Rethinking digital transformation of healthcare

The role of technology and institutions in service innovation

Arto J. Wallin
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Abstract

Due to the mounting prevalence of chronic diseases, increasing demand for expensive treatments and the growing old-age dependency ratio, there is a pressing need to augment the productivity and quality of health and elderly care. Although the potential of digital technologies is widely acknowledged, focusing on technological innovations and incremental improvements originating from the healthcare system does not appear to provide the desired results. Therefore, there is a need for innovation that breaks established rules and practices and enables systemic transformation in healthcare.

This article-based doctoral thesis builds on four published studies employing abductive case research strategy: a dialogue between theory and empirical analysis. The first two studies were conducted under the framework of European innovation programmes. They explore how digitally-enhanced services improve service productivity in the elderly care setting, and provide insights into innovation challenges experienced during a three-year collaborative innovation project. The latter two studies focus on start-ups operating under a start-up business accelerator programme. They increase understanding of the institutional constraints experienced by entrepreneurs when developing innovations that diverge from the prevailing rules of healthcare, and of the ways in which they attempt to change the rules hindering the adoption of innovations.

The thesis contributes to service research by constructing a more profound understanding of the mechanisms that advance, hinder, enable and constrain service innovation in the field of healthcare. In particular, the thesis contributes to integrating the perspective of institutional entrepreneurship in service innovation, highlighting the importance of actions that contribute to breaking prevailing ‘rules of the game’ (i.e. institutions) and creating new ones. In addition, the thesis depicts how digitalization reveals the pervasive role of technology in innovation. Jointly, these contributions advance the synthesis view on service innovation – a view that highlights the importance of both technological and service aspects in innovation.

The policy and managerial implications of the thesis suggest that, in addition to a complex set of institutions that guide innovation in the field of healthcare, the development context may also have a notable impact on innovation. The institutional structures of collaborative innovation programmes should encourage collaboration outside project boundaries, in order to foster the actors’ awareness of the institutional and market environment. Exposing innovation to institutional forces makes it easier to comprehend the necessary institutional change and to develop ways of justifying the change to actors that are vital for its support. The institutional perspective should be more tightly linked to the practice of innovation.

Keywords digitalization, service innovation, innovation challenges, institutionalisation, healthcare renewal

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| Abstract | Due to the mounting prevalence of chronic diseases, increasing demand for expensive treatments and the growing old-age dependency ratio, there is a pressing need to augment the productivity and quality of health and elderly care. Although the potential of digital technologies is widely acknowledged, focusing on technological innovations and incremental improvements originating from the healthcare system does not appear to provide the desired results. Therefore, there is a need for innovation that breaks established rules and practices and enables systemic transformation in healthcare. This article-based doctoral thesis builds on four published studies employing abductive case research strategy: a dialogue between theory and empirical analysis. The first two studies were conducted under the framework of European innovation programmes. They explore how digitally-enhanced services improve service productivity in the elderly care setting, and provide insights into innovation challenges experienced during a three-year collaborative innovation project. The latter two studies focus on start-ups operating under a start-up business accelerator programme. They increase understanding of the institutional constraints experienced by entrepreneurs when developing innovations that diverge from the prevailing rules of healthcare, and of the ways in which they attempt to change the rules hindering the adoption of innovations. The thesis contributes to service research by constructing a more profound understanding of the mechanisms that advance, hinder, enable and constrain service innovation in the field of healthcare. In particular, the thesis contributes to integrating the perspective of institutional entrepreneurship in service innovation, highlighting the importance of actions that contribute to breaking prevailing ‘rules of the game’ (i.e. institutions) and creating new ones. In addition, the thesis depicts how digitalization reveals the pervasive role of technology in innovation. Jointly, these contributions advance the synthesis view on service innovation – a view that highlights the importance of both technological and service aspects in innovation. The policy and managerial implications of the thesis suggest that, in addition to a complex set of institutions that guide innovation in the field of healthcare, the development context may also have a notable impact on innovation. The institutional structures of collaborative innovation programmes should encourage collaboration outside project boundaries, in order to foster the actors’ awareness of the institutional and market environment. Exposing innovation to institutional forces makes it easier to comprehend the necessary institutional change and to develop ways of justifying the change to actors that are vital for its support. The institutional perspective should be more tightly linked to the practice of innovation. |

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Viimeaikainen teknologinen ja yhteiskunnallinen kehitys ovat synnyttäneet tarpeen uudistaa länsimaisia terveydenhuoltojärjestelmiä. Muun muassa kroonisten sairauksien levineissyyden kasvaminen, uusien kalliimpien hoitojen kehittäminen ja huoltoaseman heikkeneminen ovat aiheuttaneet haasteen, jota ei pystytä ratkaisemaan yksittäisillä teknologisilla innovaatioilla. Tämä on saanut useat tieteelliset ja innovaatiokorkeakoulut ja yhteisöjä kehittämään uusia ratkaisuja ja teknologisia innovaatioita. Todelliset ratkaisut ongelmaan ovat kuitenkin olleet vielä puuttueellisia.

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In addition to my co-authors, there are certain people who have guided me in my work or who have made a major contribution on my journey. I’m deeply grateful to Dr. Kaisa Koskela-Huotari whose motivation and enthusiasm gave me a lot inspiration to embark on the journey toward dissertation. Numerous discussions with her helped me to build an understanding of service-dominant logic and connect this theoretical approach to the phenomenon of digitalization. My sincere gratitude goes also to Dr. Kaisa Still and Dr. Katri Kallio. Insightful discussions with Dr. Still have stimulated my thinking process and her feedback on the manuscript helped me to improve it. Dr. Kallio showed me what dedication to the dissertation project means and how it leads to great results.

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Atypical theoretical perspective to many engineering driven projects at VTT. My sincere gratitude goes to my co-workers and especially to other PhD students at Roskilde University of various disciplinary backgrounds. Discussions with them enriched my understanding and helped me to see the studied phenomenon from fresh perspectives.

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Oulu, 3 April 2018
Arto Wallin
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<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
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<tr>
<td>MLP</td>
<td>Multi-Level Perspective</td>
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<td>NIS</td>
<td>National Innovation Systems</td>
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<td>NPD</td>
<td>New Product Development</td>
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<td>NSD</td>
<td>New Service Development</td>
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<td>R&amp;D</td>
<td>Research and development</td>
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<td>S-D logic</td>
<td>Service-Dominant logic</td>
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<td>SME</td>
<td>Small and Medium-sized Enterprises</td>
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List of original publications

This thesis is based on the following original publications, which are referred to in the text as Articles I–IV. The publications are reproduced with kind permission from the publishers.


Contribution of the author to the publications

Article I  Digitally-enhanced services for the elderly

As a co-author of Article I, I conducted a literature review regarding productivity and chose the theoretical framework of service productivity. I conducted the interviews with the service providers and analysed data especially from the service provision perspective. The conclusions were drawn and the paper was written in collaboration with Juha Häikiö and Minna Isomursu, and my main contribution was in theory, methodology and discussion.

Article II  Challenges of new service development

As the first author of Article II, I designed the study jointly with the co-authors. I collected the data regarding service providers jointly with Pasi Pussinen. Transcription of the interviews was carried out by Tutkimustie Oy. I conducted the literature review and created the framework for the study by analysing theory and empirical data. Marja Harjumaa, Pasi Pussinen and prof. Minna Isomursu participated in joint analysis sessions in which conclusions of the findings were drawn. I was mainly responsible for writing the article, although I received some contributions to specific sections from the co-authors and they reviewed the article several times before its submission. The language of the manuscript was checked by Semantix Finland Oy.

Article III  Transforming healthcare through entrepreneurial innovations - An institutional view

As the sole author of Article III, I developed the initial idea and design for the study with Minna Pikkarainen. I conducted three first interviews with Minna Pikkarainen and one with Päivi Jaring and the other 28 interviews independently. Transcription of the interviews was carried out by Tutkimustie Oy. I conducted an initial literature review and analysed the data. I first wrote an article that was presented in RESER XIV, September 10-12th, 2015 in Copenhagen. I later refined this article based on the feedback from reviewers and the audience at the conference. Prof. Lars Fuglsang helped me to refine the theoretical framework and draw conclusions. I conducted a more detailed literature review and re-analysed the data. Finally, I wrote the article that was submitted to the journal. The language was checked by Semantix Finland Oy.

Article IV  Service innovations breaking institutionalized rules of health care

As the main author of Article IV, I developed the initial idea and design of the study with Minna Pikkarainen. I conducted three first interviews with Minna Pikkarainen and one with Päivi Jaring and the other 28 interviews independently. Transcription of the interviews was carried out by Tutkimustie Oy. I collected additional data from publicly available sources and analysed the data. I developed the theoretical framework and drew conclusions together with Prof. Lars Fuglsang, who helped me in writing the article, for which I was mainly responsible. The language was checked by Semantix Finland Oy.
1 Introduction

‘in times of turbulence the biggest danger is to act with yesterday’s logic’ Peter F. Drucker

The renewal of healthcare systems has become a key concern of policy makers in many developed countries (Lorenzoni, Belloni and Sassi, 2014). The need to innovate healthcare service delivery and organizational functions has been acknowledged for several decades (Hunter, 1983), but innovation efforts have mainly been focused on medical technology and drugs (Berwick, 2003; Djellal and Gallouj, 2008). The need for more profound transformation of healthcare systems has intensified in recent years due to several societal and technological developments (Barnett et al., 2011; Janssen and Moors, 2013). On the one hand, the increasing demand for care challenges the sustainability of the current system (O’Connor et al., 2016). The growth of demand is attributed to the increased prevalence of chronic diseases and to the increase of ageing population with complex health and social care needs (Länsisalmi et al., 2006; Lopreite and Mauro, 2017). It is estimated that persons over 60 years will more than double globally to 2.1 billion by 2050, which is anticipated to have a significant impact on the support ratio, defined as the number of workers per retiree (United Nations, 2017). On the other hand, health economic studies point out that supply pressures also threaten the sustainability of healthcare systems (Okunade and Murthy, 2002; Macdonnell and Darzi, 2013; Lehoux et al., 2016). Contrary to many other fields, in which technological innovations have lowered costs, the introduction of new medical technologies, drugs and therapies often increases health spending (Okunade and Murthy, 2002). Even when new technology and drugs are not expensive in unit costs, they may amplify the demand for novel medical treatments and therefore increase overall health spending (Rosenberg-Yunger et al., 2008; Macdonnell and Darzi, 2013).

In order to tackle the challenge of increased demand while reducing the costs of healthcare systems, policy makers across the globe look to information technology (IT) as an enabler for the transformation of healthcare system (Agarwal et al., 2010). IT-enabled innovations have already been used on many fronts in healthcare, but they have mainly been targeted to professionals (e.g. electronic medical records) and are aligned with the prevailing logic in healthcare that focuses on ‘production of healthcare’ as opposed to producing health (Asch and Volpp, 2012). Consequently, innovations have not tended to reduce the need for labour, which still accounts for the largest proportion of spending in many countries (Macdonnell and Darzi, 2013). However, this may be about to change, since many of the ‘digital health’ innovations diverge from the prevailing logic of healthcare by promoting preventative care with an aim to keep people out of hospitals, consequently reducing the overall costs related to treatments (O’Connor et al., 2016). In addition, digital health innovations enable new kinds of self-care approaches, in which the customer plays a bigger role especially in the self-management of long-term conditions. Moreover, many digital health innovations aim to make healthcare more affordable by redesigning workflows or by automation of tasks previously conducted by health professionals, such as automatic image analysis. Together these innovations have become a phenomenon, referred to as the digital transformation or revolution of healthcare, which highlights expectations of the dramatic changes in the field of healthcare in the coming decades (Agarwal et al., 2010; Topol, 2013).

On a smaller scale, digital transformation is already going on in practice as digital health innovations are altering healthcare processes, practices and labour structure (Agarwal et al., 2010; Macdonnell and Darzi, 2013). In recent years, significant efforts have been made to advance this development in order to promote the transformation of the healthcare system. At the EU and national levels, there have been massive investments in strategic innovation programmes to support the innovation in general, e.g. FP7 and Horizon 2020. Entrepreneurial activities have also been increasing in this area, in which the United States has a clear lead in investments (Mohout and Staelraeve, 2016; Tecco and Zweig, 2017). One of the challenges in the European setting has been an excessive focus on technological innovations, and lack of understanding of the complex systemic nature of innovation within the field of healthcare. Although service (innovation) research has gained some foothold in this context, its sociology-based institutional approach to innovation has remained mostly as a distant stream of research. This thesis presents the claim that the integration of service-oriented and institutional approaches to innovation provides a frame for understanding and analysing complex and systemic innovations and therefore enabling the success of innovations in healthcare.
The aim of the thesis is to construct a more profound understanding of the factors influencing the digitally-enabled service innovation in healthcare and in home care of the elderly (for the matter of simplicity, the term healthcare is henceforth used to also refer to those parts of social care that are linked to elderly care). In particular, the study investigates mechanisms that advance, hinder, enable and constrain service innovation1 from the perspective of niche actors. Therefore, the study does not aim to provide an account of overall system-level transformation of healthcare, but aims to provide detailed insights by investigating individual service innovations (cases). These cases create new knowledge about how individual innovations drive digital transformation, and how innovators experience enablers and constraints for enacting transformation. Even though digital transformation is inherently a technological phenomenon, this thesis focuses particularly on the social and institutional change associated with it, which has recently been identified as focal to service innovation. In addition, the thesis does not aim to go into the details of the healthcare substance, but the healthcare context is only described to the extent needed for understanding the studied innovation.

The research was conducted in the separate sub-studies, which answer specific research questions, originally presented in Articles (I-IV). Each study focused on a separate theme related to the central aim of the thesis, thereby providing a unique contribution. The first two studies were conducted in the context of home care services developed within a collaborative R&D project setting. The aim of the first study was to explore the opportunities which the new interaction technique provides with regard to innovation in elderly care service provisioning, especially from the perspective of service productivity and experience. The second study was a longitudinal case study conducted within the R&D project, and it illuminates the challenges faced by R&D actors during the collaborative new service development process aiming at commercializing innovation in home care markets. The third and fourth studies were conducted in an entrepreneurial context, with companies operating within a start-up accelerator program. Based on the knowledge gained from the earlier work, the research focused on socially constructed institutional arrangements in the field of healthcare, which define the ‘rules of the game’ within the field (North, 1990). The third study explains how entrepreneurs experience formal and informal rules within the healthcare system as forces constraining their innovation activities. The fourth study explores how these entrepreneurs initiate and enact change in the rules of the field in order to succeed in their innovation activities. Finally, the aim of the summary is to review and integrate theories and concepts central to the thesis, introduce the four studies, synthesize the results and draw general conclusions. Together these four studies and the summary provide insights into how digitalization enables the creation of service innovations that aim to transform the field of healthcare. Moreover, the thesis opens up the challenges which entrepreneurial and R&D actors face when developing innovations diverging from the prevailing rules of the game in healthcare, and provides insights into how actors can change these rules in order to succeed in their innovation efforts.

The thesis identifies several theoretical perspectives that are highly relevant for understanding innovation in the field of healthcare. These theoretical perspectives can be roughly categorized under three disciplinary views. Firstly, innovation research is a broad disciplinary view under which innovation theories are developed (Sundbo, 1998). Innovation theories lay the foundations for understanding service innovation. This thesis, in particular, applies a multi-level perspective on socio-technical transition (Geels, 2002, 2004a; Geels and Schot, 2007) to understand niche-level innovation activities and the way in which institutionalized rules can be broken by pressure from the niche level. Secondly, service research provides a multi-disciplinary perspective on understanding service innovation and new service development processes. This thesis uses service-dominant logic as a philosophical foundation and theoretical lens to understand complex service innovation within service eco-systems. Thirdly, research on institutions and institutional change, also referred to as organizational institutionalism (Greenwood et al., 2008), complements innovation and service theories. Neo-institutional theory is utilized to explain institutional constraints for innovation, and the actors’ agency in the change is approached from the theoretical

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1 All innovations studied in this thesis are enhanced or enabled by information and communication technology (ICT). Hence, they can be referred as ‘ICT-enabled’ or ‘digitally-enabled’ service innovations. This indicates that innovations are not purely digital, but that ICT plays an important role in service provisioning even if it is not always visible to the customers or the frontline employees. However, from the service systems perspective, practically all modern service processes in the field of healthcare rely to some extent on ICT. Therefore, for the sake of simplicity this thesis uses the notion of ‘service innovation’.
perspectives of institutional work and institutional entrepreneurship. Together these three complementary and partly overlapping disciplinary perspectives are the lenses used in this thesis to create better understanding of the healthcare context and the studied phenomenon - digital transformation of healthcare. The framework of the thesis is illustrated and summarized in Figure 1.

![Diagram of theoretical perspectives](image)

**Figure 1. Theoretical perspectives to investigate the digital transformation of healthcare.**

The thesis introduces the disciplinary views with different backgrounds in separate sections, and in this way provides a clear structure for the thesis. However, there have been increasing efforts, especially by service researchers, to combine the knowledge accumulated within the different streams. The aim of these bridging efforts is to combine organisational and human understanding with business and technological understanding in order to study value co-creation and innovation (Spohrer et al., 2007; Maglio and Spohrer, 2008), and to understand change in complex service ecosystems (Vargo, Wieland and Akaka, 2015). In addition to the three main perspectives of the thesis, the long learning process that gradually proceeded from the first study to the writing of the summary builds on the many other theories that have inevitably shaped the thinking process. Especially the theoretical and applied research related to strategic management (e.g. business model design, innovation management, dynamic capabilities) has essentially influenced the researcher's world view and research design, even though it is not explicitly presented in the thesis. Information systems science is closely related to service research and provides particular insights into digitalization and how it is related to service innovation. The more recent articles (III-IV) are also closely connected to the theories of entrepreneurship. However, to keep the discussion coherent, the thesis summary focuses mainly on introducing the innovation, service and institutional perspectives and their application to understanding of the studied phenomenon, i.e. digital transformation of healthcare.

The summary part of the thesis is structured as follows. After this introduction, Chapter 2 presents the main theoretical perspectives and their applications in the healthcare context. On this basis, the research gaps are identified and the research framework constructed. Chapter 3 summarizes the research gaps, introduces the research questions and the research process, which are followed in Chapter 4 by a description of the research approach and methods, and a discussion of the validity, reliability and generalisability of the results. Chapter 5 summarizes the empirical results from the four individual studies (I-IV). Finally, Chapter 6 synthesizes the results, analyses their implications and discusses the limitations of the study and potential future research directions.
2 Theoretical perspectives

This thesis is theoretically grounded on innovation research, service research, and research on institutions and bridges between these research streams. The theoretical review starts by introducing these perspectives separately, with an aim to define the theoretical background and to discuss the focal theories under each research stream. This is followed by a section aiming to elaborate how these perspectives contribute to the understanding of innovation in and transformation of healthcare, and why the chosen perspectives are relevant for the thesis.

2.1 Innovation research

The roots of innovation studies are usually attributed to Josef Schumpeter (Schumpeter, 1934, 1939, 1943), who is considered to be the ‘father’ of innovation research (McCraw, 2000). His definition of innovation was broad, consisting of the introduction of 1) new goods, and 2) new methods of production, 3) the opening up of new markets, 4) the conquest of new sources of supply of raw materials or semi-manufactured goods, and 5) the carrying out of a new organization of any industry, such as breaking up of a monopoly position (Schumpeter, 1934, p.66). Despite the originality of the work, his innovation theory had a marginal status for decades, while more traditional economic theories held the field and narrowed the understanding of innovation to technological novelties and intra-organization R&D. Later on, the Schumpeterian concept of innovation has been ‘re-discovered’ and used in many different disciplines.

2.1.1 Three disciplinary views on innovation

Although the body of knowledge in innovation research has grown to prominence, innovation studies still lack consensus about the exact meaning of innovation. Innovations are studied, for example, from the perspectives of economists, organizational sociologists and technology management theorists (see review Gopalakrishnan and Damanpour, 1997), who take different stands on the innovation. Innovation economics started to become significant after the economic depression at the end of 1970s had challenged prevailing economic theories (Dosi, 1988; Freeman, 1974; Nelson & Winter, 1982). Innovation economics argued that the innovations driven by entrepreneurs are responsible for most economic growth when bust turns to the boom (Sundbo, 1998). Whereas innovation economics build on the legacy of Schumpeter, approaching innovation often from the perspective of economic growth, the sociologist perspective builds mostly on traditions in which innovation is seen as an activity renewing social behaviour (McClelland, 1961; LaPiere, 1965). Therefore, sociologists have mainly been concerned with the issue of how innovations are incorporated into organizational structures (Aiken and Hage, 1971), and become accepted within social groups via the process of institutionalization (Zucker, 1977).

The technology perspective on innovation has traditionally focused on the generation of new technologies and improving the existing technology (Gopalakrishnan and Damanpour, 1997) in the industrial context. The technologists’ aim has been to understand the generation of technological innovations within organizations and their subunits (e.g. R&D department). In addition to focusing on development and R&D processes, technologists have applied theories of innovation adoption and diffusion to understand how inventions transform to innovations (Gagnon et al., 2012; Li et al., 2013). Although the innovation diffusion theory (Rogers, 1962, 1995) was originally sociology-based communication theory, it has been widely utilized by technologists from the perspective of diffusion of technology. Innovation diffusion theory explains diffusion as a process through which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 1995). Technologists have mostly been concerned with the drivers and barriers for successful diffusion of the technology, whereas the theorization has focused on the identification of general patterns between innovation processes (Markard and Truffer, 2008). Finally, technologists have also studied innovation from the macro-perspective, especially from the perspective of fundamental technological transition processes (Van den Ende and Kemp, 1999). These technological transitions and broader socio-technical transitions are discussed in Section 2.1.5.
2.1.2 From entrepreneurs as innovators to R&D-based innovation

The innovation theories have also been divided regarding the locus of innovation. The early works of Schumpeter can be seen as one end of the spectrum, highlighting the role of the individual entrepreneur as innovator. It is important to notice that Schumpeter made a strong division between invention and innovation. Although the entrepreneur may also be an inventor, the entrepreneurial activities were those focused on carrying out new combinations (inventions) into practice (Schumpeter, 1934). The entrepreneurs were considered to be less dependent on traditions and connections, as their characteristic tasks focus on ‘breaking up old and creating new tradition’ (Schumpeter, 1934, p. p.92). Their role was to challenge the status quo preserving industry incumbents. Although Schumpeter’s later theoretical contributions are less focused on the individual notion of entrepreneur, the later theory also focuses strongly on how entrepreneurs reform or revolutionize the pattern of production by exploiting an invention (Schumpeter, 1992). These formulations of innovation and entrepreneurship have had considerable influence on later works on entrepreneurial innovation, and on the emergence of entrepreneurship as a separate academic discipline (Landström and Lohrke, 2010).

Although Schumpeter originally assigned the role of innovator to the entrepreneur (Schumpeter 1934), the focus of innovation studies in the decades following the Second World War was mainly on innovations initiated by scientific advancements and basic research. The simple form of this technologically-oriented innovation process became known as the ‘linear model’, which suggested that innovations are ‘pushed’ (Carter and Williams, 1957) to the market by suppliers after going through the stages of basic research, applied research, development, production, and diffusion/marketing (Kline and Rosenberg, 1986; Godin, 2006). This prominent model was supported by the policy makers and academic organizations lobbying for research funds (Godin, 2006). However, as years went by, an increasing number of scholars began questioning the linear model relying on the argument that customer need is the most important driving force for innovations (Utterback, 1971). Step by step, a broader view on innovation gained ground (Kline and Rosenberg, 1986). This view suggested that the complex and non-linear nature of the innovation process needs to be viewed as a series of changes in a complete system including the market environment and social contexts of the innovating organization (Kline and Rosenberg, 1986). These ideas and the developments, most of which were presented by representatives of evolutionary economics (Nelson & Winter 1982), paved the way to innovation systems studies (see section 2.1.4).

2.1.3 The new era of entrepreneurial innovation

After Schumpeter’s theories, entrepreneurial innovation was for long seen as secondary compared to R&D and science-based innovations. However, in recent decades studies of entrepreneurship have gained significance also including notable interest in entrepreneurial innovation. As a result of this wide interest, the studies related to innovation in an entrepreneurial setting have spread to different streams. Innovation management scholars have, for example, been interested in high-technology entrepreneurship (Markman, Balkin and Schjoedt, 2001; Groen, Wakkee and De Weerd-Nederhof, 2008) and how the management of the ‘entrepreneurship model’ of innovation differs from that of the more traditional ‘corporate model’ of innovation (e.g. Freeman & Engel, 2007). Innovation policy-oriented research on entrepreneurial innovation has mainly focused on the innovations of new ventures that break path-dependency of the field and question established competencies (Baumol, 2002). This stream has recently gained increasing interest, focusing especially on radical innovations and entrepreneurial innovation ecosystems (Autio et al., 2014; Garud, Gehman and Giuliani, 2014; Autio and Rannikko, 2016). Thereby, it is closely related to innovation systems studies.

The entrepreneurial innovation perspective acknowledges that the ventures are operating within a complex multi-dimensional context including social, institutional, industrial, organizational, spatial and temporal networks (Autio et al., 2014). This entrepreneurial ecosystem regulates the direction and quality of innovation by shaping possible rewards and even the legitimacy of organizational forms. Although an entrepreneurial ecosystem may include various types of new ventures, typically new ventures are not innovative. In fact, the findings indicate that only a very small proportion of new entrepreneurial ventures create the greatest economic benefits (Acs, 2008; Shane, 2009; Autio and Rannikko, 2016). Therefore, it is argued that policy makers should
stop subsidizing the formation of new ventures in general, but focus instead on the subset of businesses with growth potential (Shane, 2009). These arguments have resulted in the reformulation of policy interventions, which are increasingly focused on high-growth entrepreneurship initiatives (such as publicly sponsored incubators and accelerators) targeted to the growth-seeking entrepreneurs (Minniti, 2008; Autio and Rannikko, 2016). There is, however, a lack of evidence about the effectiveness of these entrepreneurship initiatives compared to other available instruments (Autio and Rannikko, 2016).

2.1.4 Innovation systems thinking as a dominant frame for R&D policy

The view of innovation systems emerged in academic and industrial policy debates in the mid-1980s, especially under the stream of research that became known as the national innovation systems (NIS) approach (Lundvall et al., 2002; Sharif, 2006). Since then, it has made a major contribution to innovation studies (Martin, 2012; Sharif, 2006). Firstly, it departed from the earlier innovation studies focusing mainly on radical innovations arising from the intended R&D efforts. Instead of them, the NIS approach sees innovation as a continuously ongoing cumulative process based on learning, searching and exploring, and resulting in new products, techniques, forms of organizations and markets, thereby blurring the line between invention, innovation and diffusion (Lundvall, 2016). Secondly, the NIS approach also diverged from the dominant thinking according to which an innovation process was a firm’s internal process (i.e. closed innovation), by highlighting that the success of innovation is often based on close long-term relationships with agents external to the firm (Lundvall et al., 2002). Later on the ‘openness’ of the innovation process has been further emphasized, and it has become a main stream especially through the popularization of the concept of open innovation (Chesbrough, 2006). Thirdly, the NIS approach builds on institutional economics by claiming that the institutional setting has a major impact on how economic agents behave and thus on innovation (Lundvall et al., 2002). Over the years, the original NIS approach has been criticized for its conceptual boundaries, which limit the focus to the national level in an era of internationalization and globalization (Lundvall, 2016). Consequently, the innovation systems perspective has also been applied at different analytical levels, such as regional (e.g. Cooke, 1998) and sectoral (Malerba, 2004) levels. Lately, it has been increasingly applied across different levels (Meuer, Rupietta and Backes-Gellner, 2015), which emphasizes even more the complex nature of innovation in the global economy.

