On the other hand, the diversity of case organizations and projects reduce the data subjectivity and also improve generalizability of results, which is still limited at best even within the central government scope, not to mention public sector in general. Practices that are applicable to agencies under VM can be considered different from those of under Ministry of Defense or municipal sector, for example. The main case data was acquired through interviewing respondents after the projects, with the exception of the observation method applied during the case in Publication IV. This timing enabled the respondents to post-rationalize their subjective views and answers, but this was met by validating the analyses and results with the respondents and other members of the organization. Also, a substantial amount of publicly available material was collected to support case data acquisition, and the organizations also provided plenty of case-specific supporting material. However, by conducting a longitudinal supporting study, such as ethnographic research or dynamic observation in the contextual environment, these biases could be even better reduced in and further insight and perspective to the findings of this study could also be acquired.

4.4 Recommendations for further research

This dissertation research has opened doors for many interesting research opportunities. First, to meet the identified weakness of this study as constructive research, the validation of the proposed construct through longitudinal research is proposed. Also, comparative research of the synthesized findings between similar studies from other countries or through a literature review would answer the question whether this is "just a Finnish thing" or if the situation is similar elsewhere. The presented contextual limitations also justify further research within the Finnish context as well: studies that would focus on the local–national and international axis (Hansen & Kræmmergaard, 2013; Klievink & Janssen, 2009) of the public sector digitalization would be welcomed, especially now that the Finnish public sector is going through a structural reformation. The scope limitations have also left the door open for studies on the data governance aspects of ICT project governance in digital transformation, as well as the citizens' perceived value of processes and ICT project product interface (Beynon-Davies, 2007). This dissertation also proposed a construct for ICT project governance and two novel aspects to it that could be studied further. First, the connection between the ICT project governance model and e-government transformation evolution progress and scope would be worth investigating (Janowski, 2015; Lee, 2010). Secondly, how

the construct supports the work of an institutional entrepreneur through the TEF is yet only food for academic thought (Cordella & Iannacci, 2010).

Institution theory research highlights many elements that resonate strongly with the topic and findings of this research: through what mechanisms does central government as an institution gain legitimacy, e.g., what are the constituents for pillars of power in digital transformation (Scott, 1995) within an institution? Drawing further from institution theory, or more specifically institutional entrepreneurship (Maguire et al., 2004; Wijen & Ansari, 2007), an interesting research topic would be to study the performance and activities of the proposed government CIO as central actor, active agent or "institutional entrepreneur hero" (Micelotta et al., 2017, p. 1883) of institutional change—the digital transformation—and reflect the findings with the characteristics of the linking pin of alignment (Hrebiniak & Joyce, 1984). The processes of transitioning from strategic alignment to social alignment (Gilchrist et al, 2018) and forming and building a consensus of the national digitalization strategy (Bowman & Ambrosini, 1997; Floyd & Wooldridge, 1992; OECD, 2014) would also provide valuable insight into the topic. Furthermore, it would be interesting to operationalize and analyze the strength of governance practice connections and interdependency between organizations by applying a quantitative or longitudinal research approach on several public sector organizations.

Some interesting research topics can also be brought forward from the individual publications. Publication II suggests first and most importantly that further theorization or conceptualization of project governance based on existing studies would be of strictly limited usefulness. Therefore, fellow researchers are encouraged to focus on new empirical studies in this field, albeit not necessarily to the exclusion of theory. Such studies should focus on the proposed concept of agile project governance to: 1) assess how agile methodologies, techniques, and project governance practices are applied in different levels of organizations and to understand the pervasive impact of such measures from top management via projects to individuals, 2) evaluate how project contract, model, and delivery types, such as integrated project deliveries or project alliance models or outsourcing and offshoring, impact the application and utilization of agile approaches from a project governance perspective. What are the characteristics or prerequisites of an Agile Alliance? 3) analyze how agile project governance scales, changes, or evolves according to project size (small- or large-scale), type (pure agile, hybrid, or traditional), complexity (organizational, geographical, or cultural), or product construct ("off-the-shelf" product, platform, tailored, or new product), and 4)

Understand how agile project governance is perceived and applied in different empirical (industries, private-public sectors) and academic contexts (research streams). How does (external) governance turn into (internal) governance in different contexts, and what might explain these differences and commonalities? Are there areas where agile project governance still contradicts with traditional methods? Or are there areas where the new, emergent tactics have not yet been properly identified and described?

Publication IV suggests a need for further understanding and, consequently, research, on the topic of ICT alliance projects. Since this study covered only the early stages of an ICT alliance project, longitudinal research on the entire ICT alliance project lifecycle is suggested in order to assess and analyze the fit-for-purpose and success mechanisms of it. As ICT projects tend to produce novel solutions by nature, it could be especially interesting to study the opportunity capturing during the development phase and how this could be used as a mechanism for institutional innovation (Hietajärvi, Aaltonen, & Haapasalo, 2017b; Mignerat & Rivard, 2009; Zietsma & Lawrence, 2010). Second, as this study provided the first conceptualization of the ICT project alliance characteristics, more data and case studies are called for to operationalize and validate the concept further and to analyze the similarities and differences between it and more traditional project alliance models applied in, for example, the construction field. Third, the contextual peculiarities of the public sector impact both the ICT and project alliance. Therefore, it would be interesting to know how an ICT project alliance in the private sector would be different. Publication IV provided insight into the horizontal transfer process of managerial practices across two fields but did not delve too deep into the field or the organizations within. What are the mental models in the organizations within a field, or through what kind of enactment organizations advance the field itself (Porac, Thomas & Baden-Fuller, 1989) in such settings would be interesting research topics for future studies.

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