Department of Industrial Engineering and Management

Rethinking digital transformation of healthcare

The role of technology and institutions in service innovation

Arto J. Wallin

Aalto University

DOCTORAL DISSERTATIONS

Aalto University publication series
DOCTORAL DISSERTATIONS 105/2018
VTT SCIENCE 176

Rethinking digital transformation of healthcare

The role of technology and institutions in service innovation

Arto J. Wallin

A doctoral dissertation completed for the degree of Doctor of Science (Technology) to be defended, with the permission of the Aalto University School of Science (Espoo, Finland), at a public examination held at the lecture hall TU1 of the school on 15th June 2018 at 12 noon.

Aalto University
School of Science
Department of Industrial Engineering and Management

Supervising professor
Professor Risto Rajala, Aalto University, Finland

Thesis advisor
Marja Toivonen, Professor Emerita, VTT Technical Research Centre of Finland and Adjunct Professor, Aalto University, Finland

Preliminary examiners
Professor Helinä Melkas, Lappeenranta University of Technology, Finland
Professor Tiziana Russo Spena, University of Naples Federico II, Italy

Opponents
Professor Mattias Elg, University of Linköping, Sweden
Professor Helinä Melkas, Lappeenranta University of Technology, Finland

Aalto University publication series
DOCTORAL DISSERTATIONS 105/2018

VTT SCIENCE 176

ISBN 978-952-60-8019-2 (printed)
ISBN 978-952-60-8020-8 (pdf)
ISSN 1799-4934 (printed)
ISSN 1799-4942 (pdf)
http://urn.fi/URN:ISBN:978-952-60-8020-8

ISBN 978-951-38-8638-7 (printed)
ISBN 978-951-38-8637-0 (pdf)
ISSN 2242-119X (printed)
ISSN 2242-1203 (pdf)
http://urn.fi/URN:ISBN:978-951-38-8637-0

Unigrafia Oy
Helsinki 2018

Finland

441 697
Printed matter

Aalto University

Abstract

Aalto University, P.O. Box 11000, FI-00076 Aalto www.aalto.fi

Author
Arto J. Wallin

Name of the doctoral dissertation
Rethinking digital transformation of healthcare

Publisher School of Science

Unit Department of Industrial Engineering and Management

Series Aalto University publication series DOCTORAL DISSERTATIONS 105/2018

Field of research Service innovation

Manuscript submitted 22 December 2017 **Date of the defence** 15 June 2018

Permission to publish granted (date) 14 March 2018 **Language** English

☐ **Monograph** ☒ **Article dissertation** ☐ **Essay dissertation**

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

ISBN (printed) 978-952-60-8019-2 **ISBN (pdf)** 978-952-60-8020-8

ISSN (printed) 1799-4934 **ISSN (pdf)** 1799-4942

Location of publisher Helsinki **Location of printing** Helsinki **Year** 2018

Pages 186 **urn** http://urn.fi/URN:ISBN:978-952-60-8020-8

Aalto-yliopisto

Tiivistelmä

Aalto-yliopisto, PL 11000, 00076 Aalto www.aalto.fi

Tekijä
Arto J. Wallin

Väitöskirjan nimi
Terveydenhuollon digitalisoituminen ja muutos - Teknologian ja instituutioiden rooli palveluinnovaatiossa

Julkaisija Perustieteiden korkeakoulu

Yksikkö Tuotantotalouden laitos

Sarja Aalto University publication series DOCTORAL DISSERTATIONS 105/2018

Tutkimusala Palveluinnovaatiot

Käsikirjoituksen pvm 22.12.2017 **Väitöspäivä** 15.06.2018

Julkaisuluvan myöntämispäivä 14.03.2018 **Kieli** Englanti

☐ **Monografia** ☒ **Artikkeliväitöskirja** ☐ **Esseeväitöskirja**

Tiivistelmä

Viimeaikainen teknologinen ja yhteiskunnallinen kehitys ovat synnyttäneet tarpeen uudistaa länsimaisia terveydenhuoltojärjestelmiä. Muun muassa kroonisten sairauksien levinneisyyden kasvaminen, uusien kalliimpien hoitojen kehittäminen ja huoltosuhteen heikkeneminen ovat aiheuttaneet haasteen, jota ei pystytä ratkaisemaan yksittäisillä teknologisilla innovaatioilla. Tämä on saanut useat tieteenalat kiinnostumaan siitä, miten terveydenhuoltojärjestelmän systeeminen muutos kohti kestävämpää mallia saadaan toteutettua. Todelliset ratkaisut ongelmaan ovat kuitenkin olleet vielä puutteellisia.