The innovation systems approach has also influenced policy makers across the globe (Meuer, Rupietta and Backes-Gellner, 2015). The case of EU in particular is an example of how academic theory influences the goals, encouragement and promotion of supranational innovation (Manjón and Merino, 2012). One of the major choices in European science, technology and innovation policy has been to focus on creation of innovation networks by refocusing funding from single actors to collaborative R&D arrangements (Defazio, Lockett and Wright, 2009; Manjón and Merino, 2012; Wanzenböck, Schembgell and Fischer, 2013). This policy is based on the assumption that interaction failure can be reduced and efficiency of the innovation system improved by fostering collaboration among partners through public interventions (Defazio, Lockett and Wright, 2009; Manjón and Merino, 2012). Despite the significant allocation of funding through European framework programmes that are largely based on collaborative innovation projects (e.g. FP6, FP7 and Horizon 2020), there are relatively few studies that analyse the outcome and effectiveness of these projects on a European level. It has been argued that collaborative research has promoted a strong science base in Europe, but this does not translate into wealth-generating innovations. This ‘European paradox’ has been debated since the introduction of the EU Green Paper on Innovation (1995), and even 30 years after recognising the problem there is still a widespread belief that EU underperforms in the commercialization of publicly funded science (Jacobsson, Lindholm-Dahlstrand and Elg, 2013). However, some studies suggest that the European paradox appears mostly in the reporting to and by the European Commission itself, rather than in the data (Dosi, Llerena and Labini, 2006). Moreover, the paradox is argued to emanate from a narrow, standard economics-based understanding of the innovation process (Eparvier, 2005; Lundvall, 2007). This narrow perspective ignores individual, organizational, and inter-organizational learning as outcomes of innovation activities and as sources of economic growth (Lundvall, 2007). Therefore, the real paradox is that the policy is theoretically influenced by the innovation systems approach, but the implementation and evaluation of innovation initiatives are often conducted in a simplistic manner focusing mainly on commercial results.
2.1.5 System transitions and the multi-level perspective

Whereas the innovation systems approaches are mainly focused on investigating how national, regional, and sectoral systems impact on innovations, there is also a long tradition of investigating the complex nature of radical innovations which require a broad systemic view (Markard and Truffer, 2008). The socio-technical transition perspective builds on the analysis of institutions by adopting influences from sociology (Van den Ende and Kemp, 1999; Kemp, Rip and Schot, 2001; Geels, 2002, 2004a). It defines system innovations as large-scale transformations in the ways of fulfilling major societal functions, in which the transformation typically depends on the development of new socio-technical configurations (Geels, 2004b). Hence, this stream of innovation research is mainly focused on very broad transition processes at an aggregated level. Examples are aviation systems (Geels, 2006), water supply (Geels, 2005) and transport systems (Berggren, Magnusson and Sushandoyo, 2015). Research into socio-technical transition and a multi-level perspective (MLP) on this transition (Geels, 2002, 2004a) have emerged as an influential contemporary framework for understanding the systemic nature of innovation. The transitions are explained as co-evolutionary processes between systems (resources, material aspects), actors involved in maintaining and changing systems, and the institutions which guide the actor’s perception and activities (Geels, 2004a; Berggren, Magnusson and Sushandoyo, 2015). MLP emphasizes that system innovations are more than technological discontinuities, since a technical change is always situated and shaped by a host of other factors (Van den Ende and Kemp, 1999), such as markets, user practices, regulation, culture, infrastructure and science (Geels, 2006).

MLP describes a system innovation as a dynamic interplay between three levels: niches, regimes, and landscapes (Geels, 2002, 2004). The niche level consists of niche environments, which are protected spaces where radical innovations emerge through co-construction processes of small networks of dedicated actors (Geels, 2002, 2006). The concept of niche builds on the theory of strategic niche management that defines technological niches as societal experiments with new technologies outside the laboratory in a user context (Schot, Hoogma and Elzen, 1994). Since technological niches are protected from competition, they enable actors to diverge from the rules of the existing regime and provide locations for learning processes. The sociotechnical regime is a broader and more stable community of interacting groups (Geels and Schot, 2007). The concept has been built on the notion of ‘technological regime’ by the evolutionary economists (Nelson and Winter, 1982), and the regime refers to cognitive routines embedded in the ‘minds of engineers’. Geels (2002) adopted the broader notion ‘sociotechnical regime’ and defined it as a semi-coherent set of regulative, normative and cognitive rules carried by different social actors. The sociotechnical landscape refers to the wider exogenous environment that provides a strong structure for activities. It can be seen as slowly evolving stable material environments, widely shared cultural beliefs and symbols, and macro-economic patterns, which are beyond the direct influence of actors but may put pressure on the sociotechnical regime (Geels, 2004a). Jointly these three levels can be used to understand the forces preventing and promoting the innovations and dynamics of complex systemic innovations.

2.2 Service research

After Schumpeter’s work, the vast majority of innovation studies focused on technological innovations in manufacturing, largely due to the fact that manufacturing was the prominent economic activity at the time (Drejer, 2004). However, the growing importance of the service industry was recognized already in the 1950s and the notion of ‘service economy’ was introduced to describe a situation in which the production of tangible goods was no longer the main source of employment (Fuchs, 1965). Although employment was growing rapidly in the service sector, this sector was considered more as a residual category for economic activities that did not fit into either agriculture or manufacturing (Metcalfe, 2001). A lower productivity level and growth rate was also considered characteristic of the service sector (Maroto-Sánchez, 2012). Thus, the first scholars who focused on services had to fight to assert the need for studying this sector (Fisk, Brown and Bitner, 1993). From the perspective of innovation, services were regarded mainly as ‘consumers of innovation’ rather than its source (Toivonen and Tuominen, 2009). Despite the harsh breeding ground, thriving communities of service scholars slowly emerged during the 1980s. On the one hand, their emergence was based on the efforts of marketing scholars (Grönroos, 1978, 1982;
Lovelock, 1983; Zeithaml, Parasuraman and Berry, 1985), who managed to establish service marketing as a respected field of research within the marketing discipline (Furrer and Sollberger, 2007). On the other hand, social scientists started to carry out statistical service studies (Gershuny and Miles, 1983; Illeris, 1989) and studies on some specific service sectors, especially business services (Howells and Green, 1986).

2.2.1 Disciplinary perspectives on service innovation and related concepts

Although service innovation as a process and outcome has been of interest to service scholars for a long time, the theoretical and methodological development has been carried out under several concepts and the perspectives vary between scholarly disciplines. Especially economists had an early interest to study the service economy by using the productivity perspective to analyse how innovations influence the input-output ratio and economic growth (Fuchs, 1965; Kendrick, 1988). The economists were also puzzled by the paradox of why rapid advancements in information technology appeared to have low impact on productivity - especially in the service sector (Brynjolfsson, 1993). The increasing importance of the service sector has raised conceptual and methodological problems related to the use of the traditional productivity concept (see the review of Maroto-Sánchez 2012). The concept of performance has been suggested as an alternative which could be applied together with a multi-criteria framework to evaluate the outcome of service innovation (Djellal and Gallouj, 2013).

Interest in productivity also emerged among service marketing and management research in the 1990s, but the approach was more process-oriented. It departed from the traditional input-output model developed in the manufacturing context, in which productivity was seen merely from the production efficiency viewpoint (Grönroos and Ojasalo, 2004). In service marketing and management research, the output of the service process was seen to be created through the perceptions of customers, and it was conceptualized as service quality or satisfaction (Gummesson, 1998; Parasuraman, 2002). Moreover, unlike in traditional manufacturing, customers were considered to provide important inputs to the service process (e.g. time, effort or emotional energy) (Parasuraman, 2002). Understanding of the impact of a wider actor network on productivity was also emerging (Gummesson, 1998). Therefore, productivity in the service context was increasingly seen as a very complex concept, requiring the development of models that better take into account the role of the customer and other beneficiaries in service productivity. Consequently, service researchers have developed concepts and models that integrate the traditional producer-centric efficiency with the customer outcome perspective (Parasuraman, 2002; Grönroos and Ojasalo, 2004, 2015). However, the debate still continues about whether the productivity concept should be used at all in the service context (Djellal and Gallouj, 2013; Wirtz and Zeithaml, 2017).

The process perspective on service innovation also aroused scientific interest in the 1990s. New Service Development (NSD) became one of the major frameworks for analysing service innovation from this perspective, but for two decades it did not use the concept of innovation. NSD gained interest especially within the field of service marketing and management, and among researchers with a product development background (see reviews by Johne & Storey, 1998; Papastathopoulou & Hultink, 2012; Witell, Snyder, Gustafsson, Fombelle, & Kristensson, 2016). Although NSD was originally strongly influenced by the stage-gate process models developed within new product development (NPD), early NSD researchers already realised that new services should be developed differently from tangible products (Johne and Storey, 1998). The focus of the NSD research evolved from linear company-centric process models (Scheuing and Johnson, 1989) to iterative and multi-actor development (Stevens and Dimitriadis, 2005), and customer-orientation became one of the major characteristics of the NSD process (Alam and Perry, 2002). NSD studies also started to establish links to other theories, such as the organizational learning theory (Stevens and Dimitriadis, 2005), and to question the unique characteristics of service innovation (Papastathopoulou and Hultink, 2012). Through these shifts in its focus, NSD moved quite far from its conceptual foundations in new product development. Nowadays, NSD research is often seen as one stream of research within the broader study of service innovation, and NSD scholars often use the concepts of NSD and service innovation synonymously (Biemans, Griffin and Moenaert, 2016).

Growing needs to understand, manage, measure and innovate services has also boosted service research in other academic fields. Disciplines such as operations research (Roth and Menor, 2003), engineering (Freund and Spohrer, 2012) and general innovation studies (Drejer, 2004)
have made major contributions to the study of service innovation. Consequently, after 30 years of service research, it has become widely recognized as a well-established field, and service innovation is seen as an engine for economic growth that pervades throughout all sectors (Snyder et al., 2016). The study of service innovation is no longer promoted merely by the academics, but also by policy makers and industry leaders who regard service innovation as imperative for succeeding in the modern world (Chesbrough and Spohrer, 2006; Snyder et al., 2016).

2.2.2 Different approaches to service innovation

As the short recap of the history of service innovation shows, its study has attracted attention from many disciplinary fields over several decades. In order to bring clarity to the study of service innovation, many researchers have attempted to develop taxonomies which categorize studies on the basis of their underlying assumptions. One of the traditional divisions is between technologist, service-oriented, and integrated approaches (Gallouj and Weinstein, 1997). The model of demarcation approach (Bartras, 1986) has been considered as the first actual innovation theory focusing on services (Toivonen and Tuominen, 2009) and referred to as a technologist approach because it explains how technological innovations developed in manufacturing diffuse to the service sector (Gallouj and Weinstein, 1997). For a long time, the technologist perspective represented the majority of service innovation studies (Witeell et al., 2016), but recently it has been in a phase of relative decline (Gallouj and Savona, 2009). The reason for the decline is the rise of perspectives that reveal non-technological forms of innovation. Gallouj and Weinstein (1997, p. 538) called this stream of research the service-oriented approach that helps to identify innovation where ‘the technologist gaze perceives nothing’. It brings the theory closer to the broad, Schumpeterian view on innovation (Schumpeter, 1934). Scholarly works on practice-based (e.g. Russo-Spena and Mele, 2012), user-driven (e.g. von Hippel, 2005) and employee-driven innovation (e.g. Melton & Hartline, 2010) have also emphasized incremental, bottom-up innovation instead of innovation incubated in R&D labs or driven by radical technological changes. The integrative approach can be seen as a countermove against the strong dichotomy between innovation in manufactured goods and services (Gallouj and Weinstein, 1997; Gallouj and Savona, 2009). Building on Lancaster’s definition of product (Lancaster, 1966), Gallouj and Weinstein (1997) aimed to combine insights from both manufacturing studies and demarcation writers to lay foundations for a general description of innovation. This ‘characteristics-based approach’ does not merely add one to another, but aims to develop an integrated account which covers all aspects of innovation activity (Gallouj and Windrum, 2009).

Coombs and Miles (2000) made a highly similar categorization compared to ‘technologist-service-oriented-integrative’ approaches, using a slightly different terminology to categorize service innovation from the viewpoint of instruments and theories needed in the analysis. Their three-part taxonomy – ‘assimilation-demarcation-synthesis’ – has been widely adopted in later studies (Drejer, 2004; Carlborg, Kindström and Kowalkowski, 2014; Snyder et al., 2016). The assimilation approach resembles the technologist approach, as the main argument is that service innovation is similar to innovation in manufacturing and therefore the concepts developed in a product or manufacturing context can be assimilated within a service context (cf. also Nijssen, Hillebrand, Vermeulen, & Kemp, 2006). Drejer (2004) argued that assimilationists treat services merely as ‘intangible goods’ and see their production process as similar to manufacturing. In contrast, the demarcation approach highlights the idea that service innovation differs fundamentally from product innovation and therefore requires novel theories and instruments (Coombs and Miles, 2000). Carlborg and his colleagues (2014) identified retrospectively that the need to demonstrate distinctiveness was due to the immaturity of service innovation as an area of research. Therefore many pioneers of service innovation (e.g. Edvardsson & Olsson, 1996; Sundbo, 1997) took a strong demarcation perspective. The synthesis approach by Coombs and Miles (2000) refers to innovation studies that aim to develop a common account applicable both to services and to manufacturing sectors. Their work emphasizes that service innovation reveals aspects that have previously been neglected in the innovation process, but are widely distributed across the economy.

Recently, Miles (2016) suggested a more detailed categorization that builds on both the Coombs-Miles division and the Gallouj-Weinstein division. He used two orthogonal dimensions: technologically or service-oriented division and assimilation vs. demarcation division. The first dimension separates studies stressing the involvement of new technology from those emphasizing non-technological forms of innovation. The second dimension varies from the high similarity between
sectors to the extreme distinctiveness of the service sector. In addition, the synthesis approach includes an objective to develop a multidimensional innovation approach to understand different forms of innovation and therefore to overcome the divergence of debate (Gallouj and Savona, 2009; Miles, 2016).

2.2.3 Digitalization as a driver for service innovation

The need for an integrative approach on innovation is widely acknowledged by academics (Carlbring, Kindström, & Kowalkowski, 2014; Drejer, 2004; Gallouj & Weinstein, 1997; Miles, 2016). This need has become increasingly relevant due to digitalization, which has impacts on all kinds of innovations (Normann, 2001; Barrett, Davidson and Vargo, 2015). Digitalization is in this work understood as a process of socio-technical change integrating multiple technologies into all aspects of daily life (Yoo et al., 2010; Gray and Rumpe, 2015). Digitalization, therefore, goes beyond the technical process of encoding diverse types of analogue information into digital format (i.e. digitization). It includes reconfiguration of broader socio-technical structures with digitized artefacts (i.e. digital information and infrastructures) as well as the changes in artefacts themselves (Yoo et al., 2010). Digitalization enables the development of novel value creation combinations, and opens up opportunities for innovations that may radically transform business models and entire industries (Lanzolla and Anderson, 2008; Waelbroeck, 2013).

Digitalization also reveals the nature of service(s) by decoupling information from its related physical form (Normann, 2001; Barrett, Davidson and Vargo, 2015). The decoupling of information, also referred to as resource liquefaction (Normann, 2001), makes products more intangible and they ‘behave like services’ (Ng, Vargo and Smith, 2013). In addition, digitalization enables the standardization of many traditional service processes (e.g. broadcasted lectures) and hence services begin to ‘behave like goods’ (Gallouj and Savona, 2009; Ng, Vargo and Smith, 2013). These trends have blurred the boundaries between goods and services, and scholars on many fronts increasingly consider the division to be redundant (Vargo and Lusch, 2004a; Gallouj and Savona, 2009). This has led to new, broader, all-encompassing definitions of goods/products (Gallouj and Savona, 2009) and service (Vargo and Lusch, 2004a), which has in turn laid the ground for the theory of service innovation to become a general theory of innovation (see the next section ‘service-dominant logic’).

Digitalization is also blurring the line between technological and non-technological innovation. Understanding about digitalization and about the nature of technology in general is evolving at the same time as technological development focuses increasingly on software (i.e. intangible methods and processes) rather than industrial manufacturing and mechanical artefacts (hardware). Information technology is not only seen as a driver for revolutionary services but also as a basic force behind service innovations and as an inseparable part of our lives (Bitner and Gremler, 2010; Ostrom et al., 2015). This calls for new research approaches that help to understand the ubiquitous nature of technology and how it impacts on service innovation (Ostrom et al., 2015). A broader view of technology is suggested as an approach to creating better understanding of the pervasive role of technology in innovation (Arthur, 2009; Akaka and Vargo, 2014). It builds on Orlikowski’s (1992) structurational model of technology, which builds on the premises that technology has a dual nature and it is interpretively flexible. The duality means that the technology is both physically and socially constructed. It is developed by creative human actors (‘designers’) who physically construct it and assign a social meaning to it. However, technology is also developed by users, who sometimes participate in physical construction, but more importantly contribute to the social (re)construction of technology when they interpret, appropriate and manipulate technology in various ways. Therefore, technology is ‘interpretative flexible’ (Pinch and Bijker, 1987), which refers to the degree of the users’ engagement in technology’s physical and social constitution during its development and use. Acknowledging the dual nature of technology could contribute to resolving the dichotomic debate about service innovation, and it calls for the further development of a synthesis view.
2.2.4 Towards an integrative, multi-disciplinary perspective of service innovation

Although recent reviews generally consider the synthesis perspective to be the dominant approach to service innovation (Carlborg, Kindström and Kowalkowski, 2014), Miles (2016) claimed that it has not yet evolved into the unifying multi-dimensional innovation approach that it aims to be. One major challenge is that due to the rich set of contributions from many academic disciplines, service innovation has evolved into a complex cross-road of various research interests. Although there is a strong call for multi-disciplinary views on service innovation, the intra-disciplinary development is maintained by academic traditions and norms that encourage academics to publish their research within outlets of specific academic disciplines.

An attempt to establish a new academic discipline called Service Science is an effort to integrate across academic silos in order to advance multi-disciplinary research on service innovation (Chesbrough and Spohrer, 2006). This idea of having a new discipline surfaced at IBM (which was successfully involved in the establishment of computer science), and rapidly gained notable support from many service academics across various disciplines. The rationale behind the new discipline was that the lack of a multi-disciplinary focus creates challenges to the understanding of the phenomenon of service innovation in all its richness. Therefore, service science is needed to create a basis for systematic service innovation, which is achieved by combining organizational and human understanding with business and technological understanding (Maglio and Spohrer, 2008). The basic theoretical construct and the unit of analysis in service science is a service system, which is defined as ‘dynamic value-cocreation configuration of resources including people, organizations, technology and shared information’ and which is connected to other service systems by value propositions (Maglio et al., 2009, p. 5). The philosophical foundation for service science is service-dominant logic (Maglio and Spohrer, 2008; Vargo and Akaka, 2009), which is further elaborated in the next section.

2.2.5 Service-dominant logic - changing the philosophical stance

Service-dominant (S-D) logic (Vargo and Lusch, 2004a, 2008, 2016) suggests an alternative paradigm for understanding (service) innovation, based on the principles of value co-creation and resource integration in actor networks. S-D logic has its background in the marketing discipline, and it was originally developed as a critique against the long-prevailing dominant thinking in this discipline: against the logic built on the goods-centred, manufacturing-based model of economic exchange (Vargo and Lusch, 2004a, 2004b). In order to replace the goods-based model with a more general and generalisable service-dominant model, Vargo and Lusch, the founders of the approach, saw it necessary to reconceptualise some of the core concepts of marketing (Vargo and Lusch, 2004a, 2008, 2016).

Firstly, S-D logic considers service to be the fundamental basis of all exchange (Axiom 1) (Vargo and Lusch, 2016, p. 18). The notion of service (singular) reflects the process of application of one’s competences for the benefit of another entity (Vargo and Lusch, 2008). Thereby, S-D logic transcends the division between goods and services (plural), which are regarded as tangible and intangible units of output, respectively. From the S-D logic perspective, service-to-service exchange is the fundamental economic activity, which is masked by indirect exchange of goods. Although goods are seen as relevant distribution mechanisms or ‘vehicles’ for service provisioning (Lusch and Nambisan, 2015; Vargo and Lusch, 2016), S-D logic argues that it is redundant to speak about ‘goods’ and ‘services’ being created to provide the service. Instead, S-D logic suggests using the notion of direct and indirect service provisioning (the latter includes service exchange through money or goods (Koskela-Huotari and Vargo, 2016; Vargo and Lusch, 2017). Consequently, the distinction between product and service innovation is no longer relevant: through the S-D logic lens, all innovations are fundamentally service innovations (Lusch and Nambisan, 2015).

Secondly, the notions of ‘producers’ vs. ‘consumers’ are not only irrelevant, but they are misleading from the philosophical standpoint of the S-D logic. These notions are linked to the manufacturing oriented paradigm which sees value as added to products by the producers within the value chain, and as finally embedded in products and consumed or ‘destroyed’ by the consumers (Vargo and Lusch, 2011; Vargo, Wieland and Akaka, 2016). In order to overcome this distinction, S-D logic relies on the ‘Nordic school of marketing’ and the Actor to Actor (A2A) -orientation (e.g.
Håkansson and Snehota, 1995) to incorporate a general actor in the context of exchange relationships (Vargo, Wieland and Akaka, 2016). Accordingly, S-D logic states that ‘value is co-created by multiple actors, always including the beneficiary’ (Axiom 2). Furthermore, S-D logic indicates that actors cannot deliver value to others, since ‘value is always uniquely and phenomenologically determined by the beneficiary’ (Axiom 4) (Vargo and Lusch, 2016, p. 18).

Thirdly, S-D logic blurs the division between ‘innovators’ and ‘adopters’. Vargo and Lusch (2015) argued that this conventional view dividing actors into those who create innovation and those who adopt them limits the understanding of how multiple actors contribute to innovation. The need to broaden the view has already been highlighted in other streams in marketing and innovation literature, such as the practice-based view (Russo-Spena and Mele, 2012), and the view on open innovation (Chesbrough, 2006). They emphasize that innovation should not be restricted within the confines of organization, but seen as evolving from the practices and joint actions of numerous network actors (Lusch and Nambisan, 2015). S-D logic fosters an ecosystems view which conceptualizes innovation as ‘the development of new forms of value through interactions among multiple actors both contributing to and benefiting from the exchange of service’ (Vargo, Wieland and Akaka, 2016, p. 2). S-D logic departs from the Schumpeterian view, according to which the entrepreneur is the main source of innovation, by stating that all actors have both the role of a service provider and the role of a beneficiary; thus, they also have the role of both an innovator and an adopter (Vargo and Lusch, 2011). This may be difficult to perceive if only a specific innovation is studied at the company level. Therefore a service ecosystems perspective is needed, which encourages zooming to the broader level of actor networks to study value creation and innovation (Wieland, Vargo and Akaka, 2016).

Fourthly, resources and resource integration are central concepts in S-D logic-based analysis of innovation. S-D logic diverges from the goods-dominant view in which innovation focuses mainly on creating new tangible resources (products). S-D logic recognizes the primacy of operand resources (i.e. knowledge and skills), which are capable of acting on other resources, rather than operand resources (e.g. raw materials) on which an operation is needed to produce an effect (Vargo and Lusch, 2004a; Vargo, Wieland and Akaka, 2015). Operand resources cannot be used in isolation, but they always need to be combined or bundled with other operand resources for usefulness, or employed to act on operand resources (e.g. raw materials) (Vargo and Lusch, 2004a). Consequently, S-D logic argues that ‘all social and economic actors are resource integrators’ (Axiom 3), who integrate resources to create value for themselves and to provide service for others (i.e. co-create value) (Vargo and Lusch, 2016, p. 18). From the innovation perspective, this implies that all innovations are results of recombining existing resources (cf. Schumpeter, 1934).

Fifthly, S-D logic develops the notion of technology by drawing on the evolutionary and socially constructed nature of technology (Pinch and Bijker, 1987; Orlikowsky, 1992; Arthur, 2009). Vargo et al. (2016) pointed out that the development of new technology is usually seen from a too limited perspective in the innovation setting, especially when physical devices are exclusively seen as technology. S-D logic broadens the scope of technology and defines it as a combination of practices, processes and institutionalized artefacts (i.e. symbols) that fulfil a human purpose (Akaka and Vargo, 2014), or more generally as ‘potentially useful knowledge that may provide solutions to new or existing problems’ (Vargo, Wieland and Akaka, 2015, p. 65). According to this broad definition, technology is incremental and cumulative in nature and is composed of dynamic resources, such as scientific knowledge and skills. Therefore, technology is always an integral part of value creation and service provisioning (Vargo, Wieland, & Akaka, 2015).

Although service-dominant logic was initially intended to shift the perspective of marketing scholars, practitioners and educators (Vargo and Lusch, 2004a), it has become one of the major schools of thought for service scholars as the result of collaborative work. S-D logic’s potential is recognized particularly in building a bridge between different research traditions and disciplinary views (Miles, 2016). However, some researchers have presented critique towards this transcending view. It has been argued to be too broad to have operational meaning (O’Saughnessy and O’Shaughnessy, 2009), and its view on value co-creation has even been argued to be a concept without substance (Gronroos, 2011). Moreover, researchers are not unanimous concerning how to categorise S-D logic’s perspective on service innovation, since it diverges notably from other scholarly works that are considered to contribute to the synthesis view, such as the Gallouj-Weinstein model based on the Lancasterian idea of a characteristics-based analysis of goods (Gallouj and Weinstein, 1997). Miles (2016) located S-D logic as a ‘servo-assimilation’ category, which
stresses similarity across all sectors and innovation as involving new service elements. S-D logic scholars themselves consider the demarcation and assimilation perspectives to be inspired by the goods-dominant logic, and S-D logic to be in line with the synthesis view (Ordanini and Parasuraman, 2010; Edvardsson, 2013; Koskela-Huotari, 2016).

This thesis builds on the S-D logic’s service ecosystem perspective, which is very promising for building a synthesis view. A challenge in S-D logic is that it has hitherto been mainly a meta-theoretical narrative, which needs increased attention to developing lower level theories to explain the emergence of innovations (Vargo and Lusch, 2017). This thesis aims to contribute to the development of such a lower level theory. It bridges between the perspectives of S-D logic and more traditional service innovation research to contribute to the synthesis view on service innovation.

2.3 Research on institutions and institutional change

Many academic disciplines, such as economics (e.g. Veblen, 1989), political science (Bill and Hardgrave, 1981), sociology (e.g. Parsons, 1934/1990), and organizational research (Selznick, 1948), have an extensive history in institutional theory, starting already from the mid-19th century. This ‘early institutional theory’ was, however, eclipsed for decades, until it was rediscovered in the 1970s (Scott, 2008a). Since then, institutional theory has grown in prominence and a broad body of literature covers not only the founding disciplines, but has spread to new areas. Especially organizational and management studies have adopted the sociology-based institutional theory as a dominant frame to explain both individual and organizational action (Dacin, Goodstein and Scott, 2002). In addition, information systems research (e.g. Currie & Swanson, 2009) and service research are increasingly drawing their ideas from the neo-institutional theory, which offers a paradigm to understand why actors behave in ways that defy the economic logic and norms of rational behaviour (Suddaby, 2010). The rest of this section focuses mainly on organisational (sociological) institutionalism, which is a broad field within institutional scholarship that aims to understand how organisations and institutions interact (Greenwood et al., 2008). The final section in this chapter discusses how this theory is approaching service research.

2.3.1 Emergence of the neo-institutional theory

The emergence of the neo-institutional theory in organization research is usually credited to a few founding articles (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Zucker, 1977). Meyer and Rowan (1977) adopted the notion of institution from the seminal work on the social construction of reality, which defined institutions as ‘reciprocated typifications of habitualized actions’ (Berger and Luckmann, 1966, p. 72). This definition indicates that habitualized actions may become institutions if they are repeated and the interpretation is shared within the social group. However, institutions cannot be created instantaneously, but they are the products of historical processes (Berger and Luckmann, 1966). Institutions emerge and evolve through the process of institutionalization, by which the actions become repeated over time and are assigned similar meanings (typified) by self and others (Berger and Luckmann, 1966; Scott, 1987).

The early neo-institutional studies focused strongly on how organizations conform with the requirements of the institutional environment in order to achieve the legitimacy needed for success and survival, and this leads to a similarity in formal organizational structures (Meyer & Rowan, 1977). DiMaggio and Powell (1983, p.149) used the notion of isomorphism to describe this process, which they defined as a ‘constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions’. They identified three analytic categories that explain the main mechanisms through which organizations operating in the same institutional environment become similar: 1) Coercive pressure is a result of cultural expectations of the society and the formal and informal pressure exerted on an organization by other organizations. 2) Mimetic pressure is driven by uncertainty that encourages organizations to copy useful practices either intentionally or unintentionally. 3) Normative pressure is strongly associated with the development of professional norms and is reinforced by formal education and the professional network (DiMaggio and Powell, 1983).
Scott (1995) built on their work and developed three analytic categories for institutional elements, which are 1) regulative elements, 2) normative elements, and 3) cultural-cognitive elements. Specific institutions are made up of different combinations of these elements (Scott, 2008a), and the elements together with associated activities and resources provide stability and meaning to social life (Scott, 2014). Thereby, institutions are often seen as constraints on action, also referred to as institutional constraints, which impose restrictions by defining, for example, moral, legal, cultural boundaries, and acceptable behaviour (Scott, 2008b). Instead of focusing only on regulative and normative constraints, which were the main interest in institutional economics (see North, 1990), both Scott (1995) and DiMaggio & Powel (1983) heavily emphasized the role of culture and cognition in institutions.

One of the persistent problems in the early neo-institutional studies was that whereas the theory explained how organizations are influenced by the institutional setting, it underestimated the significance of interest and agency (DiMaggio, 1988; Beckert, 1999). As a result, the theory was misinterpreted to argue that organizations were prisoners of their institutional environments (Suddaby, 2010). To tackle this challenge, the scope of the neo-institutional theory was broadened also to account for the transformation and change of institutions. In order to explain the change, theorizing has focused especially on two streams of research, which aim to incorporate interests and agency to the institutional theory. The first stream builds on institutional complexity and the other focuses on actors who have resources to initiate and enact an institutional change, i.e. institutional entrepreneurs (Beckert, 1999). The following sections dig deeper into these research streams, which are essential from the viewpoint of this thesis.

2.3.2 Institutional complexity and change

The paradox of embedded agency refers to the theoretical challenge of explaining how actors can change institutions if their actions, intentions and rationality are embedded in the institutions they wish to change (Holm, 1995). Several authors have argued that institutional rules are not complete nor coherent and are often in conflict with each other (Friedland and Alford, 1991; Greenwood and Hinings, 1996; Beckert, 1999). Thus, any social structure should be viewed as a part of a larger system, a whole composed of multiple, interrelated structures operating at multiple levels (Seo and Creed, 2002). Seo and Creed (2002) identified various contradictions among and between the institutional arrangements (i.e. a varying set of interrelated institutions) by drawing upon dialectic theory (Benson, 1977). They suggested that the accumulation of contradictions provides the seed for an institutional change. Kraatz and Block (2005) argued that one of these main contradictions is related to institutional pluralism, which is the situation in which actors are simultaneously located within the intersection of multiple institutional spheres. This complex position implies that actors are simultaneously participants of two or more ‘games’, which have different rules. Actors may for example be subject to multiple regulatory regimes, influenced by differing normative orders and guided by different cultural logics. They may also play different roles in different institutional settings, as they have several institutionally defined identities (ibid.). Due to this pluralism, an actor cannot ever be fully embedded in all conflicting institutional structures, which provides room for institutional change.

Neo-institutionalists have also sought explanations for the paradox of embedded agency by building on the concepts of social skill, social position and reflexivity (Fligstein, 1997; Greenwood and Suddaby, 2006). Fligstein (1997) claimed that some individuals with ‘social skill’ are more sensitive to inter-subjective relationships. They have highly developed cognitive capacity for reading people and complex institutional environments, and are therefore better equipped to induce competition and cooperation amongst others (Fligstein, 2013). Suddaby, Viale and Gendron (2016) named the capability to adapt and change as ‘entrepreneurial social skill’ and differentiated it from the social skills needed for understanding and maintaining the field’s status quo. The network location theory implies that organizational fields contain a limited number of subject positions (Focault, 1972), which different field-level actors occupy (Maguire, Hardy and Lawrence, 2004). Battilana (2007) used the notion of social position and showed that different types of changes are likely to be initiated by actors who occupy different social positions within the field. Greenwood and Suddaby (2006) suggested that the peripheral actors are more likely to diverge from the institutionalized template of the field for three reasons. Firstly, they have weaker connections to other actors and are thereby less bound by the norms that are reproduced in social interaction within the field. Secondly, peripheral actors have weaker connections to the field-level processes.
which structure the activities of the field. Thirdly, peripheral actors have a disadvantaged position within the field, which could be improved by the change. Suddaby, Viale and Gendron (2016) proposed that the concept of reflexivity (Bourdieu, 1990; Archer, 2003) combines both social position and social skill as explanations for change in highly institutionalized fields. They suggested that individuals have moments of self-awareness during which they are able to see the opportunities and constraints imposed on them (i.e. institutions). Thus, the reflexivity enables them to change the institutions within which they are embedded.

To sum up, institutional change is driven both by complexity and a disadvantaged social position in the field. Complexity creates competing institutional demands, thereby leaving room for reflexive interpretation of the situation and for responding to it locally and creatively (Lawrence, Suddaby and Leca, 2011; Suddaby, Viale and Gendron, 2016). Variance in social positions leads to a situation in which some actors are always in disadvantaged positions at the periphery of the field. Moreover, there is a continuous flow of potential entrants coming from outside to the field and being hence ‘new to the game’ (Cliff, Jennings and Greenwood, 2006). These new and peripheral actors are likely to be less embedded in the institutional arrangements, as well as motivated to seek improvement to their social position within the field. An institutional change is likely to be initiated if these actors have the capability to enact the change.

2.3.3 How actors create, maintain and change institutions

DiMaggio (1988) proposed another approach to introduce agency into institutional theory in order to correct the erroneous idea that organizations are prisoners of their institutional environments. He proposed that organized actors with sufficient resources (i.e. institutional entrepreneurs) can create new institutions when they see an opportunity to realize interests that they value highly (DiMaggio, 1988, p. 14; see also Maguire, Hardy and Lawrence, 2004, p. 657). Institutional change is enacted in institutionalization projects for which institutional entrepreneurs mobilize actors (backers) who gain from the success of the project. In addition, institutional entrepreneurs bargain for support from other external constituencies (DiMaggio, 1988). DiMaggio’s ideas were adopted in strategic management, mainly by Oliver (1991, 1997), in order to provide understanding of how actors pursue specific strategies to react on institutional pressures, but the theory received only little attention (e.g. Fligstein, 1997) within organizational research.

Greenwood and Suddaby’s (2002) study on the transformation of a mature institutional field appears to have sparked growing academic interest in institutional entrepreneurship. Their study focused on central actors within the field, and highlighted institutional entrepreneurs as actors who break the field’s institutionalized rules. This deinstitutionalization takes place by introducing a possibility for change through new ideas (Greenwood, Suddaby and Hinings, 2002; Greenwood and Suddaby, 2006). In subsequent years, numerous articles were published contributing to the emerging theory of institutional entrepreneurship both in management and organizational journals. Empirical studies provided detailed accounts from the emerging fields, such as commercial whale watching (Lawrence & Phillips, 2004), AIDS treatment (Maguire, Hardy and Lawrence, 2004), Spanish gastronomy (Svejenova, Mazza and Planellas, 2007), and socially responsible mutual funds (Markowitz, 2007). The case studies were followed by more theoretically oriented contributions (Dorado, 2005) and articles that aimed to link institutional entrepreneurship with other concepts and theories, such as reflexivity (Mutch, 2007), hegemony (Levy and Scully, 2007) and resource dependence (Santos and Eisenhardt, 2009). In addition, there was an aim to integrate the emerging theory to other disciplines, such as entrepreneurship (Phillips and Tracey, 2007) and institutional economics (Pacheco et al., 2010), which developed concurrently but were mostly unlinked to the neo-institutional approach.

The rapid shift in the focus of institutional theory from institutional constraints to strategic agency also induced criticism. Institutional entrepreneurs were regarded as heroic actors who are overly rational and disembedded from institutional pressures (Meyer, 2006, p. 732). However, in their review, Leca, Battilana and Bozeman (2009) claimed that the overemphasis of agency was rapidly replaced by more balanced views. Accordingly, actors are embedded in institutional arrangements but they can envision a change due to a number of enabling conditions (Battilana, Leca and Bozeman, 2009). Moreover, the initial focus of institutional entrepreneurship on visible and dramatic actions created a need to introduce new concepts that would take better into account nearly invisible and often mundane actions of the institutional change as well as actions preventing the change (Lawrence and Suddaby, 2006a). The notion of institutional work emerged
to broaden the vision of agency in relationships to institutions by representing the ‘broad category of action aimed at creating, maintaining and disrupting institutions’ (Lawrence and Suddaby, 2006b, p. 212). Thereby, institutional work can be seen as an expansion of the concept of institutional entrepreneurship. In addition to theories of institutional entrepreneurship, it builds on the semi-coherent research stream of deinstitutionalization, which focuses especially on the actors’ active engagement in the disruption of institutions (Oliver, 1992). Moreover, the institutional work recognizes that actors are actively involved in the institutional maintenance through ensuring adherence to rule systems and through reproducing existing norms and belief systems (Lawrence and Suddaby, 2006b). These actions can be seen as institutional resistance, and are not necessarily deliberate ‘counter-actions’ to institutional change efforts, but also mean the everyday reproduction of roles, rites and rituals (Lawrence, Suddaby and Leca, 2011).

The past decade has produced extensive contributions to the understanding of creation, maintenance and disruption of institutions, which are labelled under the concepts of institutional work and institutional entrepreneurship. Studies examining deliberate actions for creating new and transforming existing institutional arrangements are still primarily focused on institutional entrepreneurship (Lawrence, Lea and Zilber, 2013). Disruption and deinstitutionalization are discussed both under the topic of institutional work (e.g. Maguire & Hardy, 2009) and as a part of the actions of institutional entrepreneurs who need to break existing institutional arrangements in order to create new institutions (Battilana, Lea and Boxenbaum, 2009; Hardy and Maguire, 2017). Institutional entrepreneurship is not only seen as an endeavor conducted by isolated individuals, but increasingly as a collective, incremental and multi-level activity conducted by individuals inhabiting social groups, which motivate, inspire and enable their engagement (Dorado, 2013; Hardy and Maguire, 2017). The complex nature of institutional work is also highlighted in new concepts such as institutional judo. This concept refers to actions using institutional pressures to the advantage of an actor who changes those institutions (Hansen et al., 2015).

Despite the extensive number of contributions, institutional scholars have recently called for more comprehensive understanding on the process and actors involved in institutional work. This thesis aims to answer this call, and more broadly contribute to the narrowing of the following identified research gaps. Firstly, there is a need to create a better understanding of the early stages of institutional entrepreneurship (Henfridsson and Yoo, 2013; Qureshi, Kistruck and Bhatt, 2016). Secondly, more attention should be paid to the inquiry of how institutional work is driven by heterogeneous actors hailing from different fields (Hampel, Lawrence and Tracey, 2017). In addition to answering these gaps, the thesis also advances understanding of the role of institutions in service innovation.

### 2.3.4 Institutions in service and innovation studies

Contemporary innovation and service research is increasingly interested in the role of institutionalization as an underlying mechanism for innovation (Geels, 2004b; Vargo, Wieland and Akaka, 2015). The multi-level perspective (see 2.1.5) suggests that regulative, normative, and cognitive institutions that coordinate actions (Scott, 1995) are found at both the niche level and the sociotechnical regime level (Geels and Schot, 2007). At the regime level, institutions are shared by professionals in the community and therefore create stability and protect the regime from radical change. As a result, innovations created by regime level actors are often based on path-dependencies and are incremental in nature (Geels, 2008), whereas at the niche level the institutional arrangements are unstable and ‘in the making’ (Jørgensen, 2012). Hence, compared to the regime level, the actors working at the niche level are embedded in structures in a more loosely coupled way and they are more open to experimentation that deviate from the dominant institutional arrangements. Therefore, the niche actors who are not strongly attached to the prevailing regime are a potential source of radical innovations. However, the challenge is that the diffusion of innovation outside the technological niche requires a change in deep structures at the regime level. For this reason, the support and legitimacy from the regime actors is highly important.

Although the multi-level perspective (MLP) has become a prominent stream in academic research and there are many similarities with service innovation research, the studies applying this perspective are not well connected to service innovation studies. One of the reasons may be the ‘technological imperative’ of the innovation studies (Meuer, Rupietta and Backes-Gellner, 2015). As a result, service-dominant logic and its service-ecosystems view have recently become the
most influential drivers for incorporating the institutional perspective into service innovation research (Vargo, Wieland and Akaka, 2015, 2016; Koskela-Huotari and Vargo, 2016; Vargo and Lusch, 2016, 2017; Wieland, Vargo and Akaka, 2016). The institutional perspective of S-D logic is based on the sociology of structuration (e.g. Berger and Luckmann, 1966; Giddens, 1984), institutional economics (e.g. North, 1990; Williamson, 2000) and organizational institutionalism (DiMaggio and Powell, 1983; Scott, 1995), and highlights the central role of institutions in value creation and innovation (Vargo and Akaka, 2012; Vargo et al., 2015a; Wieland et al., 2016). The essential role of institutions has recently been formally included in S-D logic by adding a new foundational premise (Axiom 5), which states that ‘value co-creation is coordinated through actor-generated institutions and institutional arrangements’ (Vargo and Lusch, 2016, p. 18).

The institutional perspective of S-D logic is tightly linked with its ecosystems perspective, which defines service ecosystem as ‘a relatively self-contained, self-adjusting system of resource-integrating actors connected by shared institutional arrangements and mutual value creation through service exchange’ (Vargo and Lusch, 2016, pp. 10–11). In combination, this systemic and institutional perspective indicates that value is created within service ecosystems through ongoing interactions among multiple actors guided by varying institutional arrangements (Vargo, Wieland and Akaka, 2016). Institutions are seen as ‘rules of the game’ (North, 1990), which coordinate interactions between actors (‘players’) within the service ecosystem and provide stability for it. More specifically, institutions are defined as ‘humanly devised rules, norms, and beliefs that enable and constrain action and make social life at least somewhat predictable and meaningful’ (Vargo & Lusch, 2017, p. 49; cf. North, 1990; Scott, 2014).

The service ecosystems view enables zooming in and out between different levels of the system. Micro-level interactions are nested within broader social contexts (meso, macro), which include additional actors and distinct institutional arrangements (Chandler and Vargo, 2011). Zooming out reveals the complex, dynamic, and multidimensional nature of the context for interaction (resource integration, value co-creation and innovation) and helps to perceive conflicting institutional arrangements. The service ecosystems view acknowledges institutional pluralism and complexity, i.e. the co-existence of multiple and often conflicting institutional arrangements, which are central drivers for innovations (Siltaloppi, Koskela-Huotari and Vargo, 2016). Moreover, each iteration of interaction within the service ecosystem changes the system to some degree (Chandler and Vargo, 2011; Vargo and Lusch, 2011). Hence, institutions are not only changed by actors who purposefully change the system, but all actors continuously co-create institutions through numerous iterations of social interactions (i.e. resource integration and service exchange practices) (Vargo et al., 2015a). This constantly ongoing iterative process of institutional maintenance, disruption and change (Lawrence and Suddaby, 2006a) is referred to as institutionalization and is identified as a key mechanism through which innovations emerge (Vargo, Wieland and Akaka, 2015).

Although the service ecosystem perspective has mainly been focused on zooming out to broaden the view, researchers have also pointed out the importance of zooming in on actors that drive particular innovation processes at the micro-level (Edvardsson, 2013; Wieland et al., 2016). For this purpose, S-D logic applies the theory of institutional work (Lawrence and Suddaby, 2006b; Lawrence, Suddaby and Leca, 2011; Lawrence, Leca and Zilber, 2013). It enables zooming in to activities of a diverse set of actors, interactions among them, and their involvement in political struggles (Wieland, Vargo and Akaka, 2016, p. 39). This approach emphasizes that even when actors develop value propositions in order to create new institutions, the value propositions always reflect the overlapping maintenance and disruption of institutions (Wieland, Vargo and Akaka, 2016). On the other hand, institutional defenders (DiMaggio and Powell, 1983) may primarily focus on maintaining prevailing institutional arrangements, but simultaneously contribute, possibly unknowingly, to changing and breaking some other arrangements (Lusch and Vargo, 2014; Koskela-Huotari and Vargo, 2016). Wieland, Vargo and Akaka (2016) claimed that institutional maintenance is often overlooked as an important approach to innovation, and that focusing on both institutional maintenance and change is imperative for the study of innovation.
2.4 Transformation and innovation in the healthcare context

Despite the apparent need for innovations that would make healthcare systems more affordable and accessible, innovation efforts in many developed countries have focused on evidence-based medical innovations - especially on the development of new medical technologies, drugs, and treatments (Berwick, 2003; Djellal and Gallouj, 2008). Although these innovations enable the provisioning of better health outcomes, they are also the main driver for the growth in health spending (Macdonnell and Darzi, 2013), a problem with which the care system is already struggling. Therefore, policy makers are looking for innovations that enable transformation of the care system to a more sustainable direction. However, creating innovations to solve complex problems has turned out to be difficult (Barnett et al., 2011; Thakur, Hsu and Fontenot, 2012), and researchers with many disciplinary views have been interested in advancing understanding of health innovations.

In the following sections, this thesis introduces research concerning transformation and innovation in the healthcare context. This research partly overlaps with the perspectives reviewed in the previous sections. The aim is not to go deep into the substance of healthcare, but rather to provide a general framework for empirical studies and to create an overview on how different perspectives in combination can be used to understand the transformation currently taking place in the field of healthcare.

2.4.1 Innovation adoption and diffusion as focal theories to understand digitally-enabled innovations in healthcare

The issues of adoption and diffusion have been the main perspectives in studying healthcare innovations. Earlier works have been largely influenced by the models of technology acceptance and its variants (Davis, 1989; Venkatesh and Davis, 2000; Venkatesh et al., 2003), and by the seminal work of Rogers (1962, 1995) on innovation diffusion. The theory of innovation diffusion has recently been utilized, for example, to explore patient acceptance of self-service e-health solutions (Zhang et al., 2015) and transformation of specific healthcare procedures (Leggott et al., 2016). Theory has also been used to explain why preventive innovations diffuse so slowly in healthcare. Rogers (2002) argued that the rewards of adopting a preventive innovation are often delayed in time and therefore the diffusion is very slow. However, the diffusion process can be accelerated by introducing innovations through opinion leaders in a community (e.g. renowned medical practitioner).

The information systems discipline has been a strong advocate for technology adoption research. Studies in this field have often been conducted at the micro level in order to understand why and how a certain IT-enabled innovation is (or is not) adopted by individuals, professional groups or organizations (e.g. Dehzad, Hilhorst, Bie, & Claassen, 2014; Gagnon et al., 2012; Lin, Lin, & Roan, 2012). Factors hindering the adoption of healthcare innovations, include the difficulty of changing behaviour and current medical practices, and regulative and legal constraints (Anderson, 2007; Holden & Karsh, 2010; Lin et al., 2012; Länsisalmi et al., 2006). However, the suitability of technology-oriented frameworks to these kinds of studies has been questioned (Fitzgerald et al., 2002). The logic of adopting innovations does not necessarily follow rationalistic, science-based reasoning, but is often subject to debate, negotiation and politics (Fitzgerald et al., 2002; Barnett et al., 2011). Thus, the context of innovation is a key factor in understanding the behaviour related to the adoption and diffusion process (Fitzgerald, Ferlie and Hawkins, 2003). The way in which benefits and risks of innovation map onto the interests, values and power distribution of numerous actors in the ‘adoption system’ is critical for understanding the innovation diffusion (Denis et al., 2002). It is increasingly acknowledged that innovations result from collaborative actions and diffusion should be viewed from the systemic rather than from a single organization’s viewpoint (Määkimattila, Melkas and Uotiila, 2017). In order to understand this complex process of adoption and diffusion, researchers have begun to rely more on system theories (e.g. Ciasullo, Cosimato and Pellicano, 2017) and sociological theories, such as the theory of normalization process (May, 2013; O’Connor et al., 2016) and the institutional theory (Liu, 2011; Sherer, Meyerhoefer and Peng, 2016).
2.4.2 Service innovation research in the healthcare context

In addition to studies investigating innovation in healthcare technologies, the nature and impact of service innovations in the healthcare context have also been studied over four decades (for a review see Kaluzny, 1974). Health services research is a research stream originating mainly from within the academic field of health sciences. It started to become significant already in the 1990s, when healthcare researchers saw it as a cross-disciplinary effort to ‘provide unbiased, scientific evidence to influence health services policy at all levels so as to improve the health of the public’ (Black, 1997, p. 1834). Healthcare was experienced to be a challenging context due to the complexity created by dozens of occupational groups often competing with one another, and fostered by heterogeneity of the customers, making it difficult to standardize service processes. Moreover, professionals, especially medical doctors, were found to have significant autonomy and power to decide how resources are used, making service management even more challenging (ibid.). In addition to drawing on ‘hard’ disciplines such as statistics, economics, and epidemiology, early health services research was also influenced by history, psychology, and sociology, which helped to change the perspective from practitioners and objective measurements of medical interventions to patients, their subjective concerns, and also the non-medical aspects of care (Cleary, 1997). Interaction between patients and medical professionals and patient engagement have remained as central focus areas of health services research (Clancy, 2011; James, 2013; Prey et al., 2014). Healthcare policy is another strong area in health service research. Especially public governance of health services (e.g. Callaghan & Wistow, 2006; Martin, 2008), rural health programs and health innovation in developing countries (Fajans, Simmons and Ghiron, 2006) have aroused considerable interest among scholars. More recently digitalization has also influenced health service policy, as researchers increase their focus on e-health and ICT service strategies (e.g. Garmann-Johnsen, 2015; Bernardi, 2017).

The problem of health service research is the lack of a cohesive approach, which prevents the accumulation of research findings on innovation in healthcare and has made the development of a unified body of knowledge challenging (Fox, Gardner and Osborne, 2015). The numerous paradigms, methodological choices and theoretical approaches related to health services research make it very difficult to see the field as a whole. Literature reviews on health services research are usually conducted from a very focused perspective, such as a theoretical review (e.g. complexity theory), methodological review (e.g. mixed methods approaches), or sub-sectoral review (e.g. home care services) (Genet et al., 2011; Thompson et al., 2016). The lack of a coherent approach becomes even more challenging when other research streams related to service innovation in healthcare are taken into account (Danaher and Gallan, 2016). For example, population health, health economics, and healthcare management provide valuable contributions which improve understanding about healthcare systems and outcomes. However, Danaher and Gallan (2016) argued that no-one has as much potential to develop a coherent theory as the service research community, which now has a tremendous opportunity to apply, expand and develop new theoretical lenses to assess and improve service in health care.

In recent years, the service research community has paid particular attention to the changing role of the healthcare customer (for a review see McColl-kennedy et al., 2017). This is well aligned with recent policy discussions proposing patient engagement as a means to maintain the sustainability of healthcare systems (James, 2013; Hardyman, Daunt and Kitchener, 2015). The changing role is fostered by digitalization, which makes new roles possible for the customer both in service development and in provisioning. From the service development perspective, healthcare users are not passive patients, but even aging customers can participate to service development (Hennala, Melkas and Pekkarinen, 2011; Harjumaa and Isomursu, 2012). In addition to seeing customers as potential sources for learning, whose needs the organizations translate into health service innovation (Duncan and Breslin, 2009; Elg et al., 2012), they can also be considered as active participants in the service innovation process (Bowen et al., 2013; Gallan et al., 2013). A more active role of the health services user requires development of the organizational capabilities of healthcare providers (Sharma, Conduit and Hill, 2014). The user engagement aims to counter the traditional power imbalance in healthcare innovations caused by information asymmetry (Barile, Saviano and Polese, 2014). However, it is claimed that growing user engagement paradoxically increases the level of professionalism of active users and neglects the perspectives of ‘less expert’ users (Enany, Currie, & Lockett, 2013).
The value co-creation perspective adopted from the service-dominant logic extends the view of service innovation in healthcare beyond the traditional patient-provider relationship (Beirao, Patricio and Fisk, 2011). Scholars have recently utilized the perspective, for example, to identify distinct value co-creation practices styles among healthcare customers (McColl-Kennedy et al., 2012), and to categorize practices based on their impact on an ecosystem (Frow, McColl-Kennedy and Payne, 2016) or on the effort the customer needs to make (Sweeney, Danaher and McColl-Kennedy, 2015). Although these studies also concern patient engagement, Joiner and Lusch (2016) claimed that S-D logic for healthcare changes mindset from capturing ‘patient value’ to co-creating value. Hence, S-D logic replaces the linear, tightly linked system of healthcare suppliers with a broader network of value co-creating actors including family, friends and organizations not formally part of the established health industry (Joiner and Lusch, 2016; Ciasullo et al., 2017; Ciasullo, Cosimato and Pellicano, 2017).