Tässä neljään julkaistuun tutkimukseen perustuvassa artikkeliväitöskirjassa tutkitaan terveydenhuollon muutosta palveluinnovaatioiden näkökulmasta. Työssä käytetään abduktiivista tapaustutkimustastrategiaa, jota voi kuvailla jatkuvaksi teorian ja empirian vuoropuheluksi. Kaksi ensimmäistä tutkimusta toteutettiin kotihoidon kontekstissa ja palvelukehitys tapahtui yhteisrahoitteisissa tutkimus- ja kehityshankkeissa. Ensimmäinen tutkimus selvitti uuden digitaalisen vuorovaikutusteknologian mahdollistamia palveluja kotihoidossa ja niiden vaikutuksia palvelujen tuottavuuteen. Toinen tutkimus tarkasteli useiden toimijoiden yhteistyönä tapahtuvaa palvelukehitystä kolmivuotisen hankkeen aikana ja tunnisti hankkeessa esiin tulleita haasteita. Kolmas ja neljäs tutkimus keskittyivät nuoriin yrityksiin, jotka kehittivät uusia digitaalisia palveluinnovaatioita terveydenhuoltoon startup-kiihdyttämössä. Kolmas tutkimus pureutui yritysten kokemiin institutionaalisiin esteisiin, jotka rajoittavat innovaatioiden kaupallistamista. Neljäs tutkimus valottaa sitä, miten yritykset pyrkivät muuttamaan innovaatioita rajoittavia instituutioita. Yhdessä nämä neljä tutkimusta muodostavat kokonaisuuden, joka avaa terveydenhuollon muutoksen luonnetta kolmen toisiinsa kietoutuneen ilmiön kautta, joita ovat digitalisoituminen, palveluinnovaatio ja institutionaalinen muutos.

Väitöskirja parantaa teoreettista ymmärrystä teknologian ja instituutioiden roolista palveluinnovaatioiden kehittämisessä. Se syventää ymmärrystä digitalisoitumisen vaikutuksista palvelujen tuottavuuteen ja palveluinnovaatioihin. Se luo uutta ymmärrystä siitä, miten instituutiot estävät, rajoittavat ja edistävät terveydenhuoltojärjestelmän ulkoa tulevia palveluinnovaatioita sekä toisaalta siitä, miten yritykset pyrkivät muuttamaan innovaatioiden leviämistä rajoittavia instituutioita. Työ edistää monitieteellistä palveluinnovaatioteoriaa ja luo paremman pohjan ymmärtää innovaatioita, jotka muuttavat terveydenhuollon vakiintuneita ajatusmalleja, tapoja ja sääntöjä.

Avainsanat digitalisaatio, palveluinnovaatio, innovaatioiden kehittämisen haasteet, institutionaalinen muutos, terveydenhuollon uudistuminen

ISBN (painettu) 978-952-60-8019-2 **ISBN (pdf)** 978-952-60-8020-8

ISSN (painettu) 1799-4934 **ISSN (pdf)** 1799-4942

Julkaisupaikka Helsinki **Painopaikka** Helsinki **Vuosi** 2018

Sivumäärä 186 **urn** http://urn.fi/URN:ISBN:978-952-60-8020-8

Acknowledgements

The road to dissertation is long and there are many people who have enriched and shaped this journey. This journey would not have been possible without certain people with whom I have travelled or passed by.

First, I would like to express my gratitude to Professor Helinä Melkas from the University of Lappeenranta, Finland and Professor Mattias Elg from Linköping University, Sweden, who have agreed to act as the opponents of my dissertation. They are both highly valued scholars and I look forward to interesting discussions with them.

Professor Helinä Melkas was also the preliminary examiner of my dissertation together with Associate Professor Tiziana Russo-Spena from the University of Naples Federico II. I would like to thank them both for carefully reading my dissertation manuscript and providing insightful and encouraging feedback. Their constructive comments helped me to improve my dissertation to its final form.

I am grateful to Professor Risto Rajala from Aalto University, Finland who acted as my PhD supervisor. He helped me to officially start the PhD project and pushed me in the direction of institutional theory at the right moment, which changed the course of my journey towards dissertation. I would like to thank him for insightful feedback on the manuscript and conducting various duties as a supervisor.

I would like to express my deep gratitude and appreciation to Professor Marja Toivonen who has been my main advisor and VTT's supervisor during the PhD project. Her high enthusiasm and professionalism in her work as VTT's Research Professor gave me boost of enthusiasm and confidence to pursue my dissertation in the field of service research and innovation. Discussions with her clarified my thinking and helped me to find the focus for my work. Although we worked on different projects, it has always been reassuring to know that I have her knowledge and experience in the background available when needed.

Besides the mentors who have had an official role in my work, there have been many individuals who have collaborated with me in the three research projects related to the dissertation. I would like to thank Professor Minna Isomursu who guided me in the first two research projects from which two articles were written. During these times I did not yet even know that I would eventually write my dissertation, but she encouraged and gently pushed me towards this academic challenge. My special thanks go to the co-authors of the first two articles: Mr. Pasi Pussinen, Dr. Marja Harjumaa and Mr. Juha Häikiö with whom I worked under the supervision of Professor Isomursu. Together we learned how to write solid academic articles, but more importantly their companionship made every day work much more fun and interesting. The last two articles are based on the data collected within the startup accelerator programme. I am grateful to Professor Minna Pikkarainen from the VTT who helped me to get access to the startup accelerator, design the study and to define the first steps in data collection. I would also like to thank Outi Toijala from the EIT digital who had important role in enabling data collection within the startup community.