The interest of the service research community is not limited to a traditional illness-focused approach, but there is need for a broader understanding of improving the wellbeing of individuals, collectives and ecosystems. This focus on wellbeing through ‘transformation service’ has recently been identified as a top research priority in service research (Ostrom et al., 2015). The research conducted under the label of transformative service research aims to ‘create uplifting changes and improvements’ in wellbeing (Anderson, Ostrom, & Bitner, 2011, p. 3) and is transdisciplinary in nature and (Anderson et al., 2013; Anderson & Ostrom, 2015). Topics that are identified as needing more attention include improving understanding of the needs of the elderly and those facing health and social problems, and investigating how the development of technology-enabled services can address these challenges (Ostrom et al., 2015).

To sum up, the main interest of service research has been in the changing role of healthcare users in innovation. Although this focus area is crucial for understanding the ongoing transformation in healthcare, there is a need to have broader systemic perspective on transformation from the perspectives of other actors. Both transformative service research and the ecosystems view of S-D logic have recently emphasized the need to broaden the perspective of innovation outside the traditional boundaries of healthcare. The following section elaborates how an institutional perspective can provide a complementary view to understanding the transformation of healthcare as a broad systemic phenomenon, and how the social position of innovator impacts on healthcare transformation.

2.4.3 Institutional perspective on innovation and transformation of healthcare

Organizational scholars utilized institutional theory to study the change of healthcare systems already before information systems and service scholars ‘found’ this theoretical approach. However, the level of analysis was rather different, because many organizational scholars aimed at explaining historical change processes that had radically transformed healthcare systems (Scott et al., 2000; Galvin, 2002; Caronna, 2004; Reay and Hinings, 2005). Deviating from the studies of the adoption processes of individual innovations within organizations, the work was focused on more large-scale health reform initiatives and the structural change of healthcare systems, especially in North America. To highlight the breadth of these change processes, Scott and colleagues (2000) utilized a concept of ‘profound’ institutional change. A profound change indicates new rules and governance mechanisms, new logics that direct field actions, new actors and relations among actors, new meanings associated with the attributes or behaviour of actors, and modified boundaries of the field and between groups within the field. A profound change also requires a complex set of changes at multiple levels (i.e. individual actors, organizations, populations of organizations, and the field). As a consequence, profound institutional changes are very rare and most changes in established organizational fields occur more incrementally or in identifiable stages over time (Greenwood, Suddaby and Hinings, 2002; Reay and Hinings, 2005).

In addition to the historical analysis of large-scale transformations, institutional scholars have recently identified the need to understand the actions of micro-level actors in healthcare innovations. For example, researchers investigating healthcare transformation within the context of the UK National Health Service have utilized institutional work and institutional entrepreneurship as theoretical perspectives to analyse the ongoing healthcare reform. Currie et al. (2012) used the institutional work perspective to explain how healthcare professionals respond to innovations, which entail new nursing and medical roles, through actions aiming at maintaining institutions that
protect their professional power. Two other studies focus on the relationship between actors’ social positions and institutional change by analysing the likelihood of enacting change in the healthcare context (Battilana, 2011), and the capacity to envision and enact change (Lockett et al., 2012). Scholars have also increasingly acknowledged that the institutional change should not be seen only as a transformation from one dominant logic to another (e.g. from goods-dominant logic to service-dominant logic, or from professional logic to business logic), since logics in the healthcare field are variegated and ambiguous (Currie & Spyridonidis, 2016). Moreover, there are several institutional logics co-existing and evolving at the same time (van den Broek, Boselie and Paauwe, 2014). An institutional change is comprised of actions of numerous actors who are intentionally or unintentionally engaged in institutional work by re-enactment of routines and practices, which may strengthen some institutional arrangements while contributing to the change or disruption of others (Currie et al., 2012; Reay & Hinings, 2009).

Despite the emerging interest in institutional work in the field of healthcare, the studies are still scarce and mainly focused on actors who have prominent positions within the field. An identified challenge is that the healthcare actors privileged by existing arrangements tend to focus on innovations that maintain the institutional status quo (Battilana, 2011; Currie et al., 2012). Therefore, there is a need to gain better understanding of how actors coming from outside the field of healthcare create innovations to transform the field. For this purpose, we need to understand how peripheral actors can develop strategies to cope with multiple co-existing logics and at the same time act as institutional entrepreneurs to break institutionalized rules that have been hindering the innovations.
3 Aims and context of the study

This chapter summarizes research gaps and presents the research questions, which are grounded on the theoretical background described in the previous chapter. They are also grounded on the aim of this thesis - improving understanding of the mechanisms that advance, hinder, enable and constrain service innovation in the field of healthcare in the digital era. The second section focuses on describing the two research contexts in which the studies of the thesis are implemented. The purpose is to clarify the empirical context on which the research questions are founded.

3.1 Research gaps and questions

This thesis focuses on studying the phenomenon referred to as digital transformation of healthcare. The thesis builds on various theoretical perspectives to improve understanding of the phenomenon, and aims particularly to contribute to the development of service innovation theory. More specifically, the thesis pursues insights into how organizations contribute to this transformation by developing service innovations that diverge from the institutional template, what challenges organizations face during the innovation process, and how they aim to tackle the challenges.

Digitalization is identified as one of the major forces driving technological and social change, which is also transforming healthcare policy and the field itself. However, a notable part of healthcare innovation research is still based on a technologist perspective on innovation, and builds on a standard economics approach separating R&D and the diffusion inventions. In addition, innovation policy is paradoxically building the rationale for collaborative innovation initiatives on innovation systems theories, but in practice the designed initiatives and actions are largely based on traditional linear R&D based innovation models. By contrast, service-oriented innovation research has focused largely on innovations which are non-linear in nature and developed outside R&D labs. This perspective has increased understanding of innovations driven by users and employees, and highlights the importance of learning in renewal of practices, which is often a slow and iterative process. It has created crucial knowledge needed for improving existing service processes and creating new ones. Although a service-oriented perspective has provided an invaluable contribution to service innovation research, it has downplayed the growing and crucial role of technology in service innovation. This thesis builds on the premise that service innovation theory can become a unified perspective on understanding and developing all kinds of innovations in the digital era. In order to reach this goal, there is a need to create deeper understanding of the role of technology in service innovation, which enables overcoming the dichotomy between technological and non-technological innovations. S-D logic, and particularly its institutional service ecosystem’s perspective, is a promising meta-theoretical approach to this end, but it lacks a lower level theory that bridges between the perspectives of S-D logic and more traditional service innovation research. This is the first major research gap that this thesis aims to narrow.

Digitalization is also seen as an enabler for major transformation of healthcare systems. Previous research has identified that innovations driven by central actors within the field are aligned with prevailing institutional arrangements in order to maintain privileged positions of incumbents. Since it seems that the major transformations will not be enacted by the incumbents, there is growing interest to transform the field of healthcare from outside, which is also reflected in innovation and entrepreneurship policy. Innovation programmes, mainly driven by the technology industry, enable the development of transformative innovations in collaborative innovation projects. Moreover, new entrepreneurial ventures are actively developing innovations that threaten the field’s status quo. Although their innovations often aim to transform some specific area of healthcare, for example by reallocation of tasks from highly educated professionals to lower level professionals or computers, they also contribute to larger transformation. Thereby, these actors are seen in this work as niche-level innovators who aim to break institutionalized rules at the regime level. The niche environment enables experimentation and provides protection from the market selection, but this context also presents new challenges for the diffusion of innovations. There is growing interest to study how the context of innovation impacts on the success of innovation, and understanding the process of institutionalization is argued to be imperative for the
study of innovation (Wieland, Vargo and Akaka, 2016). Despite the emerging interest in how actors impact on institutionalization in the field of healthcare, the studies are still scarce and mainly focus on actors who have prominent positions within the field. There is a need to create deeper understanding of how peripheral actors experience the institutional context and develop strategies to cope with multiple, often conflicting logics. Furthermore, better understanding is needed regarding micro-level actions of institutional change and how actors (institutional entrepreneurs) break institutionalized rules hindering their innovations. These constitute the second major research gap for the thesis.

The thesis aims to narrow these research gaps through seeking answers to four research questions (RQs):

RQ1. How can digitally-enhanced service innovations increase service productivity?
RQ2. Why is the creation of service innovations challenging in public-private partnership projects?
RQ3. How can institutional arrangements constrain the service innovations of new ventures?
RQ4. How can new entrepreneurial ventures contribute to the institutionalization of innovation?

These research questions correspond to the research questions that are presented in the four original articles in a more detailed form. Each article focuses mainly on one of the research questions, which reflects the specific phase of the abductive knowledge creation process that slowly cumulates into insights that are presented in the summary part of the thesis. However, there are linkages between the articles. On the one hand, earlier articles created pre-understanding for the later articles and helped to identify research gaps and formulate research questions. On the other hand, subsequent articles complemented knowledge creation and dug deeper into the issues which were insufficiently covered in previous articles. Section 4.3 describes in more detail the abductive knowledge creation process, depicting the linkages between articles. Together the articles contribute to building a holistic picture of the overall phenomenon of digital transformation in healthcare: the challenges that organizations face in the creation of innovations and the strategies they use to tackle these challenges.

### 3.2 Research context

This thesis is based on a constructivist case study approach, which requires that the research context should be well described (Stake, 1995, 2000; Schwandt, 1998; Mir and Watson, 2000). Stake (1995) argued that case research taking a constructivist stand needs to develop vicarious experiences and a sense of ‘being there’ for the reader. Hence, the objective of this section is to set the scene by introducing the two empirical research contexts in which the case studies were conducted. They are described as parallel trajectories.

#### 3.2.1 Digitally-enabled home care innovations within European collaborative innovation projects

The empirical cases on the first trajectory explore the service innovations targeted to home care markets. When the first case study was started in 2006, the supporting of independent living of elderly people at home had become a major issue in the health and social care policy. From the economic perspective, the main drivers for new service innovations in home care were the increasing old-age dependency ratio, i.e. the number of elderly people as a proportion of the number of people of working age, and the significantly lower price of home care compared to long-term residential care (Chappell et al., 2004). From the human perspective, the motivation to digitalize home care services was that it enables elders to stay longer in their own homes, which the elderly themselves regard as a positive alternative compared to moving to institutional care (Hammar, Raatikainen and Perälä, 1999). Therefore, supporting the independent living of the
elderly at home appeared to be a highly recommendable option, and digital services were increasingly seen as a way to support this option. The practical aim of the conducted case studies was to improve the service processes that support the living of elderly people in their own homes.

The innovation activities on this trajectory were explored within the setting of three collaborative innovation projects in the framework of two European R&D and innovation programmes (see Figure 2). The SmartTouch-project was implemented under the framework of the Information Technology for European Advancement (ITEA2) programme, which was part of the EUREKA cluster programme aimed at advancing pre-competitive research and development in software. The projects under the ITEA2 framework were industry-driven and had to involve complementary R&D from different partners. The study reported in the thesis was one of several case studies conducted within the project. In total, the project included 24 partners from eight countries, with a total funding of almost 30 million Euros.

HearMeFeelMe-project and WeCare project were conducted under the framework of the Ambient Assisted Living (AAL) Joint Programme, which was an EU innovation programme financially supporting the development of information and communications technology (ICT) -based solutions addressing demographic ageing (AAL, 2014). The AAL Joint Programme funded projects in public-private partnership, and the studied projects were composed of 7 to 10 independent partners from three different countries. The total funding varied from 1.6 million to 3.67 million Euros and the amount of funding to each partner varied depending on the focus of the project. The activities of these projects were focused on ‘pre-commercial research’, meaning that commercial activities were not permitted, but the innovation activities were expected to lead to solutions that could be commercialized within 2-3 years after the project had ended (AAL, 2009).

The general objective of these programmes was to support innovation activities conducted in projects composed of several partners from different countries. The projects included SMEs, large industrial corporations, end-user organisations, and research organizations. The researchers participated actively in the innovation efforts of these projects. Although the innovations pursued in these programmes were expected to be ‘close to market’, they were also expected to be high risk in nature, which meant that companies could not launch them in the market without public support. Therefore, the partners implementing innovation projects received public funding from European Union and national funding agencies. The projects were granted funding for a limited period of time (3 years), after which they were expected to commercialize the developed solutions on their own or with the support of other funding instruments. The focus on ‘close to market’ innovation activities indicated a paradigm shift compared to previous EU framework programmes (e.g. the FP7 usually had a longer-term focus, 5-10 years to market) (Jaekel, Wallin and Isomursu, 2015).

3.2.2 Digital health innovations under the business accelerator programme

The second trajectory is focused on new ventures developing service innovations for ‘digital health markets’. The study included a broad range of new ventures, which had mostly been founded by entrepreneurs with a high-tech background but with poor experience in the field of healthcare. However, these ventures persevered to introduce innovations requiring changes in regulations, norms or taken-for-granted beliefs related to healthcare and wellbeing. The main interest was in 10 ventures that can be categorized under three segments of digital health:

1. Employer-paid preventive health solutions targeted to employers to help them support their employees’ health (e.g. life-style coaching, stress analysis)
2. Medical applications targeted mainly at consumers to enable prevention and self-treatment of diseases (e.g. diabetes, tinnitus, and mental health)
3. Medical solutions targeted mainly at professional use, which suggest new ways of diagnosing medical problems (e.g. eye and brain imaging)

The development context was a start-up business accelerator programme operating under the European Institute of Innovation and Technology (EIT)3. EIT is an independent body of the European Union, set up to spur innovation and entrepreneurship across Europe. Although the concept

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2 The national funding agency providing funding for Finnish project partners was Tekes, the Finnish Funding Agency for Technology and Innovation.
3 see https://eit.europa.eu/
of business accelerator is sometimes used interchangeably with the concept of business incuba-
tor due to the similar service provision, the accelerator can be seen to help more mature ventures
that are already approaching their ‘adulthood’. Many accelerator programmes are privately funded
(Miller and Bound, 2011), but the programme in our study was operating with the support of public
funding. This accelerator programme focused on providing support to a diverse group of relatively
new companies, referred to as ‘digital health start-ups’ also including spin-offs from universities,
research institutes and large technology enterprises. The timeframe of activities was much shorter
than in the collaborative innovation projects, since the new ventures were selected to the pro-
gramme in annual batches, usually for a duration of 12 months. Whereas the studied European
innovation programmes aimed at cross-fertilization between project partners, the accelerator pro-
gramme aimed at cross-fertilization between start-ups within the programme. The accelerator
programme did not provide funding for the new ventures, and therefore start-ups needed to reach
profitability very quickly, or to access funding from other sources.

Figure 2 links the four research questions of the thesis to the studies conducted within the five
different projects on the two trajectories. Altogether, the thesis investigates service innovations in
two different kinds of development environments that both target the same outcome: the creation
of service innovations that diverge from habitual routines and processes in the healthcare field.
The synthesis enables a comparison of these two development contexts and the challenges ex-
perienced in them. Thereby, it provides insights into which challenges are likely to be caused by
the specific development context (i.e. operating under the framework of the innovation pro-
gramme or within the accelerator programme) and which may be more general from the viewpoint
of service innovation. Thereby, the overall aim of the synthesis is to describe the knowledge ac-
cumulated across all studies and to create more profound understanding of the mechanisms that
advance, hinder, enable and constrain service innovation in the field of healthcare in the digital
era. Section 4.3 provides a more detailed account of the research process, thereby providing
depth and nuances to the case contexts
Figure 2. Overview of the research process of the study.

**TRAJECTORY 1** "Exploring service innovation in collaborative innovation projects in the context of elderly care"

- **SmartTouch & HearMeFealMe projects (2006-2010)**
  - RQ1: How can digitally-enhanced service innovations increase service productivity?

- **WeCare project 2010-2014**
  - RQ2: Why is the creation of service innovations challenging in public-private partnership projects?

**Study I**

**TRAJECTORY 2** "Studying institutional change initiated by new ventures in the context of digital health services"

  - RQ3: How can institutional arrangements constrain the service innovations of new ventures?
  - RQ4: How can new entrepreneurial ventures contribute to the institutionalization of innovation?

**Study II**

**SYNTHESIS**

- 2017
  - Synthesis of previous work on two trajectories to create new theoretical knowledge on service innovation
4 Methodology

This chapter describes the research approach of the thesis, which defines ‘plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation’ (Creswell, 2014, p. 3). The first section provides an overview of the philosophical foundations on which the thesis is built. It presents the constructivist approach and focuses specifically on the moderate end of constructivism (Nightingale and Cromby, 2002; Järvensivu and Törnroos, 2010) – the view adopted in this thesis. The second section presents abductive case study (Dubois and Gadde, 2002, 2014) as a strategy for inquiry and justifies its application in the present context. The third section opens up the interplay between the theory and the empirical research in this thesis in more detail and describes the methods utilized for the data acquisition and analysis. The final section discusses the validity, reliability, and generalizability of the study.

4.1 The philosophical position of the thesis

The standpoint with respect to the philosophy of science taken in the thesis can be identified as moderate constructionism/constructivism (Järvensivu and Törnroos, 2010). It builds on the interpretivist-constructivist research tradition that is a loosely coupled family of methodological and philosophical persuasions (Denzin & Lincoln, 2017; Lincoln & Guba, 1985, 2000; Schwandt, 1998). Interpretivism was developed as a criticism of the dominant positivistic paradigm in social sciences, which is based on the (naïve) realistic ontology implying that there is a single objective reality to any research phenomenon (Lincoln and Guba, 2000). Hence, the interpretivist-constructivist approaches in general4 represent an opposing, anti-realist ontology, which highlights the existence of multiple local realities that are subjectively constructed (Lincoln and Guba, 2000).

Constructivism, which is a more recent shade in interpretive thinking, considers knowledge and truth to be dependent on the perspective - no amount of inquiry can produce convergence on absolute knowledge or truth (Lincoln and Guba, 1985, p. 83; Schwandt, 1998). Therefore, the goal of research is not to search for objective truth, but rather to understand the complex world of lived experience from the perspective of those who live it (Schwandt, 1998). Constructivism is based on epistemological relativism (Mir and Watson, 2000), which argues that knowledge is relative, for example to time, place, society, culture, the conceptual view, and personal conviction (Siegel, 2004). A fundamental assumption shared by representatives of the constructivist tradition is that the researcher (subject) and the phenomenon under investigation (object) cannot be separated (Mir and Watson, 2000). The researcher is never an objective observer but should rather be seen as a part of the research process (Rowlands, 2005). In constructivism, knowledge is never discovered, but always created (Schwandt, 1998). There are, however, different emphases on whether the knowledge is mainly created ‘in the minds of individual asserts’ (Lincoln and Guba, 1985, p. 83) or in social interaction between people. The latter is a particular emphasis of the social constructivist paradigm (Berger and Luckmann, 1966). The seminal works of social constructionism regard ‘reality’ as the world that people create in the process of social exchange (Gergen, 1985), and the knowledge about the world is maintained, interpreted and negotiated by social interaction (Berger and Luckmann, 1966). During recent decades, (social) constructionism has successfully spread to most areas of social sciences, but at the same time, the variety of approaches labelled under it has grown (Alvesson and Sköldberg, 2017). Therefore, there is a need to define the epistemological and ontological position within the constructivist tradition, which can be approximately categorized to range from moderate to naïve (Nightingale and Cromby, 2002; Järvensivu and Törnroos, 2010). This thesis is located in the moderate end of the constructive tradition.

Moderate (social) constructivism relaxes the naïve relativist ontological assumption that all knowledge claims are equally good and that there is no reality beyond subjects (Järvensivu and Törnroos, 2010). Several researchers have criticized this overemphasised ‘strong’, ‘radical’ or ‘idealist’ constructivism (e.g. Kwan & Tsang, 2001; Reed, 2005). Moderate constructivism accepts that there may be reality, although the objective reality can never be truly known. What can be

4 The ontological assumptions of constructionism are still debated (see Nightingale & Cromby, 2002).
known are specific subjective and community-based contingent truth claims, which apply when
the claim is based on evidence that is acceptable to the community (Longino, 2002; Järvenpää
and Törnroos, 2010). Likewise, the goal of this thesis is not to move closer to one universal truth,
but to create better understanding of different community-based accounts of knowledge. The
moderate constructivist approach strives towards this end by combining multiple viewpoints of the
truth through community-based knowledge-creation and empirical observation bounded by sub-
jectivity (Järvenpää and Törnroos, 2010). In practice, this community-based knowledge creation
has taken place in numerous interviews during which the knowledge is socially constructed be-
tween the interviewee and the interviewer. Moreover, the community-based knowledge creation
process has occurred between researchers discussing and analysing the data, and also in the
author’s interactions with other people outside the actual thesis project. This type of research
process can be described metaphorically as ‘sculpting’ rather than ‘excavation’, since the
knowledge has been iteratively created in interaction between the imagination and theory-base
of the researcher and the medium of the studied phenomenon (Mir and Watson, 2000).

4.2 The abductive case study as a strategy for inquiry

The research strategy of this thesis is based on case study, which is suggested as an appropriate
choice when the studied contemporary phenomenon is not distinguishable from its context (Yin,
2003), and the aim is to investigate the dynamics of phenomena in depth within a real-life context
(Eisenhardt 1989; Yin 2009). More specifically, this research is based on interpretative case study
(Stake, 1995) following abductive logic (Dubois and Gadde, 2002, 2014); thus, it diverges from
traditional, linear, (post-)positivist case studies (e.g. Yin, 2003b). Stake (2000) noted that an
interpretive case study design emphasizes optimization of understanding the case instead of gen-
eralisation beyond the case. The understanding is cumulated in the ‘pool of data’ over time and
includes not only formally collected data but also data gathered informally, such as background
assumptions, acquaintances with other cases and first impressions (Stake, 1995). The interpre-
tation of data is not limited to specific analysis sessions, but includes a continuous social and
cognitive process through which inferences are formed. The case study reports are not objective
truths or final forms of knowledge, but should rather be seen as glimpses into cumulated
knowledge describing the best interpretation of a phenomenon at a specific point in time. This
type of a non-linear and flexible research design is particularly suitable for moderate constructivist
research that aims to increase understanding and awareness of a specific phenomenon
(Järvenpää and Törnroos, 2010).

The abductive approach is based on knowledge creation that lies between the inductive and
deductive approaches (Dubois and Gadde, 2002, 2014). According to Dubois & Gadde (2002),
abductive logic is close to inductive reasoning as represented by grounded theory (Strauss and
Corbin, 1998). However, compared to inductive reasoning, in which theory is generated from the
data, abduction stresses more the continuous interplay between theory and empirical observa-
tions. Although abductive case study bases case design and data collection on a preliminary
analytical framework, the framework is not fixed as in deduction. It consists of ‘articulated precon-
ceptions’, which develop over time according to the discoveries of the empirical work as well as
through analysis and interpretations (Dubois and Gadde, 2002). Similarly to grounded theory, the
abductive approach is suitable for research processes that aim at discovery of new theories rather
than the confirmation of existing ones (Suddaby, 2006; Dubois and Gadde, 2014). Moreover,
when the discovery needs to go beyond the surface into deep structures, the non-linear move-
ment back and forth between theory and empirical findings – a characteristic of abduction – is
well justified (Dubois and Gadde, 2014). Hence, abductive knowledge-creation is particularly well
suited to this study, in which the objective has been to create new and useful knowledge on three
interconnected phenomena related to service innovation, digitalization, and institutional change
and to create better understanding of the dynamics between them in the healthcare context.
4.3 The abductive process of knowledge creation in this thesis

Järvensivu & Törnroos (2010) suggested that it is not sufficient to say that the research process is abductive, but the way in which it is abductive needs to be specified. This is particularly true in a study that is based on individual articles, which are temporally spread over a long period, were designed from different bases, and were influenced by the contributions of several researchers. Figure 3 summarizes the process of abductive knowledge creation in this thesis, and in the following paragraphs, its different phases are elaborated in more detail.

4.3.1 Phase 1: Creating understanding about opportunities and challenges of service innovation in a home care context (2006-2010)

In the first research phase, the knowledge creation was implemented first within two individual case studies, which were later compared to each other and published as Article I. Both cases aimed at improving home care services by integrating new digital resources to existing service processes. Both studies had two units of analysis: the elderly, with a focus on subjective user experience, and the order and delivery process from the service provider viewpoint. The case studies were planned and conducted in a real-life environment with the city authorities organizing and managing daily service processes in elderly care. The development was conducted in both cases within collaborative innovation projects operating under the framework of two European innovation programs.

When the first case study started in 2006, the initial aim was to investigate the capability of elderly customers to use digital technology, and to explore how this new interaction technique impacted on the effectiveness of the service. The author was asked to participate in this project to conduct business research that would help create better theoretical and managerial understanding from the cases particularly from the service providers’ viewpoint, and to analyse the new business potential that might emerge from the proposed service concept. Since the author had limited experience and knowledge of the home care context, the first task was to gain better understanding of the home care practices and service processes. This took place through participation in the meetings of the home care organization and through interviewing different stakeholders. At this initial stage, other researchers were mainly responsible for designing the pilot study and data collection related to it. The author interviewed service providers, whereas one of the co-authors interviewed elderly customers before and after the eight-week pilot phase. After the pilot, the case study proceeded to within-case analysis conducted jointly by four researchers. The first case study was reported and published preliminarily as a conference paper and later as a journal article (Häikiö and et.al., 2007; Isomursu et al., 2008).

The second case study was conducted two years later in 2008. This study also focused on the issue of how digital technology could improve home care service processes. However, this time the trial aimed at investigating the suitability of digital meal ordering to elderly persons with varying physical and cognitive skills. The data collection included pre-pilot interviews with all 16 elderly customers, and numerous interviews with them after the five-week trial period; in the latter phase, the frontline employees and managers in the provider organization were also interviewed. After the data collection, three researchers analysed jointly the findings and reported them as a within-case report. After the second single case study was conducted, researchers moved on to the cross-case analysis, which compared the findings from two separate cases conducted within similar settings. The aim of the cross-case analysis was to develop stronger theoretical and managerial propositions.

Overall, the first phase of the thesis included notable back and forth movement between empirical data, analysis, and theory. Researchers related empirical observations to existing theoretical understandings, such as business model innovation, business strategy, and technology adoption and diffusion. Empirical observations also led to the search for new theoretical explanations that would better explain the relationship between the value experienced by the users and the improved efficiency of service provisioning. This resulted in the ‘discovery’ of the notion of service productivity, which was not included in the initial theoretical frameworks, but was now applied as a theoretical construct that appeared to provide an explanation for the relationship between the quality experienced by the elders and the efficiency of providing the service. The empirical observations during the first phase of the research also revealed various challenges that hinder the
service development. This contributed to the research design and the selection of the initial theoretical framework for the second study.

### 4.3.2 Phase 2: Digging deeper into challenges of service innovation in the context of public-private partnership projects (2010-2014)

The second phase of the research was also conducted in the home care context under the framework of a European innovation program. The research design was based on a single case study, which was performed over a significant period of time (≈4 years). Research design was based on the initial research questions focused on studying the development and adoption of digitally-enabled innovations. The initial theoretical constructs were largely similar to those used in previous cases: perceived service quality and technology adoption. During the case, extensive amounts of data were collected by various methods, such as participatory workshops, semi-structured interviews, self-reporting diary, observations, and participatory observations. Parallel to the data collection, researchers continuously explored new theoretical approaches. Increasing attention was paid to emerging streams of service science (Spohrer and Maglio, 2005; Maglio and Spohrer, 2008) and service-dominant logic (Vargo and Lusch, 2004a, 2008), with an aim to determine how these theories would fit into empirical observations. However, at that point these theories seemed to be at a high abstraction level, and the more practice-oriented framework of New Service Development (NSD) (Menor, Tatikonda and Sampson, 2002; Papastathopoulou and Hultink, 2012) was utilized to provide theoretical grounding for the work. The analysis also aimed to utilize NSD to bridge empirical findings with higher abstraction level theories.

The empirical observations led to the finding that the context of innovation, and various formal and informal rules linked to it, had a major influence on the service development. However, at the time of conducting the case study, the institutional theory was not yet linked to service research and therefore in the search for complementary or rival theories (Yin, 2009), researchers did not consider it to be a plausible explanation for empirical findings. The situation changed during the finalization of Article II: the author’s continuous search for new theories led to the discovery of the institutional theory, which appeared to be promising in providing a more robust explanation of the challenges faced in the final stages of the innovation process. In order to create better understanding of the role of institutions in the service innovation process, the institutional theory was included in the research design for the next case study.

### 4.3.3 Phase 3: Exploring the role of institutions in service innovation in an entrepreneurial context (2014-2017)

The third research phase was conducted within the context of a business accelerator program targeted to new ventures. The main reason for changing the studied development context from the collaborative innovation projects to new ventures was the desire to understand better the role of start-ups and spin-offs as a driving force for the transformation of healthcare. Although new ventures were often cited as a source for radical innovations, these ventures were too small to be eligible to participate in most of the innovation programs at the European level. It was also hypothesized that start-ups develop innovations in the environments in which they are more susceptible to market and institutional forces. Therefore, as the previous findings had pointed out that the context of innovation is crucial for understanding the success of commercialization, the start-up environment would provide an excellent framework for studying the relationship between organizations and the institutional context.

The opportunity to study start-ups opened up when the author was offered a dual role in the accelerator program. The author’s main work was to provide support for the ventures in the program with regard to their commercialization and internationalization efforts. In addition, the author was given an opportunity to conduct interviews with all actors of the program. The interviews were designed and analysed in a research project5 parallel to the accelerator program. Through this dual role, the author had access to a large number of entrepreneurs and was able to conduct in-depth interviews with them. The research began by conducting an initial literature survey on institutional theory and institutional entrepreneurship in order to identify research gaps. However,

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5 The research design and analysis of this study was conducted within the Accelerate-project under the framework of ITEA3, which is a programme targeted for pre-competitive R&D projects in the area of software-intensive systems and services.
the research design conducted together with other researchers was deliberately built in a way supporting inductive reasoning in the first part of the research. Hence, the aim was to conduct narrative interviews with entrepreneurs in order to collect stories that they told in their own words about their path of developing and commercializing service innovations to healthcare markets. The main idea was to understand the events on their journey that were memorable and important for them, and to interpret the role of different institutional arrangements and institutional change efforts from their stories. The data were collected from two batches of ventures within the accelerator program. The first 25 interviews concerning 18 different ventures were conducted from April to November 2014. For the first few interviews the author was accompanied by a fellow researcher, but the rest of the interviews were conducted solely by the author. After each interview the author conducted initial within case analysis and wrote case memos that helped in the theorization and reflection of findings. After finishing the first data collection round, the author moved to cross-case analysis, in which the main aim was to find managerial results that were meaningful for the entrepreneurs. Next the author co-organized a workshop for the ventures, with the aim of disseminating these managerial findings and of collecting feedback for the emerging theory. In February 2015, seven new interviews were conducted to deepen the insights and to validate some of the findings that had emerged during the initial cross-case analysis. Each new interview was first analysed case-by-case by writing a case memo and then including the case in the cross-case comparison. Finally, data included 32 interviews from 25 ventures. These ventures were established in seven countries (10 Finnish, 4 Dutch, 3 Italian, 3 Swedish, 2 German, 2 UK, and 1 Belgian), but their actions were not limited to these countries as many of them were aimed at international markets.

The academic dissemination of the findings started in 2015. Since the amount of data was large, the author first selected only five ventures in which institutional forces impacting on the innovation process were identified to be the most clear and concrete. The findings drawn from these cases were introduced in the first article presented in an academic conference in September 2015. After the conference, the author was accompanied by an experienced researcher who started helping in the analysis and in writing the subsequent articles. The analysis indicated that it might be highly relevant to collect data about the ventures from a longer time period, in order to obtain deeper and broader understanding of the institutional change efforts. Hence, the author started expanding the analysis by collecting publicly available data (e.g. press releases, blog posts, and social media data) related to seven ventures that were actively involved in the institutional change. This further data collection provided evidence of the concrete and visible actions of institutional entrepreneurship that was often not visible in the interview data. Throughout the analysis process, the researchers continuously aimed at refining initial theoretical frameworks that would explain how institutional elements constrain innovation activities and how entrepreneurs participate in institutional change activities. Thereby, stages of data analysis were followed by additional data collection, which on the one hand aimed at providing more nuanced explanations and deeper insights, and on the other hand tested the analytical generalisability of the initial framework.

4.3.4 Phase: Synthesis

The final phase of the knowledge creation process concerns the synthesis of three temporally separated phases of the thesis. The synthesis builds on the empirical findings and theoretical work conducted in the three previous phases and in the two different development contexts. The synthesis enables comparison of these two development contexts and the challenges experienced in them. It creates an understanding of which challenges are likely to be caused by the specific context (i.e. operating under the framework of an innovation program or within the accelerator program), and which may be more general from the viewpoint of service innovation. In addition, during the synthesis a more thorough review of different theoretical perspectives was made with the aim of taking the theoretical discussion to a broader and deeper level. Altogether, the thesis follows the logic of abduction: the confrontation between theory and empirical observations has been highly iterative throughout the work, allowing the author to adjust both the theoretical frame and data collection during the research process. Figure 3 summarizes the process of abductive knowledge creation throughout the thesis.
### Figure 3. The process of abductive knowledge creation

<table>
<thead>
<tr>
<th>Preunderstanding</th>
<th>Phase 1</th>
<th>Phase 2</th>
<th>Phase 3</th>
<th>Synthesis</th>
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<tbody>
<tr>
<td><strong>Theory</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous theoretical knowledge: e-services, technology adoption, business model innovation</td>
<td>Service productivity, Quality of life (QoL)</td>
<td>New service development, service science, value co-creation perspective of S-D logic</td>
<td>Institutional theory, institutional perspective of S-D logic</td>
<td>Theoretical synthesis (innovation, service innovation, institutions)</td>
</tr>
<tr>
<td>Dialog between theory and empirical findings</td>
<td>RQ1: How can digitally-enhanced service innovations increase service productivity?</td>
<td>RQ2: Why is the creation of service innovations challenging?</td>
<td>RQ3: How institutional arrangements constrain new ventures’ service innovations?</td>
<td>RQ4: How can new entrepreneurial ventures enact institutional change?</td>
</tr>
<tr>
<td>Deviating empirical observation</td>
<td>Integration of new service in routines and practices of elderly challenging.</td>
<td>Development context has major impact on challenges experienced in service innovation.</td>
<td>Institutional complexity is both enabler and constraint for innovation.</td>
<td>Importance of institutional sensemaking and the legitimacy building</td>
</tr>
<tr>
<td>Context</td>
<td>Homecare service innovations developed within R&amp;D-projects under the framework of European innovation programmes</td>
<td>Service innovations driven by new ventures under the framework of a startup business accelerator programme.</td>
<td>Broad view on healthcare as a overall context for the study</td>
<td></td>
</tr>
</tbody>
</table>
4.4 Evaluating the quality of the study

There are significant tensions within qualitative research, which are reflected in how to evaluate the quality or trustworthiness of the research (Denzin & Lincoln, 2017, p. 15; Yazan, 2015). Positivists highlight a strict interpretation of the concepts of validity, reliability, and generalisability as a fundament of true scientific research (Kvale, 1995; Carcary, 2009). However, there are also authors who claim that these constructs are based on a modernist notion of true knowledge as a mirror of reality, and they are not therefore applicable to constructivist research as such (Lincoln and Guba, 1985; Kvale, 1995). Some constructivists have even proposed dismissing these constructs and focusing on the creation of deeper understanding instead (e.g. Wolcott, 1990). More often, constructivists aim to ensure trustworthiness of the research either by utilizing alternative concepts introduced specifically for qualitative inquiry, or by re-conceptualizing the original concepts in order to reflect the issues that are relevant from their philosophical position (Carcary, 2009; Miles, Huberman, & Saldana, 2014). In the following, constructivist views on validity are presented in greater detail and their application in this thesis is explained. Thereafter the issues of reliability and generalisability are discussed.

4.4.1 Constructivist perspective on validity

Although validity has been a central concept in social sciences, the validity of the term validity is a contested subject among qualitative researchers (Kvale, 1995; Miles et al., 2014). The issue of validity is discussed under numerous different terms, such as authenticity and credibility (Lincoln and Guba, 1985), or by using more descriptive characterizations, such as ‘persuasively written account’ (Miles et al., 2014, p. 313). This thesis adopts the definition of valid knowledge of moderate constructivist research, building on Longino’s (2002) and Kvale’s (1995) perspectives (see also Järvensivu and Törnroos, 2010). First, the validity is dependent on the ‘quality of the craftsmanship’ (Kvale, 1995) in the design, implementation and reporting cases. Therefore, the main task of validation is not the inspection at the end of the project, but rather continuous checking, questioning and theoretical interpretation throughout the research process (Kvale, 1995). Järvensivu and Törnroos (2010) suggested checking the validity by investigating whether the truth claims are supported by data, and whether there is a clear chain of arguments between data and truth claims which is based on background assumptions and reasoning acceptable to the scientific community (c.f. Yin, 2009, p. 123). Second, the validity of research is socially constructed within the research community and tested in a dialogue, referred to as communicative validity (Kvale, 1995). Therefore, validity is based on the credibility of the researchers conducting and reporting the study, and on the validity of the community evaluating and endorsing the study (Kvale, 1995). The community’s compliance with public standards, norms and uptake of criticism, and the equality of the community participants influence the validity of the truth claims (Järvensivu and Törnroos, 2010). Third, a pragmatic approach on validity implies that the knowledge is useful when it assists in taking actions that produce desired results (Kvale, 1995). The action can be, for example, the acceptance of an article by the scientific community, or the application of findings in a managerial practice. In the following section, these three perspectives on validity are discussed from the viewpoint of this thesis.

4.4.2 Validation of this thesis

Validation is the process and tactics used to ascertain the validity of a study by examining sources of invalidity (Kvale, 1995). Representing a moderate constructivist view, Kvale (1994, p. 3) argued that ‘the stronger the attempts of falsification a proposition has survived, the more valid and the more trustworthy is the knowledge’. Validation of this thesis builds on the validity of the individual studies that are described in the articles and answers to the research questions I-IV. It also builds on the validity of how the findings of these individual studies are put together to form valid truth claims about the studied phenomenon. The validity of the work is therefore entangled in the quality of the craftsmanship in the research design, data collection and analysis, and reporting of the individual case studies as journal articles. The main tactics for validation have been checking the integrity of the drawn inferences by triangulation (Schwandt, 2007). Triangulation was not, however, used to discover repeatable observations, but it adopts a constructivist perspective that
helps to clarify meanings by ‘identifying different ways the studied phenomenon is being seen’ (Stake, 2000, p. 148). First, multiple data sources were utilized to improve the validity of the findings regarding all research questions (data triangulation). Second, multiple data collection methods were used to study the units of analysis, particularly in answering the research questions I and II (methodological triangulation). Third, each case was studied from multiple theoretical perspectives and rival explanations were actively considered throughout the work (theoretical triangulation). Table 1 summarizes various data sources, data collection methods and theoretical viewpoints used for triangulation in order to understand the studied phenomenon in detail.

Table 1. A summary of data sources, data collection methods and theoretical positions used in this thesis.

<table>
<thead>
<tr>
<th>RQ</th>
<th>Data sources</th>
<th>Data collection methods</th>
<th>Theoretical positions</th>
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<tbody>
<tr>
<td>I</td>
<td>- 25 Elderly clients&lt;br&gt;- 9 Nurses, frontline employees&lt;br&gt;- 8 Managers&lt;br&gt;- Activity database</td>
<td>- Semi-structured interviews, Participatory observation, Activity logs, Self-reporting diary</td>
<td>- Adoption of technology&lt;br&gt;- Quality of life&lt;br&gt;- Service productivity&lt;br&gt;- Usability, user experience</td>
</tr>
<tr>
<td>II</td>
<td>- 26 project meeting minutes&lt;br&gt;- 22 press releases&lt;br&gt;- 7 elderly clients&lt;br&gt;- 4 relatives of the elderly&lt;br&gt;- 5 nurses&lt;br&gt;- 1 physiotherapist&lt;br&gt;- 3 occupational therapists&lt;br&gt;- 3 managers&lt;br&gt;- 2 researchers&lt;br&gt;- 16 development workshops with varying number of participants</td>
<td>- Document review&lt;br&gt;- Self-reporting diary&lt;br&gt;- Development workshops&lt;br&gt;- Semi-structured qualitative interviews&lt;br&gt;- Theme interviews&lt;br&gt;- Observations (user tests)&lt;br&gt;- Participatory observations</td>
<td>- New Service Development (including service innovation)&lt;br&gt;- User experience, usability&lt;br&gt;- Success factors of innovation&lt;br&gt;- Business model innovation&lt;br&gt;- ICT-enhanced innovation&lt;br&gt;- Assisted living technologies</td>
</tr>
<tr>
<td>III</td>
<td>- 25 entrepreneurs/managers&lt;br&gt;- 5 opinion leaders</td>
<td>Theme/narrative interviews</td>
<td>- Service innovation&lt;br&gt;- Service-dominant logic&lt;br&gt;- Institutional theory&lt;br&gt;- Strategic/institutional fit</td>
</tr>
<tr>
<td>IV</td>
<td>- 25 entrepreneurs/managers&lt;br&gt;- 5 opinion leaders&lt;br&gt;- blog posted by 7 ventures&lt;br&gt;- twitter tweets posted by 7 ventures&lt;br&gt;- news releases containing information about 7 ventures</td>
<td>Theme/narrative interviews, Document review</td>
<td>- Service-dominant logic&lt;br&gt;- Service innovation&lt;br&gt;- Technological innovation&lt;br&gt;- Institutional theory&lt;br&gt;- Institutional entrepreneurship&lt;br&gt;- Sensemaking&lt;br&gt;- Strategic reflexivity&lt;br&gt;- Multi-level perspective on socio-technical transformation</td>
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</table>

From the perspective of communicative validity, the studies have been validated through extensive dialogue between researchers, study participants and the broader research community while designing and conducting the case studies. First, in Articles I, II and IV – answering the corresponding research questions – two to four co-authors contributed to the work, thereby ensuring active discussion. This discussion was important especially during the data analysis and application of different perspectives to interpret the data; it increased investigator triangulation (Schwandt, 2007). In addition, even though the author of this thesis was the sole author of Article III, the analysis of the data was made concurrently with the analysis of Article IV, and hence the analysis process builds not only on self-reflections but also on joint analysis sessions. Second, the authors have utilized tactics of respondent validation (Ritchie et al., 2014, p. 358) by taking preliminary findings back to the study participants to determine whether the interpretation is confirmed by those who contributed to it in the first place. The dialogue was carried out, for example,
in the form of additional interviews, ‘results workshops’ and more informal discussions, and this dialogue has resulted in new data that has been incorporated in the further analysis. Third, the author of this thesis carried out a dialogue with the wider academic community through participation in numerous PhD group sessions, seminars, and conferences, in which preliminary findings were presented and feedback was received. Fourth, communicative validation has continued in the reporting phase in which the aim has been to produce detailed accounts of the case studies; these accounts have been made as context-rich as possible considering the length limitations of the journals. Each article has gone through a double-blind review process during which its validation has been carried out by anonymous reviewers and enhanced in dialogue between the author(s), journal editors, and reviewers. Finally, the dialogue with the thesis supervisors and pre-examiners during the writing and review process validates and increases the trustworthiness of the study and confirms that it complies with the academic norms attached to thesis.

From the pragmatic standpoint, the validation of findings, propositions and emerging theories has been conducted during the research projects related to Articles I and II, as the input from the researchers was used to steer the service development process. Since 2014, the author has been involved in practical development in the healthcare domain parallel to the PhD project, which has enabled extensive validation of the study results in practice. Although this practical experience cannot be part of the thesis, it has fostered continuous checking, questioning and re-interpretation of the findings.

4.4.3 Ensuring reliability

Reliability is another concept strongly rooted in modern research principles. The goal of reliability is to minimize the errors and biases of the study by making sure that later investigators following the same procedure would arrive at the same findings and conclusions (Yin, 2003b). Strauss & Corbin (1998) argued that this kind of repeating is very difficult and not even necessary in studies that explore complex temporal social phenomena, due to the challenges of reproducing the conditions under which the evidence was collected. Although constructivists do not aim at leaving a trail that would lead to the same conclusions, they highlight the importance of ensuring reliability. This can be done by developing a ‘research audit trail’ which makes the research process transparent for external investigators (Lincoln and Guba, 1985; Carcary, 2009). This trail should provide an account of research decisions and activities throughout the study that have led to the conclusions (Carcary, 2009). It enables self-reflection on how a study unfolded (Carcary, 2009), and demonstrates that the research has been conducted with reasonable care (Miles et al., 2014). Hence, the concept of reliability in constructive studies is closely linked to ‘quality of craftsmanship’ and thereby to the concept of validity. In this thesis, reliability is ensured by presenting the description of the research process in each of the articles (within the limits of the outlet). In addition, Section 4.3 provides an overall account of the process in which the thesis unfolds step by step through four phases.

4.4.4 Generalisability of the findings

Generalisability, which is also referred to as external validity (Miles et al., 2014) or transferability (Lincoln and Guba, 1985), answers the question whether the conclusions of the study are transferable to other contexts and have any larger impact (Miles et al., 2014). A common argument against the applicability of this concept in case studies is that they provide too narrow a basis for scientific generalisation (Yin, 2003b). However, the constructivist studies do not aim at statistical generalisation (see Yin, 2003), since the goal of (moderate) constructivism is not to find a generalisable truth, but to create knowledge and insights in a specific context (Järvensivu and Törnroos, 2010). This context-specific knowledge may be applicable in other contexts through naturalistic, inferential and theoretical generalisation, which are valid for the constructivist studies (Stake, 1995; Lewis and Ritchie, 2003; Ritchie et al., 2014; Simons, 2014).

Naturalistic generalisation (Stake, 1995; Melrose, 2009), also referred to as representational generalisation (Lewis et al., 2014), happens when readers of the case study gain insights by reflecting on the details and descriptions presented in the study. When readers find descriptions that resonate with their own experiences, their role is to consider whether the situations are similar enough to warrant generalisations (Melrose, 2009). Inferential generalisation, also referred to as
case-to-case generalisation (Chenail, 2010), implies that the findings from a particular study can be inferred to other contexts beyond sampled one (Lewis and Ritchie, 2003). Therefore, the question is to what extent are the results ‘transferable’ to other contexts? This thesis aims to support representational and inferential generalisation by providing rich description of the case context and writing accessibly about the interpretation of data and how inferences are formed.

Theoretical generalisation ‘draws theoretical propositions, principles or statements from the findings of the study for more general application’ (Lewis and Ritchie, 2003, p. 277). It uses previously developed theory as a template to which empirical results from other contexts are compared (Yin, 2009). If two or more cases support the same theory, the replication helps to provide deeper understanding, and also enhances the validity of the explanation of relationships (Eisenhardt, 1989; Miles et al., 2014; Yin, 2009). Therefore, the multiple case study approach utilized in Article I, Article III and Article IV supports the generalisability of the developed theoretical views. However, the main aim of the studies, particularly of the single case study discussed in Article II, is to provide deep understanding of the studied phenomenon. Based on this deep understanding, the findings are formulated as propositional arguments, which can be seen as building blocks in a process of building a theory (Weick, 1995).
5 Results

This chapter summarizes the empirical findings of the thesis. The following sections are devoted to a detailed discussion of each empirical study and the respective research question. Research questions were originally developed for the case studies and introduced in the appended articles. In the summary of this thesis they are presented in more condensed form with the aim of providing a concise and coherent contribution.

The following sections present briefly the background, objectives and methodology of each study, for which more details can be found from Chapter 3. The main purpose of this chapter is to present the findings and contributions of each study, thereby laying the foundations for the synthesis of the findings presented in Chapter 6.

5.1 Increasing service productivity by digitalization of home care service processes

This section focuses on the first study, originally presented in Article I, and answers the first research question: ‘How can digitally-enhanced service innovations increase service productivity?’. The study takes the perspective of service productivity to understand how bringing digital service access-points into the everyday life of elderly persons can improve the service providers’ efficiency and the experienced service quality of the end-users. The study was carried out as a qualitative case study, employing an embedded research design with two individual cases in the home care setting. Both of the cases have two units of analysis: service providers and elderly (average ages 76.6 and 80 years in the two cases). The main data collection method was semi-structured interviews, but participant observation, database analysis and self-reported data from the users were also used in the analysis. Next, the context of the study is briefly summarised, which is followed by presenting the main results and contributions of the study.

5.1.1 Digitalization challenge in the field of home care

The two cases constituting the study were conducted in 2006 and 2008 in Finland. By that time, support of independent living of elderly people at home had become a major issue in the health and social care policy. The digital services were increasingly seen as an option to support independent living that could provide notable benefits. However, the market uptake of solutions had been slow. Some studies have proposed that there are several barriers preventing or at least hindering the elderly from fully benefiting from ICT-supported services. Firstly, the age-related decline in vision and psychomotor skills can make it difficult to use small devices, such as mobile phones (Sjölinder, 2006), and poor interfaces that are not designed for the elderly might lead to rejection (Abascal and Civit, 2000). Secondly, elderly people are often inexperienced in the use of new technologies (Sjölinder, 2006), and may have a negative view of their skills as users (Eisma et al., 2004), which reduces the willingness to adopt new digital services. Despite these challenges, it had been suggested that most elderly people are ready to accept novel mobile communication services, and the key factors influencing acceptance are ease of use and the actual need for the services (Mikkonen et al., 2002).

Both of the cases aimed at the improvement of service processes by utilizing Near Field Communication (NFC) technology that was state of the art technology at the time of the study. In the first case, a public elderly care service provider developed a new digital meal ordering service in collaboration with researchers under the framework of a European R&D programme. The new service enabled home care customers to choose their daily meals from a weekly menu instead of providing the same meal to everybody, which had previously been common practice. The new service was expected to improve customer satisfaction, which could lead to better food consumption, which is a problem with some elders. The physical menu was an A4-sized printed menu and a plastic stand which included NFC tags placed behind each menu item. NFC tags activate when an NFC-enabled mobile phone is brought within close proximity of the tag (the same technology is nowadays used in contactless payments). Hence, users were able to select their daily meal by bringing their NFC-enabled phones close to the tag on the menu. In addition to elderly users, home care employees also used NFC phones with which they touched NFC tags attached near
to the front door in the different delivery addresses, thereby providing real-time information of the delivery to different locations.

The second case study was conducted in the context of another collaborative innovation project, in which a public elderly care service provider developed their services jointly with a retailer and researchers. In this case, similar NFC technology was utilized to construct a more complex user interface through which customers were able to choose groceries to be delivered to their home by the home care service provider. NFC tags were in a folder that included pictures of the groceries available in the grocery store, which was the partner in the project. Since the folder had many pages, and each page included a number of items (with respective NFC tags), selection of items had to be made more carefully and required more time. When the customer placed an order, the groceries were first collected by the employee of the grocery store and then picked up by the elderly care worker on the way to visit the elderly customer. The pilot also included tracking of delivery times, as one of the goals was to develop a system that would optimize logistics and leave more time for care operations.

5.1.2 How does the proposed service innovation affect perceived service quality and productivity?

The study adopted the service productivity theory (Ojasalo, 1999; Grönroos and Ojasalo, 2004, 2015), which defines service productivity as a function of internal efficiency, capacity efficiency and external effectiveness. The external effectiveness in the model builds on the perceived service quality (Grönroos, 1984) and it connects productivity with service quality. External effectiveness is understood as the perceived service quality that is produced using a given number of inputs, and the change in external effectiveness is directly proportional to the change in service productivity (Grönroos & Ojasalo, 2004).

Both cases explored service productivity from two different perspectives. First, the service provider perspective was focused on understanding what kind of impact the application of digital technology had on the internal and capacity efficiency of the service provider. Second, the external effectiveness of output was studied by analysing changes in the quality of life (QOL) experienced by elderly users. Based on the previous research, elderly care technologies affect QOL through two main factors, namely independence and engagement (Hirsch et al., 2000).

The results from the cases indicate that digitalization can improve the efficiency of the service processes. In case 1, the added digital access-points provided data that can be used to optimize the delivery routes of the logistics service provider. The meal producer was also able to ensure that its service process is compliant with the health regulations. In case 2, the new digitally-enhanced grocery ordering and delivery process for home care customers decreased the total ordering and delivery time. However, the optimized service processes and increased efficiency cannot be directly translated into a better service experience for the user, which may impact on the adoption of the service. In case 1, five out of nine participants preferred the new digital ordering over the earlier practice and were willing to use the service in the future. However, in case 2, in which the digitally-enhanced user interface was slightly more complex, only five of eleven participants who were interviewed after the pilot were willing to continue the use. The willingness to adopt the new practice was positively correlated with owning a mobile phone before the trial. Moreover, the results showed that many of the elders were already satisfied with the conventional practice, in which they did not have to use digital technology. Therefore it was difficult to improve their quality of life by digitalization of the service. Some of them thought, for example, that the conventional process in which they interacted with people was a highlight of their day, i.e. they wanted to continue it as long as possible. In order to achieve a large-scale adoption in this target group, the users might have to be incentivized or even forced to adopt the new service.

To sum up, the objective of the study was to explore issues related to bringing digital service access points to the everyday life of elderly users and to examine the effects of digitally-enhanced services both on the users and on the service providers. This study also embarked on a long journey towards understanding how the emerging digital services enable transformation of the health and social care field and what challenges there are on that road. From the theoretical viewpoint, the study bridges between technology adoption and service research by providing a framework for evaluating the impact of technology-enabled service innovations in real world contexts. The study contributes to the discussion on how service productivity, including the perceived
service quality, can be utilized to analyze changes that digitalization may bring to the field of health and social care. It also points to the need for better theoretical understanding of how everyday routines and practices of elders (i.e. institutions) can be changed to enable large-scale diffusion of innovation.

From the empirical perspective, the findings reveal that the integration of digitally-enhanced services to the life of elderly users is challenging. Even though digitalization could be justified from the viewpoint of the service providers’ internal and capacity efficiency, the change in perceived service quality needs to be acceptable from the elders’ point of view, especially in cases in which the service process requires active participation of the end-user. Therefore, service innovation cannot apply too narrow a perspective; it often requires major changes in the whole system involved in the service provisioning. Moreover, the study identified the need for better overall understanding of the challenges that hinder the development and commercialization of digitally-enhanced services, especially in the context of public-private partnership projects.

5.2 Challenges of collaborative service development and commercialization

This section answers the second research question ‘Why is the creation of service innovations challenging in collaborative innovation projects?’. This question emerged from the empirical findings of the study published in Article I and was further refined during the study related to Article II. The section first outlines the studied service development process, and explains the methodological choices. Then the main results of the study published in Article II are summarized and their implications are discussed.

The article is based on a qualitative case study employing an embedded research design. The study analyses a joint service development process and actions of two key organizations (a private care service provider and a technology platform provider) from Finland. They were jointly developing a service innovation aiming at digitalization of elderly care services that were previously implemented only through face-to-face interaction. The studied service innovation process included iterative design, business development and implementation of four service offerings that were piloted with frontline employees and elderly customers of the care provider. The offerings were based on video-communication technology and included:

1. Direct video-communication service – Home care customers were able to connect via video with their physically distant close friends or relatives.
2. Facilitated group video communication service – Home care customers were able to participate in small group communication focusing on specific themes and facilitated by care professionals.
3. Broadcasting group activities – Home care customers were provided the possibility to participate remotely from their homes in events organized in the premises of the care service provider (e.g. sing-alongs and religious services).
4. Professional health service – Customers utilizing action therapy were provided an option to use video-supported therapy.

The main data collection method was semi-structured interviews with frontline employees, elders and managers of the involved companies. In addition, researchers organized numerous workshops to facilitate the service development and reviewed numerous meeting minutes; this improved understanding of the design options and of strategic choices made during the development process. In order to gain better understanding of the experiences that might influence the adoption processes, the researchers also collected data by asking one key person to report experiences in a diary and by observing both frontline employees and elders while they were using the service in the different phases of the project. Finally, archival data were used to gain insights from the time before the project was started – to validate organizational goals and intentions in starting the service development – and to see how the aims had changed over the years.
5.2.1 Development of service innovations in joint funded projects

The service innovation process reported in Article II was conducted in a public-private partnership project under the framework of a European innovation program. When the project idea and formation was established in 2009, video communication technologies were on the verge of a breakthrough to the general public. Although video-supported services had been piloted in the field of home care with promising results (e.g. Arnaert & Delesie, 2001; Sävenstedt, Sandman, & Zingmark, 2006), most of the pilots had been small-scale trials focusing on the implementation and deployment of some specific technology application and the trials had failed to move towards mainstream deployment (Barlow, Bayer and Curry, 2006; Eberhardt, Fachinger and Henke, 2010; Aanesen, Lotherington and Olsen, 2011). Consequently, there was a need to understand why the developed services failed to reach the market. The hypothesis was that the context of innovation (i.e. the home care market, and the development within an RDI project setting) was particularly challenging. Through a better understanding of the challenges, the study could provide implications of how technology providers and elderly care organizations could jointly develop service innovations that could be effectively integrated with complex care processes already during the development phase. Hence, the study aimed not only to understand challenges, but also to put forward ideas concerning how joint development should be planned and implemented to improve the successful diffusion of innovations to the home care markets.

5.2.2 Challenges related to service innovation

The findings of the study were classified into four categories, which are all seen as challenges for the successful creation of service innovation: 1) project setup, 2) business model and service design, 3) attitude and adoption capabilities, and 4) organizational context. The project setup itself created challenges for the success of commercialization. A fixed project plan and objectives that were written mainly by research organizations before the project began, in order to guarantee public funding for the project, were found to limit the development that could be conducted within the project. In addition, the project setup required the development to be carried out mainly within the boundaries of the fixed project consortium, which did not encourage cooperation with organizations outside the project. The project setup was also linked to low strategic priority of the development. Due to the long time-frame (3 years) and fixed objectives, the project was seen as work to be conducted when more important short term operative activities and high-priority strategic initiatives leave time for it.

The identified business model and service design challenges were mainly related to difficulties in involving end-users in the service development and in meeting different stakeholders’ value expectations. An initial idea was to involve users actively in the service development – a practice that could contribute to the business model design. However, the developers experienced it as very challenging to involve elders in the design process due to their life situations, and they also found it problematic to obtain clear feedback from the elders whom they managed to interact with. Therefore, the developers were forced to use frontline employees as the main channel to obtain user input concerning the service and business model design. Consequently, when the service was finally piloted in practice, it turned out that the designed value propositions did not match with all stakeholders, as the value expectations of different stakeholders regarding the service were different.

Attitudes and capabilities to adopt the service utilizing new technology were also found to be a major challenge. First, the reduction in cognitive and functional capabilities made the service adoption rather difficult, especially when elders did not have family members to support them in the use. Second, some frontline employees also had a rather negative attitude towards digitally-enhanced services, which was reflected as low motivation and commitment to adopt the new practices and processes.

From the organizational perspective, many of the service development challenges resulted at least partly from the on-going strategic and structural change in one of the involved organizations; this steered the company away from the original purpose of the project. Since the project was a collaborative innovation project, this company did not see it possible to pivot the project in a direction that would be better in line with its new strategic goals. Thus, the context of development forced this company to stay grounded on their previous focus area, which was experienced by other stakeholders as a reduction in the company’s interest in joint activities.
5.2.3 Root causes for innovation challenges?

The results described in the previous section indicate that the context influences the service development in many ways, and holistic systems and service perspectives should be used to understand the complexity of the context. On the one hand, service development requires understanding of the formal and informal rules (i.e. institutions) that motivate and constrain the actions of various actors involved in the home care context. Home care is a particularly challenging context, as the daily operations of the elderly are often influenced by public and private health and social care organizations, third sector organizations, and also by non-professionals such as relatives and friends who all together help the elderly to cope in their own homes. Without having good overall understanding on how this complex actor network functions, it is very difficult to design new services that would be adopted widely in the home care context. In addition to understanding the broader institutional setting, there is a need to zoom in to the micro-level to understand better some of the key stakeholders that are crucial for service adoption. For example, the attitudes of frontline employees and relatives of the elders turned out to have a strong influence on the service adoption by elderly users.

On the other hand, the collaborative innovation project context is related to many of the service development challenges. For example, the institutionalized rules of the EU framework programmes strongly influence who are eligible to participate in joint development, what kind of innovations should be developed, and how they should be developed. Although the aim of these rules is that organizations with complementary resources and competencies would work together to develop innovations, ultimately each organization is aiming towards its own goals, which may not be aligned with those of others. A long timeframe of the project does not help in this matter, as it leads to a situation in which the development is more exploratory in nature and not focused on issues with high strategic priority.

These findings raise the question whether the collaborative innovation project as a development environment is the root cause for the challenges of commercializing service innovations. Already study I and particularly study II highlighted that the collaborative nature of the innovation project had an impact on the development. However, it was difficult to evaluate how extensive the impact was without a comparison of the service development with corresponding efforts in other environments. This was the main reason to change the development context of the next study from a collaborative innovation programme to a business accelerator programme in the same field (although with a broader focus). The accelerator programme was expected to be more flexible, faster and more encouraging of collaboration outside the accelerator. Therefore, the hypothesis was that there would be fewer institutional constraints to companies to create innovations under the accelerator programme, and that this situation would lead to better innovation outcomes.

5.3 Institutional constraints of service innovations - perceptions of start-up entrepreneurs

This section focuses on the third research question: ‘How do institutional arrangements constrain the service innovations of new ventures?’ The section first briefly describes the objectives and design of the study, and then summarizes its key findings and presents theoretical and managerial implications.

The objective of the study was to explore and explain how entrepreneurs working under a digital health business accelerator programme perceive institutional constraints while developing service innovations. The study was carried out as a multiple case study initially investigating 25 ventures participating in the start-up accelerator programme. These cases were analysed first as independent cases and then by utilizing cross-case analysis (Miles et al., 2014) in order to identify institutional forces and change efforts that cut across cases. Based on the analysis, five cases in which institutional change played a major role were selected for a more detailed analysis. They were originally reported in Article III. These ventures developed innovations that required divergence from the prevailing regulatory, normative and cultural-cognitive rules within a specific healthcare segment (see Table 2). Data were collected by narrative interviews of start-up entre-
preneurs participating in two batches of the accelerator programme in 2014 and 2015. The objective of the study was to increase understanding of how different institutional elements (Scott, 2014) impact on entrepreneurial innovation in the context of healthcare. In addition, the study provides insights into the ongoing digitalization in healthcare from the perspective of digital health ventures.

Table 2. Summary of studied cases

<table>
<thead>
<tr>
<th>Case #</th>
<th>Healthcare context</th>
<th>Type of innovation</th>
<th>Phase of commercialisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ophthalmology</td>
<td>Renewal of care processes and practices in screening and diagnosis of eye diseases enabled by the disruptive technological innovation</td>
<td>International growth phase</td>
</tr>
<tr>
<td>2</td>
<td>Diabetes treatment</td>
<td>Renewal of diabetes treatment enabled by technological innovation that supports better self-treatment and communication between patients and healthcare professionals</td>
<td>International growth phase</td>
</tr>
<tr>
<td>3</td>
<td>Mental care</td>
<td>Renewal of outpatient mental care procedures by enabling self-care and improving the communication between patient and healthcare professions</td>
<td>Pre-sales trial phase</td>
</tr>
<tr>
<td>4</td>
<td>Neuroradiology</td>
<td>Renewal of diagnosis and analysis of radiological images through a system that utilizes machine vision to automate human work</td>
<td>Early sales</td>
</tr>
<tr>
<td>5</td>
<td>Prevention of chronic diseases</td>
<td>Renewal in prevention of chronic diseases enabled by the procedure of prescribing physical activities for patients</td>
<td>Pre-sales trial phase</td>
</tr>
</tbody>
</table>

5.3.1 Perception of institutional constraints

The empirical findings of the study build on the entrepreneurs' perception of the institutional constraints that new ventures face when they aim to introduce service innovation into healthcare markets. For analytical purposes, the constraints are divided into three levels: regulative, normative, and cultural-cognitive levels (Scott, 2008b). The findings show that at the regulative level, entrepreneurs experience institutional arrangements mainly as constraints for innovation activities. However, since new ventures do not have many resources and competences to deal with regulative and legal issues, they mainly aim to comply with regulative institutional arrangements. As an exception, many of the new ventures considered the governmental reimbursement rules related to care procedures as a regulative element that needs to be changed. Although they understood the high degree of uncertainty in this change process, some new ventures even designed their business model in a way that relies on such change taking place.

In many cases, most of the visible change efforts were at the normative level, on which innovations proposed by new ventures were connected to many kinds of changes regarding norms (i.e. how things should be done) and values (i.e. conception of preferred or desirable). For example, entrepreneurs experienced constraints when aiming to replace normative processes and institutionalized solutions used by medical professionals, when transferring tasks from one professional group to another, and when utilizing information technology to perform tasks previously undertaken by medical professionals (e.g. image analysis). Although many of these constraints are quite well known in general, new ventures in the field of digital health often aim to change these long-standing normative rules. Changes were experienced as particularly difficult in cases in which new arrangements weakened the social position of some powerful group of healthcare professionals. Although there are always institutional defenders hindering change, entrepreneurs appeared to believe that the growing business orientation will force through changes, especially if the change can be justified in terms of increased efficiency and effectiveness.

The institutional constraints at the cultural-cognitive level are somewhat challenging to analyse, as entrepreneurs had difficulties in recognizing the cultural-cognitive institutions that enable and
constrain their activities and choices. However, when entrepreneurs are able to make a departure from prevailing cultural-cognitive institutions, they experience constraints clearly. It may be very challenging to make others realize the need for change when dealing with taken-for-granted assumptions and premises that underlie the established institutional logic. For example, the interviewed entrepreneurs had experienced inertia in the transformation of the general institutional logic of healthcare from the cure of medical problems to prevention. The cure of medical problems builds on the history of medicine and is manifested by cultural-cognitive frames in society. In addition, cultural-cognitive constraints are reinforced by the existing norms and regulations related to healthcare delivery and policy.

5.3.2 Expanding the concept of institutional fit

As a result of the abductive knowledge creation process, the study proposes two theoretical implications. Firstly, it suggests redefining and strengthening the concept of institutional fit (Kondra and Hinings, 1998), which has been almost forgotten since its introduction in organizational research. The study suggests extending the concept of institutional fit from the organization's compliance with the organizational form prescribed by institutional norms (Kondra and Hinings, 1998) to a more holistic concept also covering regulative and cultural-cognitive institutions. The study proposes that institutional fit can be used in (service) innovation studies as a cognitive framework and tool to analyze the fit between the organization and the complex institutional environment, which influences and is influenced by the organization's innovation activities. Secondly, the study claims that the concept can be helpful in examining and explaining why certain institutional arrangements are experienced as constraints by some service innovators and as opportunities by others. The empirical findings show that institutional entrepreneurs employ different strategies in their efforts to change institutions depending on the institutional context and the type of institutional fit they experience, and thereby on the constraints and opportunities they perceive.

5.3.3 Is institutional complexity a constraint or an opportunity for entrepreneurs?

Our findings also contribute to the theoretical discussion of institutional complexity (Currie & Spyridonidis, 2016; Greenwood, Raynard, Kodeih, Micelotta, & Lounsbury, 2011), since the case companies are located in the intersection of organizational fields and therefore confront, at least partly, incompatible prescriptions from multiple fields. Firstly, many of the interviewed entrepreneurs had a strong information technology background that shaped their beliefs, values, assumptions and practices. Secondly, the interviews showed that they were driven by the entrepreneurial institutional logic, which guides behaviour and decisions in the 'start-up scene'. Thirdly, due to targeting the healthcare markets, they also had to take into account the institutional logic (or several conflicting logics) in the healthcare system, which guides the development and provides meaning to the social reality within the field of healthcare.

Building upon the rapidly growing research using the institutional logics perspective, the study contributes to the strategic view on how organizations experience and respond to complexity. In particular, the study brings to the fore the perspective of start-up entrepreneurs coming from outside the field. These entrepreneurs see conflicting institutional logics more as an opportunity than as a challenge, and they aim to introduce new kinds of technology and business logics to healthcare by fusing key elements of different logics together or by creating a new institutional logic for the field. Due to their unique position and willingness to balance between different logics, new ventures have a good position to radically change institutional arrangements in healthcare.

Overall, the results of the study contribute to building a bridge between institutional theory, strategic management and service innovation research. Incorporating institutional thinking more strongly to the study of service innovation is furthered by emphasizing the relationship between institutional environment and innovation/innovator. Furthermore, the study increases understanding of the influence of institutional complexity on the service innovation processes of new ventures and sheds light on entrepreneurs' strategic responses to this complexity. However, based on the empirical observations, the study calls for deeper research into the cognitive processes and strategic actions of entrepreneurs who aim to create innovations that diverge from the prevailing institutional template and who participate in the institutional change process from this standpoint.
5.4 Institutional entrepreneurship and service innovations

This section answers the research question 'How can new entrepreneurial ventures contribute to the institutionalization of innovation?'. The analysis is based on the study reported in Article IV. The section elaborates first the motivation and research design of the study, then summarizes the main findings, and finally discusses the contribution of the study.

The study reported in Article IV extends the empirical research within the context of entrepreneurial ventures working under a business accelerator programme. It builds on the previous empirical findings reported in Articles II and III, which identified the institutional context to be a major constraint for the success of innovations diverging from the prevailing institutional template. The hypothesis was, however, that some ventures succeed in their innovation efforts at least partly due to their own efforts to change institutional arrangements. Therefore, the objective was to understand the process of how new ventures aim to change institutional arrangements protecting the traditional field in order to enable the diffusion of the proposed innovations.

A case study approach was utilized as the research strategy, and the study was interpretative in nature. The research design was based on a multiple-case study, initially investigating 25 new ventures participating in the start-up accelerator programme. The analysis therefore builds on the narrative interviews also utilized in the study reported in Article III. However, this time the focus was not on the perceived constraints but on the actions of new ventures that aimed at changing the institutions preventing the adoption of innovations. After the initial analysis, the ventures were categorized based on the market type, and three segments in which institutional change efforts were prominent were taken into closer investigation. Three ventures representing the first segment – 'employer-paid preventive care solutions' – aimed at changing the focus of occupational healthcare from the treatment of health problems to prevention. This required change in the behaviour of employees and also in the procurement and budgeting of employer-paid health services. Two companies representing the second segment – 'medical solutions for self-treatment' – created solutions that enabled better self-treatment in the fields of audiology and mental care. Finally, two ventures representing the third segment – 'medical solutions for professional use' – were focused on developing solutions that renew practices of healthcare professionals in the fields of ophthalmology and neuroradiology. The analysis focused on these seven ventures which were recognized to be actively working to change prevailing institutions. In order to take this analysis to a deeper level, additional data were collected by reviewing publicly available data (e.g. press releases, blog posts, and social media data) on the start-up companies. The aim of analysing document data was to understand better the different forms of institutional work to which entrepreneurs contributed.

5.4.1 Deepening understanding of the nature of institutional entrepreneurship in service innovation

The study zooms in to the service innovation processes of new ventures that require change in institutional structures of the healthcare system. The findings indicate that the change is enacted through three highly iterative, non-linear, and contingent sub-processes, which are institutional sensemaking, theorization and modification of institutions. Figure 4 outlines the theoretical framework developed in study 4, which depicts the process of institutional entrepreneurship.

Institutional sensemaking captures the interpretative-cognitive processes through which actors perceive and interpret the institutional context and envision potential changes in it. The institutional environment is never objectively given for the entrepreneurs, but they interpret the environment and their social position based on subjective perceptions of the field's practice. Therefore, the envisioning of prospective future scenarios and pathways to innovation is also likely to differ between entrepreneurs even if for an outsider their social position in and experience of the field would appear to be very similar.

Theorization is a concept that is already included in some of the previous process models of institutional entrepreneurship. It describes linguistic devices by which actors manipulate the degree of uncertainty implied by an innovation and contest a proposed innovation against broad templates or scenarios of change (Suddaby and Greenwood, 2005). Two main mechanisms for

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6 Three of these ventures were the same as discussed in the third study and four were not previously investigated in detail.
theorizing the change were found in the study: 1) framing the problem especially by highlighting the failure of the prevailing institutional logic in the field, and 2) justifying the value of the innovation and proposed changes to the actors concerned.

![Diagram: The process of institutional entrepreneurship](image)

**Figure 4. The process of institutional entrepreneurship (Wallin & Fuglsang, 2017).**

The concrete actions regarding the *modification of institutions* have been a core focus of the previous process models of institutional entrepreneurship. The study shows that strategies used by institutional entrepreneurs in this vein are manifold, and depend to a large extent on the institutional environments and the entrepreneurs’ reflexive capability to identify and develop their own social positions within them. Building on Dorado (2005) and Lawrence et al. (2002), the study identified two mechanisms which new ventures utilize to modify institutions. Firstly, they aim to build formal inter-organizational arrangements with powerful players in the field, often hoping to ‘jump start’ the diffusion of innovation. Secondly, new ventures try to bargain support from and acceptance by opponents and potential promoters of an innovation from the actors that possess a higher-status social position. In addition, the study identifies legitimacy building as a crucial innovation activity, as new ventures coming from the periphery of the field are acutely aware of the importance of legitimacy. Through legitimacy building, the new ventures seek not only to improve their venture’s social position, but also to improve the legitimacy of the proposed innovation and of other actors with a common purpose.

### 5.4.2 Incorporating institutional entrepreneurship into the research and management of service innovation

The study contributes to two somewhat separate theoretical discussions and aims to bridge between them. Firstly, it contributes to the development of the institutional entrepreneurship theory (Dorado, 2005; Leca, Battilana and Boxenbaum, 2006; Hardy and Maguire, 2008), which has previously been advanced mainly by organizational and management researchers. The study claims that more attention should be paid to interpretative-cognitive processes of institutional entrepreneurs, which have largely been neglected in previous theories of institutional entrepreneurship. Incorporating this somewhat hidden part of the process helps to provide more comprehensive understanding of the complex process through which institutional change is enacted. Secondly, the study contributes to service research by extending the emerging institutional perspective on service innovation (e.g. Vargo & Lusch, 2016). Although institutional change is fundamental for service innovations, the service research has only recently started to build upon the institutional perspective, and most of the studies have been on a rather abstract level. This study zooms in to micro-level processes of the institutional change driven by new ventures, and thereby explains how institutional change is closely connected to micro-level innovation actions.

The study provides managerial insights into how new ventures struggle, navigate and negotiate on specific alternatives related to institutional change while attempting to introduce innovations to
the market. The study claims that those entrepreneurs who do not fully understand the complex institutional arrangements that need to be changed are more likely to start the development of radical innovations that diverge from the prevailing institutional template. However, in order to enact the institutional change required by service innovation, entrepreneurs must develop good understanding of their institutional environment and their position in it through the process of institutional sensemaking. The study highlights that the legitimacy of the new venture and proposed service innovation is highly important for the success of innovation. Although new ventures and innovations often lack legitimacy, entrepreneurs can increase their chances for success through successful theorization of the change and legitimacy building activities. Finally, it is known that central actors within the field have little incentive to radically change the field activities, especially if policy makers reinforce the institutional arrangements protecting the field. Therefore, the study calls for actions from policy makers to shift the focus from improving the existing healthcare system to fostering radical innovations by providing more support to entrepreneurial activities that bridge across different fields. Actors coming from outside the field or at the periphery of the field are potential sources for radical innovations that together may transform the field to make it more sustainable. However, without the policy support this task is extremely challenging.

5.5 Summary of individual studies

Previous sections have presented the main findings and contributions of individual studies. Each of these studies answers mainly one of the research questions, which reflects the specific phase of the abductive knowledge creation process. However, there are linkages between the studies, and each study contributes to cumulative knowledge creation, thereby building a clearer picture of the overall phenomena under investigation - the digital transformation of healthcare. Hence, the research process has focused on investigation of different components of the phenomenon, slowly revealing the relationships between them and their significance. Table 2 presents the context and aims of the studies, and sums up the main contribution of the study to the overall phenomena, key empirical insights and theoretical contributions of each study for the thesis.

The following chapter 6 builds on the accumulated empirical and theoretical insights and presents how these studies form a coherent whole. The overall picture provides an empirically grounded explanation of the relationship between digitalization, innovation, and institutionalization, which are identified as the three core elements of digital transformation. The chapter also presents the latest outcome of theoretical reflection carried out throughout the work, which is based on the continuous process of building theoretical interpretations from empirical findings and searching for new theoretical knowledge to find better explanations. Therefore, the presented theoretical contribution is best described as combinatorial evolution, which builds on theoretical approaches utilized in separate studies, i.e. service productivity (Grönroos and Ojasalo, 2004, 2015), New Service Development (e.g. Edvardsson & Olsson, 1996), service-dominant logic (Vargo and Lusch, 2004a, 2008; Vargo, Wieland and Akaka, 2015), institutional theory (Scott, 2014), and institutional entrepreneurship (Battilana et al., 2009). In addition to the theories utilized in the separate studies, new theoretical approaches have been adopted to develop the overall theoretical framework presented in the summary part of the thesis. These theoretical approaches include multi-level perspective (MLP) (Geels, 2004a; Geels and Schot, 2007) and a structurational model of technology (Orlikowsky, 1992). MLP frames the theoretical discussion concerning the process of innovation development and institutionalization when the innovation is developed in protected innovation environments (see Section 6.2.1.). The structurational model of technology is adopted to explain the role of technology in general, and digitalization in particular, in service innovation (see Section 6.2.3).
Table 3. Contexts, aims, main contribution to the studied phenomenon, empirical insights and theoretical contributions of the studies.

<table>
<thead>
<tr>
<th>Context</th>
<th>Aim of the study</th>
<th>Main contribution to the studied phenomenon, empirical insights and theoretical contributions</th>
</tr>
</thead>
</table>
| Creation of service innovations in the context of home care | To explore how the digital enhancement of home care service impacts on service productivity (RQ I) | Creating new knowledge on how new digital technologies open up opportunities to innovate home care services, and how digitalization of home care requires particularly innovation in service processes and practices.  
Empirical insights:  
• New digitally-enabled services have the potential to improve service productivity in a home care context, but the integration of the new service to the users’ lives is challenging if the contextual value experienced by them is low.  
• In addition to designing digitally-enabled service innovation from the perspective of technology adoption (e.g. perceived usefulness and ease-of-use), it is important to design service in such a way that new processes and practices are easily integrated into daily lives and provide value for the customer.  
Theoretical contribution:  
• The study provides theoretical insights into service productivity, and how the perceived value of new service should be investigated systemically from the different viewpoints of actors who impact on the service provisioning. Theoretical insights are further elaborated in the summary part of the thesis in section 6.1.1. |
| Innovation project under the European innovation programme | To provide comprehensive understanding of the challenges of collaborative service development conducted within a European innovation project. (RQ II) | Creating new knowledge on how the context of development shapes innovation activities and how innovation activities induce organizational learning and institutional change.  
Empirical insights:  
• The development context, i.e. European innovation programme, has a strong influence on identified service development challenges, and thereby it is also likely to impact on the success of innovation.  
• However, innovation should not be seen just as a commercialized solution, but also as a learning process through which new practices and processes are institutionalized and become accepted practice.  
Theoretical insights:  
• The study suggests augmenting new service development theory with a value co-creation perspective from service dominant logic and a systems perspective. The development of complex service innovations requires the capability to see the big picture of how value is co-created by various stakeholders and how they influence the adoption. However, development also requires deep understanding of individual value expectations and value creation. |
| Digitally-enabled service innovations aiming to transform healthcare | To understand how institutional arrangements constrain service innovations (RQ III) | Creating new knowledge on how institutional context is perceived by entrepreneurial innovators, and how it enables and constrains innovation activities aimed at enacting transformation of healthcare.  
Empirical insights:  
• Institutional complexity can be both an enabler and a constraint for service innovation. Entrepreneurs who are loosely connected to the practice in the field, and who do not fully realize conflicting institutional arrangements, are more likely to aim for innovation requiring major institutional change.  
• New ventures have very limited resources and therefore they should choose carefully which institutional change efforts they support with their scarce resources. |
<table>
<thead>
<tr>
<th>Theoretical contribution:</th>
<th>Creating new knowledge that elaborates the role and actions of new entrepreneurial ventures in the creation of service innovation that contributes to the transformation of healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Further theoretical development of the concept of institutional fit. The elaborated concept broadens the view to regulative and cultural-cognitive perspectives and explains why certain institutional structures are experienced as constraints by some service innovators and as opportunities by others.</td>
<td></td>
</tr>
</tbody>
</table>

Empirical insights:
- Institutionalization is a highly iterative process in which new ventures may have a small but sometimes crucial role.
- Legitimacy of the innovation and new venture is a key concern for entrepreneurs aiming to transform long-standing institutional structures in healthcare. The mobilization of supporters requires the ability to create persuasive stories which justify the needed change.

Theoretical contribution:
- Theoretical framework explaining how new entrepreneurial ventures can enact institutional change through the process of institutional entrepreneurship
- The development of the concept of institutional sensemaking, which explains the cognitive-interpretative processes of institutional entrepreneurs
- The framework connects micro-level processes of institutional change to service innovation, thereby contributing to the synthesis perspective on service innovation.

Insights into the role of institutions in service innovation is further elaborated in section 6.1.2 and the role of institutions in theoretical framework of the study is explained in 6.2.2.
6 Discussion and contributions

The aim of the thesis was to develop deeper understanding of the mechanisms that advance, hinder, enable and constrain service innovation in the field of healthcare in the digital era. This chapter compiles the response to the aim by synthesising the results and presenting the theoretical contribution of the thesis. The following synthesis does not only focus on results presented in the individual articles, but is based on the larger ‘pool of data’ collected and insights gained throughout the doctoral project, which is characteristic for constructivist inquiry (Stake, 1995; Schwandt, 1998). The chapter summarizes and develops further the theoretical contributions of the thesis, focusing particularly on the role of technology and institutions in service innovation, and how these contribute to the synthesis view of innovation. The final sections are devoted to a discussion about the managerial and policy implications, the limitations of the study and on outlining avenues for future research.

6.1 Synthesis of the findings

The present thesis studies the phenomena of digital transformation, which is often seen from either technological or business perspectives and which was also the starting point of the work leading to the thesis. However, during the journey, it became clear that the social and institutional perspectives are closely linked to technological advancements and innovations, and therefore it is crucial to understand these perspectives, too. Thus, the thesis views digital transformation through three interconnected phenomena – digitalization, innovation and institutional change.

Although these constructs are partly overlapping and not clearly separable analytical categories, they provide clarity to the complexity of the studied phenomenon. Figure 5 aims to clarify the concept of digital transformation by depicting six influential relationships between digitalization, innovation and institutional change. As the concept of digital transformation indicates, the question is of the introduction of new digital technologies or of the digitalization of previously non-digital processes. Hence, digital transformation is inherently a technological phenomenon. However, the transformation does not occur without integration of digital technologies into the everyday routines, practices and processes of people and organizations, which is above all a social phenomenon. These two perspectives can be integrated under the common notion of digitalization, which is closely linked to innovation. On the one hand, digitalization is (1) enabled and accelerated by the advancements of technology and innovations (i.e. new forms of creating value). On the other hand, reaching new levels of digitalization enables new behavioural patterns and (2) opens up opportunities for innovations. Institutional change (Micelotta, Lounsbury and Greenwood, 2017) is also intertwined with digitalization. It is realized in the continuously ongoing process of (re)enactment of the complex set of rules that enable and constrain interactions within social groups and is linked to digitalization in twofold ways: (3) digitalization fosters institutional change, and (4) institutional change reshapes the conditions for further digitalization. Finally, this thesis supports the development of an institutional view of innovation, which argues that institutionalization has a central role in innovation. Continuous institutional change (5) reshapes the institutional environment that enables and constrains innovation activities, and (6) innovation efforts are resource integration practices (Koskela-Huotari et al., 2016) that either intentionally or unintentionally change the prevailing institutional template. The overview and summary in Figure 5 on the interrelationships between the constructs of digitalization, innovation and institutional change can also be seen as an analytical lens to study the ongoing socio-technical change (Geels, 2004a) related to healthcare.

7 It should be noted that innovation also concerns the reconfiguration of business. This instance of innovation is often referred to as business model innovation – a construct which could also have been used here (Maglio & Spohrer, 2013; Wieland, Hartmann, & Vargo, 2017). However, in order to keep the focus of the thesis coherent, the renewal of business is discussed under the general concept of innovation.
The discussion in the following sections provides deeper understanding on each of these constructs. The aim is to establish an overall picture of how digitalization, innovation and institutionalization intertwine and form a complex phenomenon which will have a major impact on how healthcare is defined, provided, and experienced in the future.

6.1.1 Digitalization as an enabler for service innovations – a challenge or an opportunity?

Whether we realize it or not, digital technology has become a mundane and inseparable part of our life and work, profoundly changing our ways of communication and social behaviour. Digitalization is a socio-technical change process that reveals the nature of service(s) by decoupling information from its related physical form (Normann, 2001; Barrett, Davidson and Vargo, 2015). It also opens up opportunities for new value creation and enables innovations that may radically transform business models and entire industries (Lanzolla and Anderson, 2008; Waelbroeck, 2013). Although healthcare is full of examples of how technological advancements – such as new drugs and medical technologies – have advanced the field, it is also known to be somewhat resistant to major regime changes (Barnett et al., 2011; Chowdhury and Johnson, 2012). Moreover, some of its labour-intensive sub-fields, such as home care, have shown a low adoption rate of high technology. It appears, however, that even these fields cannot escape the wave of digitalization, due to the strong pressure to increase service productivity. The development of service innovations utilizing digital technology is seen as a great opportunity to improve productivity and create value in new ways. Although digitalization opens up opportunities for radical transformations, in practice it often means smaller incremental improvements to ‘digitally enhance’ some part(s) of the service process. However, even small improvements may entail major challenges.

Improving service productivity through digitalization

The results of the case studies of this thesis, focusing on the home care context, indicate that there is increasing pressure to develop innovations that improve productivity. One major challenge, however, is the lack of consensus about what productivity means in the service context (Bessant, Lehmann and Möslin, 2014). The viewpoint of the thesis is aligned with previous studies that have considered the adoption of a manufacturing-based concept of productivity to be problematic because it is too inter-organizationally oriented and primarily focused on efficiency (Carlborg, Kindström and Kowalkowski, 2013). The findings of this study support the earlier research (Maroto-Sánchez, 2012; Grönroos and Ojasalo, 2015) in that internal efficiency is only one side of the coin. The management of service productivity must also embrace the external value perspective.

This thesis contributes to developing the concept of service productivity through the service ecosystems perspective of S-D logic (Vargo and Akaka, 2012). It thereby bridges between streams, which have previously been separated – apart from rare exceptions (Viitamo and Toivonen, 2013; Edvardsson, 2014). The service ecosystem perspective helps to understand the
complexity involved in the management of service productivity and innovation. Firstly, by applying
the ecosystems perspective the focus can be transferred from the service input (in relation to the
customer outcome) to the service outcome itself (the perceived service quality). Whereas the
former view concentrates on the producer-customer dyad, the ecosystems view highlights that
the outcome is defined, not only by the involved customers, but also by other beneficiaries. More-
over, the service outcome (i.e. value) is phenomenologically determined by each beneficiary in a
given social context (Vargo and Lusch, 2008). The findings of the thesis indicate that measuring
this type of productivity is far from simple. In order to be able to understand and measure a change
in service productivity, it should be possible to define how the change in the service process
impacts on the contextual value of various beneficiaries. Furthermore, to understand the determi-
nation of contextual value, it is necessary to understand how value is co-created among multiple
stakeholders and how the institutional arrangements guide this process. Concretized in the con-
text of this study, value for the elders in the home care setting is strongly influenced by relatives
and friends, and hence value-in-context (Chandler and Vargo, 2011) for them becomes a key
parameter of the perceived service quality and should be taken into account in the service design.

The thesis also confirms the theoretical view proposing that productivity improvement is
grounded in smarter and novel ways of integrating the resources of actors involved in the value
co-creation process (Edvardsson, 2014). The findings of the thesis provide evidence that although
technology is often an enabler and a critical component in service provisioning, more important
than the technology itself is the way in which it is integrated with existing resources (e.g. skills
and other technologies) and used by service beneficiaries to achieve their goals. A particular
technology can become a key resource in the value co-creation process or it can become a re-
sistance factor for the adoption of a new service. The findings indicate that the impact depends
on the service beneficiary’s competence in using the technology and on a variety of contextual
factors such as time, place and cultural-cognitive setting. For example, video-broadcasting tech-
nology received significantly differing reception from the different front-line employees who were
supposed to utilize it in the second case study. Some employees were eager to innovate new
practices utilizing the technology, but some were reluctant to integrate technology in their work.

Increasing productivity by the digital enhancement of existing service processes

The results of this thesis show that although value is defined by the service beneficiaries, mana-
gerial practice is the other side of the coin; it should not be forgotten when aiming to improve
productivity, i.e. the service providers’ efficiency. Due to the pressure to achieve more (or at least
the same) output with less input, digitalization often means the renewal of service processes
through changing, replacing, or making redundant some parts of these processes. Firstly, repeti-
tive labour-intensive tasks are increasingly replaced with technology. The studies carried out for
this thesis revealed that these tasks can be very simple, such as recording home care service
transactions on a phone instead of on paper. However, they can also be extremely complex, such
as analysing medical images, in which the continuously increasing accuracy of computer vision
easily out-performs the human eye. Although replacing labour-intensive tasks may require signif-
icanet up-front investments in design and development, once the solution is ready the reduced
need for manual input may outweigh the development efforts through increased internal and ca-
pacity efficiency, and scalability.

Secondly, digital data has a great potential to remove unproductive parts of the service process
and improve overall efficiency of the healthcare system. However, the empirical studies of this
thesis showed that the health-related data is often in siloes in personal and professional niches,
and that there are problems in utilizing the relevant data across niches. The data collected by the
customers about their personal wellbeing is rarely utilized by professionals. In addition, different
professionals may collect the same data several times, and the data may be stored in scattered
information systems and may not be accessible when needed. Some of the case companies’
business ideas were built on productivity improvements enabled by enhanced storage and timely
access to relevant data. This kind of information can enable the improvement of care workflows,
which especially in the public sector are often sub-optimized from the perspective of specific tasks
or treatments. This leads to non-optimal internal and capacity efficiency from the broader systems
perspective, and is reflected in excessive waiting times or in bouncing customers several times
between different professionals.
Thirdly, digitalization enables the empowerment of the end users to become more tightly engaged in self-monitoring and self-care. Customers are already using digital channels and applications to do simple tasks, such as booking healthcare appointments, and our studies show that they are increasingly utilizing self-treatment services such as mental health applications. From the perspective of overall service productivity, this means shifting the input needed (especially time) for service provisioning from the traditional ‘service provider’ to ‘consumers’. Even though the resulting self-service would imply a major increase in the service providers’ efficiency, our studies indicate that it may also have a major impact on the perceived service quality, and therefore understanding the changes in value-in-context is crucial.

Digitalization as an enabler of transformative innovations in healthcare

In addition to improving existing service processes, digitalization is expected to set forth major transformations in the field of healthcare. The case analyses carried out for this thesis illustrate that the impact of transformative service innovation may at least initially be limited to a specific niche. The innovations may, for example, imply a change in work allocation between specific professional groups, which can induce fears of radical reduction for the need of specific professionals in the future, or even in the long term make certain professions obsolete. In the case studies, the aim to shift job allocation was most clearly shown in cases which were closest to clinical practice, where new innovations implied potential transfer of tasks from the most highly educated medical doctors to professionals with lower education. Transformative service innovations may also have a broader impact on the health and social care system overall. For example, individualized data that entails not only medical records, but also other personal, human biological, and social data, can radically change the way in which the wellness of people is maintained and by whom. Furthermore, digitalization entails many other technological developments, such as artificial intelligence, that are very likely to enable major transformations but the future applications of which are often beyond the imagination of actors – especially of those in the centre of the field. However, the thesis shows that some of the entrepreneurs, especially those within the accelerator programme, were capable of envisioning the future of healthcare, which requires a radical change in the field structure and redistribution of the power within the field to new entrants.

The empirical studies of this thesis show that the forces resisting change are strong, particularly when the change threatens some powerful social group within the existing system. This may, however, be difficult to notice. Our studies indicate, for example, that the resistance of medical professionals may mainly manifest itself as a lack of action to adopt new practice. This type of resistance may be masked by busy schedules, while the true motivation is discussed only within the professional communities that are inaccessible to external investigators. Many actors with a privileged position prefer the status quo, even though it is increasingly acknowledged that many of today’s jobs will be radically changed or not needed in the future. Some of them are also ready to fight fiercely to preserve the status quo, especially if the need for change is not justified to them in their own terms. Innovation and service research have recently highlighted the role of institutions as a guiding mechanism behind this complex socio-technical change process (Jørgensen, 2012; Vargo and Lusch, 2016). It is time for all service researchers and practitioners to open their eyes to the socially constructed reality that impacts on the adoption of innovation through institutions.

6.1.2 Institutions, institutionalization and innovation

An important part of this thesis has been the examination of innovation activities in which actors coming from outside or from the periphery of the healthcare sector (often having an information technology background) aim to introduce innovation to this sector. These actors have limited understanding of the institutional structures of the field, especially with regard to the normative and cultural-cognitive rules which are manifested in social interactions in the field.

Revealing the complexity of innovation through the institutional lens

The findings of our case studies support previous research results implicating institutional complexity as a source of innovation and institutional change (Currie & Spyridonidis, 2016; Greenwood et al., 2011; Siltaloppi et al., 2016). However, the findings also reveal the lack of fit
between innovation and the institutional environment, which is often realized by service innova-
tors only after they have developed the initial solution. When the developers have their solution
ready for piloting or a soft launch they begin to understand the institutional complexity. For exam-
ple, they may realize that the taken-for-granted beliefs go against the designed value proposi-
tions. Actors to whom the service is targeted do not behave as they were expected to do; a ‘hidden
agenda’ of some social group makes them antagonistic to innovation diffusion, and the network
of actors indirectly involved in the service process is more complex than originally thought. These
findings support the contemporary innovation and service research (Geels, 2004a; Vargo,
Wieland and Akaka, 2015) and point out the role of institutions both as an enabler and a constraint
for innovation. They call for extending the focus from the development and adoption of innovation
to a broader understanding of the institutionalization of innovation.

Institutional theory (see reviews Scott, 1987, 2008a) provides a lens to understand and analyse
how various and often conflicting institutional arrangements impact on the adoption and diffusion
of the proposed solutions. Our findings indicate that although the institutional theory provides a
valuable theoretical lens for understanding the formal rules of society (e.g. laws and regulations)
and their impact on the diffusion of innovations, its main benefit lies in revealing the informal,
socially constructed rules. These rules, such as institutionalized practices and norms, and espe-
cially the taken-for-granted beliefs and cognitive schemas, were noticed to be difficult to perceive,
particularly by the actors coming from outside the field. Nevertheless, normative and cultural-
cognitive institutions play a major role in the innovation process. It is therefore crucial for success
that the innovator develops understanding of the institutional constraints to avoid the worst pitfalls,
and notices opportunities that open up on the basis of the continuously ongoing institutional
change. Moreover, the institutional environment is not given for the innovators, but they are em-
bedded in this environment and can influence it by making, breaking and maintaining institutional
arrangements. Thereby, institutional work should be seen as a parallel process along with the
development of innovations (the more traditional process view).

Development environment as an enabler and constraint for change - different paths to in-
novations

Although all four studies of this thesis focus on innovation in the field of healthcare, they describe
the development and challenges of service innovation in two different institutional environments:
in European collaborative innovation programmes based on public-private partnerships and in
business accelerator programmes targeted at new ventures. Both of these environments, but es-
pecially the collaborative innovation programmes, can be understood as ‘incubation rooms’, which
in the early stage protects radical innovations from market selection in the regime (Geels, 2002).
The rationale for establishing these incubation rooms is that they provide a safe environment for
experimentation: they protect innovations against the institutional forces preventing their adoption
and diffusion. However, the studies also provide deviating findings which indicate that the devel-
opment within a restricted and protected incubation environment may have negative conse-
quences on innovation activities. Two effects are identified – institutional constraints and blind-
ness – as major challenges for the commercial success of proposed innovations. In the following,
they are opened up in more detail in the two environments in which the case studies were carried
out.

The complex institutional setting related to healthcare imposes as such certain constraints on
innovation activities. Within the setting of collaborative innovation programmes, an additional con-
straint emerges from the fact that the programmes can be seen as a set of institutions that pro-
vides strong guidance on what is developed and how it should be done. From the regulative
institutional perspective, collaborative innovation programmes have specific formal rules, which
guide the development process and constrain the available options. Our studies illustrate, for
example, that organizations must meet certain eligibility criteria (e.g. legal and financial) in order
to be accepted into the programme. They must also collaborate with certain types of organizations
from different countries, the target of development needs to fit into the programmes (with often a
rather limited scope), and the expected timeframe for commercialization must meet the pro-
grames’ objectives. Additionally, several informal normative and cultural-cognitive rules guide
innovation activities towards similar goals and mould operations into the same format that has
prevailed in European innovation projects for years. Thus, the studies indicate a paradox in col-
laborative innovation projects: even though the public funding is justified by high risks and uncertainty, the institutional constraints that either purposefully or unconsciously direct actions under the programme discourage highly risky and atypical innovation projects and lead to a notable similarity between projects. In other words, collaborative innovation programmes provide excellent conditions for iterative, rapid testing of risky service concepts, but the institutional setting attached to the programmes is not very supportive for this. The norms and cognitive frames of collaborative innovation programmes are historically grounded on linear development that builds on detailed planning and favours efficient execution of a pre-defined project plan, leaving less room for iterative development and pivoting the direction of the project. As a result, the irony of the collaborative innovation projects is that they may succeed perfectly in following the project plan, but end up with a result that has no commercial potential and therefore lacks chance of being adopted and diffused to the market after the project ends.

Our results indicate that whereas the institutional setting of collaborative innovation programmes can be a major constraint for commercial success, the institutional setting of accelerator programmes can be seen as a facilitator for success. Compared to collaborative innovation programmes, an accelerator programme has significantly less coercive rules, the pace of development is faster, and there is less bureaucracy regarding the application process. As a result, the ventures selected into an accelerator are more entrepreneurially oriented and are driven by the perceived opportunity and the desire to exploit it as rapidly as possible. Moreover, our studies revealed that when these ventures face market and institutional forces which prevent the institutionalization of the solution, they do not follow the project plan. Instead, they persistently work their way around these institutional constraints, or if institutional change efforts fail, they pivot their strategy to a more promising one. There are only a few formal rules, and normative (e.g. the norms of start-up structure and development process) and cultural-cognitive institutions established in the start-up funding scene strongly guide how new ventures should operate and what to pursue. However, these informal rules foster the risk-taking behaviour that targets to high payoff. The start-up scene encourages pursuing ideas that are bold and visionary, which is reflected in actions of the programme. Consequently, even though formal rules do not coerce start-ups to ambitious aims, the norms related to private funding and the idea of a ‘perfect start-up’ are seen as factors supporting the success.

The second effect – institutional blindness – is related to the fact that the impact of institutional forces is not easily seen from the periphery of the field. This impact is strengthened when the development is conducted in incubation environments that provide protection from the market and institutional forces. The longer the development is carried out in this kind of environment, the longer the blindness is likely to last. The comparison made between the studies of this thesis shows that collaborative innovation programmes and accelerator programmes have notable differences in how rapidly organizations are forced to encounter institutional forces at the markets. In a collaborative innovation project, it usually takes 4 - 5 years from the writing of the project proposal to the finish of the project. During that time, the development is usually carried out between a few project partners, among which there are some end-user organizations providing a real-life pilot environment. Although the end-user organizations are capable of giving feedback on the issues impacting on adoption and diffusion, marketing- and sales-related activities are often forbidden by the funding rules during the project. Thereby, the project may develop solutions for several years without having full understanding of the complex institutional arrangements impacting on the broader diffusion of the innovation. By contrast, accelerator programmes strongly encourage ventures to interact with various external stakeholders in the target market (e.g. via relationship building, test sales and marketing); this is done right from the beginning of the time they spend in the programme. As a result, ventures in these programmes are quickly exposed to external market forces and relationships. In this way, they start making sense of the institutional environment into which their innovation should fit. Being confronted with prevailing institutional arrangements and attempting to change them provides vital feedback for a venture, which soon starts to shape its innovation efforts.
6.2 Theoretical implications

This section presents the main theoretical contribution of this thesis to the service and innovation literature. The major aim is to improve understanding of how and why some niche level innovation activities are rejected by the healthcare regime, whereas others are accepted and lead to changes at the regime level. In addition, the theorization of the thesis aims to explain the role of digital technology in innovation and change, and the way in which numerous inventions may cumulate and create systemic transformation of a highly institutionalized field. The long process of theorizing resembles a combinatorial evolution, during which valuable pieces of knowledge have been combined with the aim of developing theoretical explanations that create better understanding of the studied real-life phenomena. The thesis summarizes these contributions into the form of a theoretical framework (Figure 6), which builds on several theoretical views from different disciplines. The following paragraphs introduce briefly the main insights of the framework and show their linkages to different theories. The sub-sections thereafter include a more detailed discussion of the key contributions.

The framework established in the present study to delineate the influences of technology and institutions on healthcare service innovation builds on the multi-level perspective (MLP) of socio-technical transitions (Geels, 2002, 2004a). The MLP separates three analytical levels: niche, regime and landscape. The thesis investigates mainly the creation of innovations at the niche level, more specifically in the niche environments of innovation and acceleration programmes. The niche level innovations are developed by a small group of actors who work together either in formal projects (EU innovation programmes) or through more informal collaboration (the accelerator programme). The goal is to develop innovations that break out from the niche to the regime level of healthcare and become accepted in the field. However, innovation efforts on the regime level are strongly guided and constrained by a semi-coherent set of institutionalized rules, which hinder the adoption and diffusion of innovations diverging from the prevailing institutionalized template. Therefore, the previous literature suggests that niche environments, in which the institutional structures are more loosely coupled, are more potential sources for radical innovations (Geels, 2004a; Schot and Geels, 2008). The justification is that a niche environment enables piloting and experimentation of new practices while being protected from market selection. However, the findings of this thesis indicate that the degree of protection varies, and that more protection is not necessarily better. Theorizing in the present study builds on empirical findings that provide evidence on the interaction between the niche and the regime levels and suggest two main mechanisms of how niche innovations change the regime level: regime adaptation (i.e. innovation implying gradual institutional change is accepted by the regime) and regime transformation (i.e. numerous innovations cumulate and cause a major shift in the regime level institutional arrangements) (c.f. Kijima, Toivonen and Ruutu, 2016). Sub-section 6.2.1 discusses in more detail the interaction between the niche and regime levels. The model also acknowledges the importance of the landscape level in increasing pressure for the change and in opening up a window of opportunity. The discussion of this topic is, however, outside the scope of this thesis.

The thesis improves understanding of the role of development and institutionalization in innovation. Although development may be seen as a process that results in the invention and institutionalization required for the emergence of innovation, these should be seen as two intertwined and highly iterative processes through which innovations emerge (only separated in Figure 6 for the sake of clarity). Building on the combinatorial and structurational views of technology (Orlikowsky, 1992; Arthur, 2009) and the service systems concept from service science (Maglio et al., 2009), the framework of this thesis (Figure 6) provides insights into how innovations emerge as a process combinatorial evolution. The development conducted in the niche environment can be seen as experimenting with new service system reconfigurations, including the design of new value propositions connecting the service systems internally and externally. Thereby, the innovation as a combinatorial evolution is driven by access to different resources in different fields and tensions of institutional complexity between fields (Greenwood et al., 2011). The sub-section 6.2.3 provides a more detailed analysis of the role of technology in service innovation and further develops service innovation terminology (particularly the concepts of invention and service system).
Figure 6. A summary framework of the theoretical contributions of the thesis.
The thesis pays specific attention to cases in which innovation diverges notably from the existing institutional template and requires notable institutional change. Although the ‘use phase’, user acceptance, and user integration have been recognized to be important parts of service innovation (e.g. Alam and Perry, 2002; Menor, Tatikonda and Sampson, 2002; Kindström and Kowalkowski, 2009), the phenomenon of institutionalization has mainly been neglected in the service innovation literature. The analysis of innovation processes still often implies a dyadic and producer-oriented view and downplays a systemic and socially constructed view. This is reflected in the terminology used to describe the final part of the innovation process: the sales, marketing, delivery or launch of a service. Recently, the institutional perspective on service innovation (Akaka, Vargo and Lusch, 2013; Vargo, Wieland and Akaka, 2015; Koskela-Huotari et al., 2016; Wieland, Vargo and Akaka, 2016) has adopted institutional theory to explain the process of institutionalization - development, change and maintenance of institutions - that is crucial for the success of service innovation. This thesis also builds on the institutional theory to create better understanding about the way in which niche-level actors are enabled and constrained by the institutional environment. Moreover, theories of institutional entrepreneurship and institutional work are adopted to explain how actors contribute to institutionalization, which is discussed in detail in sub-section 6.2.2.

Finally, the thesis contributes to tackling one of the main theoretical challenges in service innovation studies: the debated dichotomy between technological and service-oriented perspectives. After more traditional service innovation studies, S-D logic has recently been suggested to provide a basis for a genuine synthesis view, as it transcends the division between goods and services (Ordanini and Parasuraman, 2010). The service eco-systems perspective, which highlights the unifying role of institutions, is also seen as an advocate for the synthesis view (Koskela-Huotari et al., 2016). Recently, S-D logic and its service ecosystems perspective on innovation have adopted and extended the structurational model of technology (Orlikowsky, 1992) that also provides bases for the synthesis view via better means to understand the scope and role of technology in innovation (see section 2.2.4) (Akaka and Vargo, 2014; Vargo, Wieland and Akaka, 2015). However, this thesis argues that the S-D logic’s broad view of technology is problematic if the aim is to advance the synthesis view of service innovation. The broad view of technology integrates too many concepts into a single construct (technology) and therefore makes its application challenging both in practice and in theoretical analysis. Therefore, the scope and notion of technology should be further developed. This contribution bridges between S-D logic and more traditional service and innovation studies, and contributes to the synthesis view of service innovation (Gallouj and Savona, 2009; Miles, 2016).

6.2.1 Analyzing the relationship between the niche level development and major transformations

An important theoretical implication of this thesis is that it links service innovation to the multi-level perspective (MLP) on the socio-technical transition (Geels, 2002, 2004a; Geels and Schot, 2007). Earlier, MLP has mainly been applied in the analysis of technological innovations that are developed in technological niches and have led to a major societal transformation (an example is the turbo jet engine in aviation – Geels, 2006). This thesis provides a detailed account of niche-level actors’ efforts to innovate and institutionalize new solutions in the healthcare sector and provides insights into how the institutionalization of these new solutions may gradually contribute to a more major transformation of the regime.

The previous MLP literature identifies niches as an important locus of radical innovations (Geels, 2004a), acknowledging both market and technological niches (Geels, 2002) but focusing mainly on the technological ones. The proposed innovations reported in this thesis were developed in two different types of niche-environments: the collaborative innovation projects within the framework of joint-funded innovation programmes resemble more technological niches, whereas innovations developed within an accelerator programme resemble market niches. The thesis challenges the view that the highly protected and restricted technological niches would be needed when aiming at radical innovations; this view has also been questioned by some previous studies investigating collaborative EU projects as niche environments. These studies suggest that a minimal involvement of outsiders, the technology push approach, and the focus on first-order learning are reasons for the failure of niche development projects (Schot and Geels, 2008). In a similar vein, the findings of the thesis suggest that a highly iterative development within less protected
niches would be a better environment, especially for solutions that are relatively close to the market. However, highly protected technological niches might still be more valid for developing radical technologies that are very far from commercial exploitation. When the development activities that are relatively close to market introduction are conducted within ‘semi-protected’ niches, developers are forced to learn faster the institutional arrangements hindering the innovation at the regime level. They also conduct institutional work jointly with the visionary market stakeholders to initiate institutional change, first within the selected market niche and then within the activity of scaling it up into a broader market. Thus, the thesis provides new insights on how innovations are developed in different niche environments, and how these environments may enable and constrain the development.

The findings also contribute to the construction of a deeper understanding about the interaction between the niche and regime levels, whereas the previous literature has focused mainly on major regime transitions (Geels, 2004a, 2005; Geels and Kemp, 2007). The findings highlight that even though the internal visions of innovators might be very radical, their development projects may mainly contribute to the path-dependent evolution of the regime. On the one hand, niche level innovation processes are shaped by niche actors’ reflexive interpretations about the opportunities and constraints of the institutional context at the regime level, which is continuously evolving on the path-dependent trajectory. On the other hand, the niche-level development efforts are highly social activities. The interaction does not usually focus only on actors outside or peripheral to the regime, but also includes regime actors. Hence, the niche development is likely to have an impact on the regime-level institutionalization, especially if numerous niche-development activities are aligned and therefore reinforce each other. Major changes at the regime level are always a result of long-term institutional change efforts, in which numerous different actors at both the niche and regime levels contribute to the institutionalization process under pressure from the landscape level. At some sudden moment, the change may have proceeded into a situation in which the institutional fit between the regime and niche innovations has improved and a window of opportunity is opened for a breakthrough innovation (e.g. a regulative change is enacted). The ventures who seize the opportunity at the right moment and succeed in institutionalizing the new solution into the regime may not even realize the various actors’ roles in the long-term institutional change. However, they have enabled the gradual change of the norms and habits that had previously prevented the adoption. Hence, the institutional change is not a sudden event, but a highly iterative and continuous process, with various actors contributing to it; this needs to be understood in order to maximize the success of innovation.

6.2.2 The role of institutions in service innovation - The non-linear process of enacting institutional change

The theoretical contribution of the thesis regarding institutionalization is empirically grounded on the challenges identified in the commercialization of inventions developed within the European innovation project settings. Furthermore, empirical studies related to start-up accelerator programmes provided specific findings that contribute to understanding the institutional constraints and processes leading to institutional change. These findings diverge from the dominant view on innovation, which has hitherto been rather narrow, separating the creation of innovation from its diffusion (Biemans, Griffin and Moenaert, 2016). There are, however, some notable exceptions – mainly fostered within evolutionary economics (Geels, 2004a; Geels and Schot, 2007). From the viewpoint of this thesis, a particularly important exception is the institutional perspective of S-D logic that is linked to innovation studies – emphasizing the crucial role of institutionalization in service innovation (Barrett, Davidson and Vargo, 2015; Vargo, Wieland and Akaka, 2015, 2016; Akaka, Vargo and Wieland, 2016; Siltaloppi, Koskela-Huotari and Vargo, 2016). Most of these studies have been highly theoretical, only recently calling for mid-range theories and leaving a gap for micro-level studies. This thesis has aimed to narrow this gap by focusing on the micro-level actions that influence the process of service innovation and by pointing out the linkage of these actions to institutionalization. The aim has been to create better understanding of perceptions, interpretations and actions of individual actors, and to understand how they impact on wider service eco-systems.

The thesis argues that creating new and transforming existing institutions is crucial for the diffusion of innovations, especially when the ‘institutional design’ of innovation diverges notably from the prevailing institutional template. The process of creating and transforming institutions is a
highly iterative process, intertwined with other innovation process activities (e.g. service design). The thesis utilizes the theory of institutional entrepreneurship (DiMaggio, 1988; Battilana, Leca and Boxenbaum, 2009) and more broadly the theory of institutional work (Lawrence and Suddaby, 2006a; Lawrence, Leca and Zilber, 2013) – development, change and maintenance of institutions – in order to enhance knowledge about institutional development as a focal sub-process of service innovation. The findings propose that better understanding of the institutional context of innovation and of the ongoing institutional change processes, and the transfer of focus to institutional work, might be keys in improving the success rate of innovation projects.

Detailed insights into the relationship between actors and institutions are one of the main contributions of the thesis. The findings provided knowledge on how the innovating actors experience institutions as enablers and constraints for innovations. Moreover, the empirical findings highlighted the crucial role of cognitive-interpretative processes in institutional change, which resulted in developing a notion of institutional sensemaking. It builds on the theory of sensemaking (Gioia and Chittipeddi, 1991; Weick, Sutcliffe and Obstfeld, 2005) and strategic reflexivity (Fuglsang and Sundbo, 2002), and helps to conceptualize the highly necessary cognitive processes that institutional entrepreneurs go through while enhancing their understanding of the complex institutional structure and its impact on innovation.

The thesis also provides insights into how individual actors, who are embedded in an institutional setting, can contribute to the institutional change. Earlier research on institutional entrepreneurship (Battilana, Leca and Boxenbaum, 2009; Pacheco et al., 2010) is expanded by providing detailed insights into how peripheral actors theorize the change (Greenwood, Suddaby and Hinings, 2002) and how they build the legitimacy (Suchman, 1995) that is crucial for enacting institutional change. The findings support earlier studies of institutional entrepreneurship, which emphasize the importance of the mobilization of other actors in the institutional work (Dorado, 2005; Battilana, Leca and Boxenbaum, 2009). This is found to be particularly important for new ventures, which have a very limited control on how the institutional rules are reproduced in social interactions within the field. The thesis identifies three main paths for institutional entrepreneurship, which are linked to the role that peripheral actors may take in the institutional change. Firstly, the institutional entrepreneur can be a visionary actor who initiates the change by design prototype to share a vision of the improved future. Secondly, some of the studied institutional entrepreneurs were highly social and efficient entrepreneurial actors who started the ‘movement’ by building on inspiring vision, thereby trying to gather other actors to support and reinforce the movement. Thirdly, this study supports the findings of Hansen and colleagues (2015), who described small actors’ efforts as ‘institutional judo’, which metaphorically refers to utilizing the ongoing movement and strengthening it with own actions instead of trying to initiate a change on their own.

The thesis emphasizes the role of the actors purposefully initiating and enacting institutional change, but the findings also point out that behind the main actor, there are numerous other actors within the complex service ecosystem, and these actors continuously influence the institutionalization processes. Some of these actors conduct purposeful actions, which have traditionally been the focus of studies investigating institutional work (Lawrence and Suddaby, 2006a; Lawrence, Suddaby and Leca, 2011). In addition, it is relevant to understand non-purposeful actions through which numerous actors contribute to the institutionalization process unintentionally. The thesis argues that the analysis of complex processes of institutional change should be extended to cover actions that are not deliberate institutional work but end up with institutional consequences. Furthermore, the institutionalization is a highly iterative and non-linear process in which each iteration of social interaction has a potential to strengthen the set of prevailing institutions or change them, thereby also changing the context of innovation. For example, interactions may change the ways in which existing technologies are used, what are the problems that people are aware of, and how a potential failure of the existing institutional setting is framed. When a change suggested by a small actor is aligned with the interests of more dominant actors, and/or numerous minor changes reinforce each other, changes in the regime-level institutions may emerge. Therefore, institutionalization extends the scope of an innovation process beyond activities controllable by the firm acting as an ‘innovator’.

To sum up, the findings deepen the emerging institutional perspective on service innovation (Vargo, Wieland and Akaka, 2015) by providing micro-level insights on the process of institutionalization – not only as the final phase of innovation, but iteratively throughout the innovation process which is non-linear in nature. Accordingly, this thesis argues that the development (of a
product/service) should not be separated from the institutional development. It has identified neglect of the institutional perspective as a major reason for the poor success of innovations developed within protected innovation projects, in which the norms and cultural-cognitive templates are still strongly guiding the project to first develop an invention and then commercialize it. The perspectives of institutional entrepreneurship and institutional work should be tightly integrated with the theories of service innovation to promote understanding of the nature of innovation.

6.2.3 The role of technology in service innovation – deepening the synthesis view on innovation

Although there have been a call for and contributions to the synthesis view for over two decades (Gallouj and Weinstein, 1997), Miles (2016) argued that the consolidated view is yet to be established. This thesis regards the broad view of technology as a core constituent in the consolidation and as particularly well suited to understanding innovations in the digital era. This view regards technological development as a process of combination and evolution of previous technologies (Arthur, 2009; cf. Schumpeter 1934), and highlights its dual nature. A new technology is developed by creative human actors through physical construction (technological development in the traditional sense), but also in use through social (re)construction, in which the meaning of technology is interpreted and new meanings are attached to it (Orlikowsky, 1992). S-D logic claims that combinatorial evolution leads to technological innovation when it generates new, potentially useful knowledge (Vargo, Wieland and Akaka, 2015). This conclusion helps to transcend over the division between technological and service innovation, but it is challenging for two reasons. Firstly, it means that the concept of technological innovation is used as a replacement of the concept of invention (i.e. non-institutionalized innovation), which is widely used in general innovation studies and service innovation studies. This thesis questions the rationale for using innovation to describe invention, which may broaden the gap between S-D logic and other innovation studies. Secondly, the contents of the concept of technology are ‘overloaded’ by using it to refer generally to ‘potentially useful knowledge’. This thesis provides a counter-argument for this over-extension by building on the contributions of Arthur (2009) and Orlikowsky (1992). They both acknowledge this broad view on technology, but consider it ‘unnecessarily limiting’ for analytic purposes. This thesis thereby suggests reconsidering the S-D logic’s notion of technology and technological innovation in order to reach the consolidated view that has long been called for.

The findings of the thesis illustrate that even without ‘overloading’ the notion of technology, the synthesis view can be extended to both technological and non-technological forms of innovation. This can be done by acknowledging the pervasive role of technology and by adopting the structurational and socially constructed view (Orlikowsky, 1992; Arthur, 2009). Digitalization reveals the pervasive role of technology within service processes and service systems, thereby confirming the previous findings on its profound impact on the nature of service(s) (Bitner & Gremler, 2010). For example, reminiscence therapy was already previously a service enabled by technology (e.g. photographs and camera), but due to digitalization the role of technology has become even more evident (e.g. digital videos). The analyses, taking a service systems perspective (Maglio et al., 2009), show that technology has an important role in all studied cases; even in those in which the innovation mainly focused on the improvement of service exchange and practices between human and organizational actors. Even the most traditional healthcare service processes are enabled and constrained by digital technology. Technology (hardware and software) performs many service tasks in the background, which customers and frontline employees do not even notice in their everyday routines and practices if the technology works, but when things go wrong it may have dramatic consequences. Due to digitalization, the question is no longer whether service is enabled by technology or not; the question is whether technology is utilized directly or indirectly.

The findings of the case studies point out that in addition to the traditional development of technology, which may or may not be part of service innovation, a service innovation process always includes the social construction of technology. This thesis extends the structurational model of technology (Orlikowsky, 1992) with the institutional theory and the theory of institutional entrepreneurship, which reveal the mechanisms for influencing how new technology is interpreted and experienced within specific social groups. The institutional view on technology is helpful in developing strategies to build the legitimacy of new service practices enabled by the technology. The
findings of the case studies point out the impact of regulative and normative institutions constraining the use of technologies, but more importantly they show the role of taken-for-granted beliefs and assumptions in shaping capabilities to envision how service practices could be improved by technologies. As well as influencing the acceptance of new technologies, institutions define how existing technologies are utilized. Therefore, ‘installed’ technology should not be seen as fixed, but rather as continuously evolving through social encounters of the actors’ daily lives. The findings of the thesis support the S-D logics view that each iteration of value creation and service exchange has the potential to change the emphasis and meaning of technology, and that the attitude and behaviour towards it may change. In addition, a change in non-technological service processes may have consequences for the interpretation and use of seemingly distant technologies. These findings highlight the social construction of technology, and more generally the process of institutionalization, which are integral parts of all forms of innovation, therefore requiring a synthesis view.

Digitalization has extended the scope of technology from tangible artefacts (hardware) to intangible methods and processes (software). Although a broad view on technology (Vargo, Wieland and Akaka, 2015) extends the scope further, conclusions of the thesis concerning the role of digital technology in service innovation do not support this interpretation. However, the conclusions are aligned with Orlikowsky (1992) and Arthur (2009), who stated that technology is a device, method or process (means) that does something to fulfil a human purpose. The thesis claims that the synthesis view on service innovation should be built on the dual nature of technology but sustaining a distinction between its artificial and human elements. The thesis suggests a stronger emphasis on the notion of service system(s) (Maglio et al., 2009) - dynamic configuration of people, organizations, technology and shared information connected internally and externally by value propositions - to refine the S-D logic’s view of the role of technology in innovation. Although the notion of service system is foundational for the service ecosystems perspective (i.e. systems of service systems) (Vargo, Maglio and Akaka, 2008; Akaka and Vargo, 2014), the concept is not relied on when defining the notions of technology and technological innovations. However, the service system would provide a good basis for the elaboration of the relationship between technology and information and for the synthesis view on innovation, which is elaborated by the following example. When the purpose is to determine whether a patient has arrhythmia, different means are available, giving technology different scopes and roles. In a traditional setting, the doctor (a human agent) listens to the arrhythmia of the patient (a human agent) through a stethoscope (hardware), which needs to be integrated with the knowledge of how to use this technology. From the perspective of a broad view on technology, technology contains all the useful knowledge, including the stethoscope, the knowledge how to build it, use it, and analyse its (medical) meaning. However, if a new digital solution is developed that automatically monitors the arrhythmia of the patient (a human agent), the ‘how to listen and analyse’ knowledge component is transferred from the medical professional partly to the patient and partly embedded into the technology. The knowledge is mainly designed ‘as a service’ into technology that interprets signals (software) from the sensors (hardware), but the patient also needs to know how to use it. This example shows why it is relevant, for practical and analytical purposes, to analyse the change as the reconfiguration of a service system. It enables the division of a single construct of technology into material technology (hardware and software) and the knowledge of utilizing the technology. Digitalization is about transforming human knowledge and practices to be conducted by technology, which expands the role of technology in everyday lives. Although the scope of technology changes, both practices included in the example are service systems serving the same purpose. It is not useful to overly extend the definition of technology, as it is still relevant to understand how artefacts (hardware and software) interact with human agents.

In summary, our findings about the cognitive and action-oriented process of institutional entrepreneurship support the crucial role of institutionalization in service innovation. In addition, the clarifications about the role of technology in service innovation suggest utilizing ‘service system’ as a construct to study both technological and non-technological innovations. Together these contributions point out – even more clearly than the earlier argumentations – that the dichotomy between technology and service-oriented perspectives has always been confusing and is particularly unsuitable to describe the phenomena of the digital era.

8 Arthur (2009) used the concept of ‘purpose systems’ and defined it as a high-order category including both physical technologies (hardware and software) and non-physical ‘technologies’ such as business organizations, legal systems, monetary systems and contracts, which are all means to purpose.
6.3 Policy and managerial implications

The policy implications of this thesis are presented in the form of propositions. As the research is based on the constructivist paradigm, the thesis does not claim that these propositions are universal truths. The propositions should rather be seen as interpretations of the author about different causes and consequences. These interpretations are guided by the data acquired and the analysis conducted in the past, but the interpretations evolve through time as new information is received – yet they need to be “fixed” for the thesis. The propositions are targeted to policy makers who are responsible for designing initiatives and programmes that support the innovation activities of organizations, and to organizations developing innovations within these programmes and initiatives.

P1 - Programmes that encourage external collaboration outside the project boundaries result in solutions that have a higher potential to be commercially viable

The findings suggest that the further the development is carried out in a protected innovation environment without active collaboration with external partners, the more difficult is the commercialization of the solution. Although the protected innovation environment provides space for experimentation that could not be conducted in an open market environment, it also blinds developers from institutional and market forces, which may have a tremendous negative impact on the commercial potential of the solution. When developers have to interact with other market actors in the early phase of the development, they are likely to realize more easily the institutional forces that potentially prevent or hinder the diffusion of innovation, and to steer the development accordingly. This may lead to a more effective use of R&D funding and improved overall results.

P2 - Regulative rules of the innovation programme are aimed at selecting the most suitable candidates but the rules may in fact reduce commercial potential

When two kinds of innovation programmes are compared (joint-funded innovation projects and ventures within an accelerator programme), clear differences can be found regarding their institutional structures. The regulative structures of the programme define the length of the project and the complexity of its structure. The findings indicate that the higher the number of project partners (in an R&D program, usually between 3-10 partners), the higher the risk for failure is. The risk of failure seems to be particularly high if the partners are more or less equals and no single participant has the authority to steer the whole project towards a goal that is in their strategic interest. Prolonged length of the project also increases the risk. Even if the project partners have the same vision in the beginning, and each of them has a specific role in the development, continuing the joint development over many years is likely to lead to a situation in which partners are pulling the development in different directions. This leads to overly complex solutions, which do not easily fit the prevailing institutional template. On the other hand, in an accelerator programme, each venture has its own ‘project’ and the timeframe is short, which ensures that the development focuses on activities that have a high strategic priority. It also creates the need to establish market relationships quickly and to ensure that they can be expected to last beyond the project.

P3 – The institutional setting of the programme has a great impact on the type and motivation of companies applying to the programme

In addition to the regulative structure, there are other institutional elements which may have an even greater influence on the projects and the programme. The normative and cultural-cognitive setting related to the programme defines the norms for conducting the development under the programme, and the taken-for-granted assumptions that the involved organizations have about the programme. These define what kind of companies apply to the programme and how they act within the projects. As an example, the accelerator programme associated itself with start-up culture, which is based on a culture of embracing hard work, lean development (focusing on value creating activities), and high rewards; thus, it appears to attract entrepreneurially oriented companies. On the other hand, the conditions of European public-private partnership programmes
historically build on a strong focus on technology, but have less of an orientation towards technology commercialization activities, which have even been forbidden during projects. Moreover, the European R&D projects have traditionally been research-oriented, strongly focusing on the execution of a fixed project plan. Even though programmes have recently started emphasising market orientation and the need for commercial exploitation, historically and culturally bound expectations are changing slowly, which can be seen in the planned development activities and in the way they are conducted. Thereby, the path-dependent and socially-constructed institutional norms, culture and cognitive templates may be a major explanatory factor for the commercial success of the programmes.

The findings concerning the institutional setting raise the question of whether there is a need for long-term collaborative innovation projects at all, or should the funding schemes be redesigned. The findings of our case studies indicate that using R&D-based funding frameworks (i.e. fixed project plan, long time-frame, and multiple partners) to finance innovation projects that are ‘close to the market’ is inefficient. In this case, close to the market means that the technology is quite mature, and the question is more about applying technology in a new context. The accelerator programme shows that small, focused teams with good ideas are most likely to be able to find short term funding that is targeted to the development and commercialization. Moreover, shortage of funding will keep the team lean and focused on essentials, which is often not the case in collaborative innovation projects. Therefore, the author suggests reducing the long-term fixed funding for joint projects and replacing current ‘close to the market’-support with more fast-paced and flexible innovation actions. However, it should be noted that this thesis has focused on innovation projects which are close to the market and do not have major development challenges to be solved, which require years of work. In some cases, it may be highly necessary and relevant to provide long-term innovation funding for solving complex challenges that involve a high risk of failure (e.g. inventing a cure for Alzheimer’s disease).

P4 – Innovation projects should be seen as series of learning experiments

Although collaborative innovation projects are a challenging environment for developing successful innovations, when utilized in the right way they can provide an excellent opportunity for experimenting and learning. Instead of having a linear R&D mind-set focusing on fulfilling the predefined project plan, projects should be seen as series of learning experiments through which companies can learn for example about customer needs and how technologies can be integrated in customers’ daily lives. The collaborative projects also enable learning experiments to prototype new business models and to explore new strategic directions. Some of the learning experiments should be targeted to reveal formal and informal rules of the game that may have a positive or negative influence on adoption and diffusion. The understanding of these institutional forces is crucial in order to comprehend the needed change, which is the basis for developing ways to justify the change to actors needed to support it. Hence, the project’s main focus should not be on building technology, but on maximizing the learning.

The new way of working is not simple, especially if the project involves people who are used to playing with the old rules. The iterative and lean business development principles9, which are established practice in the start-up community, are often experienced to be challenging to implement in the context of collaborative projects. As a result, they may be applied in an overly simplistic manner to fulfil the basic ‘business requirements’ set for the project, or turned into overly complex academic exercises. This requires a change of mind-set: the goal of an R&D project is not to develop as complex a solution as possible (and hope that all the applications and features will together provide value for the customer). Neither is the goal to conduct as big a trial as possible, but rather to build as small experiments as possible that will maximize the speed of learning. The project should scale-up development activities only after early learning experiments validate the hypothesis that the innovation has real potential outside the R&D lab.

The problem is that when public funding is applied, it is often argued that there is a real need and real business potential, but the technology is not yet ready and the service concept needs to be further developed. If the learning experiment indicates that the assumed service concept is not attractive for customers, or the business model is not viable, it basically has to be admitted that

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9 Widely established methods and principles include, especially, business model design and testing (Osterwalder and Pigneur, 2010; Osterwalder et al., 2014) and lean development principles (Eisenmann, Ries and Dillard, 2011; Ries, 2011; Maurya, 2012, 2016; Blank, 2013).
the claims were wrong. Luckily, the rules of the game are changing and at least some innovation programmes\textsuperscript{10} nowadays provide the possibility to pivot, i.e. change the strategy of implementing the project's vision. In addition, some programmes provide faster funding instruments to speed up learning (e.g. Horizon 2020 Fast-track-to-innovation). The author encourages all types of companies working in collaborative projects to learn from the highly iterative and fast-paced entrepreneurial initiatives, and to apply for funding that supports innovation through a series of iterative experiments.

6.4 Limitations

Since digital transformation in the field of healthcare is a very broad topic, this thesis obviously has its limitations. The first limitation concerns the scope of studying the phenomenon. The thesis does not focus specifically on technological change, and it does not provide a detailed account of which technologies are changing and how; nor does it focus on change in organizations’ strategies and business models, which are typical viewpoints in the managerial literature concerning digital transformation. However, the thesis creates new knowledge about the institutional and social change related to digital transformation, which is insufficiently covered by the technological and business perspectives of transformation.

The second limitation concerns the objective of this thesis, which is to create new knowledge about the phenomenon of digital transformation by focusing particularly on the perspective of niche actors. This perspective limits the insights that can be gained mostly at micro level and within the specific niche market that the innovation is targeted at. Although the goal of niche actors’ innovation efforts may ultimately be to change the health and social care system at national or international level, the change at macro level is within the scope of this thesis only when it has an influence on specific service innovation activities or when entrepreneurs aim to change specific institutions (e.g. national regulations or norms). The study does not aim at cross-case comparison regarding innovation efforts in different countries, since the market segments of the companies are very different and therefore not comparable. The challenges of introducing innovations into specific countries are implicitly discussed in studies III-IV from the perspective of institutional constraints and institutional entrepreneurship when those are relevant to the specific innovation process.

The core theory naturally forms a third limitation of the thesis. The objective of the thesis is to understand mechanisms that have an impact on service innovation in the field of healthcare. Due to the chosen theoretical approach these mechanisms are mainly seen as institutions (e.g. cultural beliefs, normative behavior, values, and regulations) that enable and constrain innovation. Moreover, the mechanisms through which actors aim to change and maintain these institutions are seen as institutional work. By choosing a different theoretical lens (e.g. technology adoption), these mechanisms would be seen from the different perspective and would be labelled in different categories. Nevertheless, the author believes strongly that the emphasis on institutions and institutional work provides an important contribution to the study of service innovation and advances the understanding of digital transformation as a social phenomenon.

Methodological choices concerning the study of innovation in two different development contexts (innovation programme and accelerator programme) create the fourth limitation of the work. Cases conducted within the context of the innovation programme were based on the active participation of the author in the innovation process, whereas in the context of the accelerator programme the author’s role was more that of an external observer. Therefore, the author is likely to have a deeper understanding of the innovation challenges in the context of the innovation programme, which may have led to a slightly unbalanced comparison between development contexts. If the level of participation in the innovation process had been different in either of the development contexts, interventions might have provided different results and the insights and knowledge created about the phenomenon would have most likely been different.

\textsuperscript{10} The renewed AAL programme (2016-2020) emphasizes that the project plan is not fixed, but can be changed with good justification. See http://www.aal-europe.eu
6.5 Avenues for further research

The thesis project has been a long journey, during which many interesting bypaths have been discovered, but many of them have been left untraveled due to the need to maintain a clear focus. This final section brings forward four very different kinds of bypaths down which future research could be directed. Firstly, the thesis has studied innovations developed in two different environments through case studies. As the study was constructive in nature, its main aim was to create deeper insights into the creation of innovation and its institutionalization. Although the findings suggest that there may be differences in how successful innovation projects conducted under different frameworks are, they do not provide a direct answer to the question how effective different innovation support mechanisms are. Therefore, further research is needed with a more quantitative approach if the aim is to determine whether there are statistically significant differences in the commercial success of innovations developed under different support frameworks. If a statistical difference could be found, the findings of this study could (at least partially) answer why they were found.

Secondly, the thesis has focused on innovations in which digitalization changes the service process. The findings from the cases indicate that innovations will increasingly concern the development and diffusion of artificial intelligence-enabled service, which highlights the role of technology not only as an operant resource (Akaka and Vargo, 2014), but also as an actor. As the development of artificial intelligence proceeds, the technology will increasingly be seen as an actor within the service system, not only processing information but also learning to cope with new situations without human intervention, and also participating in the innovation process. This highlights the need for deepening the understanding of the value creation from the perspectives of both human actors and artificial actors. Hence, further research is needed for understanding value creation and innovation in service (eco)systems, in which artificial actors are not only proposing value but also evaluating whether to accept or deny value propositions.

Thirdly, the thesis has built on multiple disciplinary perspectives and contributes to the synthesis view of service innovation. The synthesis view is not yet coherent, but needs further research that focuses on building the integrative theoretical ground for understanding all kinds of innovations. S-D logic has the potential to become the unifying high-level theoretical and philosophical framework for innovation, but it needs to be complemented by theoretical development at meso and micro levels. Theorization at ‘lower levels’ helps to build a common ground and also bridges the gap between philosophical considerations and managerial practice. In addition to theorization, the emerging synthesis view requires mobilizing actors on many fronts to conduct institutional work, which is crucial for different disciplinary views to become closer and learn to accept the perspectives that may be changing certain long-standing beliefs. This also reveals the fourth bypath concerning institutional work and entrepreneurship, which has been studied quite extensively in many fields, but not much in the context of academic research. Therefore, the diffusion of new concepts and theories, such as the synthesis view on innovation, could be a relevant topic for further studies.
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