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.

During my dissertation project I had the opportunity to stay for a year at Roskilde University in Denmark. This research exchange would not have been possible without the Accelerate project and its project manager Päivi Jaring to whom I am very grateful. I would also like to express my deep gratitude to Professor Lars Fuglsang from Roskilde University, Denmark who acted as host for my research exchange and co-authored the fourth article. During the time at Roskilde University I learnt to see how the world and institutions around us are socially constructed, which is an

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.

I would also like to thank my former and current line managers Mrs. Tiina Valjakka, Dr. Maaria Nuutinen, and Dr. Heli Talja, and Dr. Tuomo Tuikka, Mr. Matias Vierimaa, and Dr. Peter Ylén for their support in finding funding and helping me to find time for research and writing.

Finally, I would like to express my deepest and warmest gratitude to my closest ones who have provided me support in the life-long learning process and more importantly provided me stability and meaning to my life. My mother Kerttu and father Eero have always encouraged me to educate myself and provided their support in whatever I decided to pursue. My wife Katri has travelled along with me since the start of my academic education and has always provided her love and support, which has enabled me to pursue my own goals. She has been an important person in helping me to reflect my own thoughts and to decide the direction of further studies. Most importantly, Katri has given me joy and meaning to my life with my sons Anselmi and Verner. Their enthusiasm and curiosity is something that still amazes me and I hope that I can provide support for them in whatever journey they choose to embark on.

Oulu, 3 April 2018
Arto Wallin

Contents

List of abbreviations

ICT	Information and Communication Technology
MLP	Multi-Level Perspective
NIS	National Innovation Systems
NPD	New Product Development
NSD	New Service Development
R&D	Research and development
S-D logic	Service-Dominant logic
SME	Small and Medium-sized Enterprises

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.

Article I Häikiö, J., Wallin, A. & Isomursu, M., 2010. Digitally-enhanced services for the elderly. *International Journal of Services Sciences*, 3(2/3), pp. 232-249. Available at: http://dx.doi.org/10.1504/IJSSCI.2010.032225

Article II Wallin, A., Harjumaa, M., Pussinen, P. & Isomursu, M., 2015. Challenges of new service development: Case video-supported home care services, *Service Science*, 7(2), pp. 1-19. Available at: http://dx.doi.org/10.1287/serv.2015.0097

Article III Wallin, A., 2017. Transforming healthcare through entrepreneurial innovations - An institutional view. *International Journal of e-services and Mobile Applications*, Vol. 9, Iss. 1, pp. 1-17. http://dx.doi.org/10.4018/IJESMA.2017010101

Article IV Wallin, A. & Fuglsang, L., 2017. Service innovations breaking institutionalized rules of health care. *Journal of Service Management*, Vol. 28 Issue: 5, pp.972-997. https://doi.org/10.1108/JOSM-04-2017-0090

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 innovation[1] 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

[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.

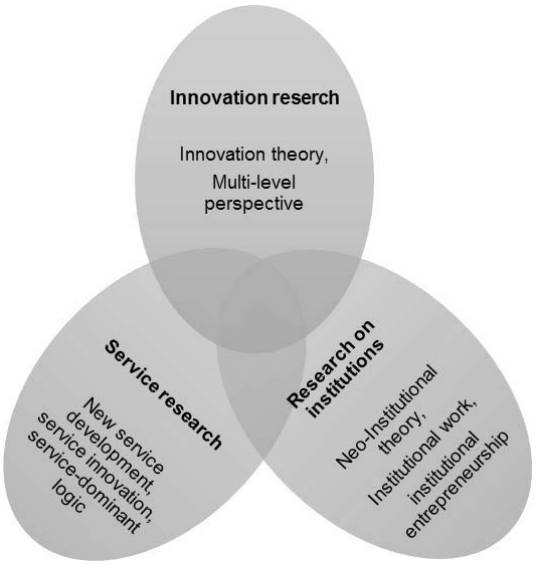


Figure 1. Theoretical perspectives to investigate the digital transformation of healthcare.

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 summarises 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 individualist 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 steams. 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, Scherngell 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 reverse innovation cycle (Barras, 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 (Witell *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: techno- vs. service-oriented division and assimilation vs. demarcation division. The first dimension separates studies stressing the involvement of new technology from those emphasising 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 (Carlborg, 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 Orlikowsky'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 *operant 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). Operant resources cannot be used in isolation, but they always need to be combined or bundled with other operant 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'Shaughnessy and O'Shaugnessy, 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 *et al.*, 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 how 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 sparkled 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 Boxenbaum (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 Boxenbaum, 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 recognises 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, Leca 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, Leca and Boxenbaum, 2009; Hardy and Maguire, 2017). Institutional entrepreneurship is not only seen as an endeavour 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, 2006), 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 experimentations 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). Wielan, 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 (Mäkimattila, Melkas and Uotila, 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 mind-set 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 the renewal of healthcare. 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[2]. 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

[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 incubator 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 programme 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 programme 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 experienced 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 programme 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 accumulated 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

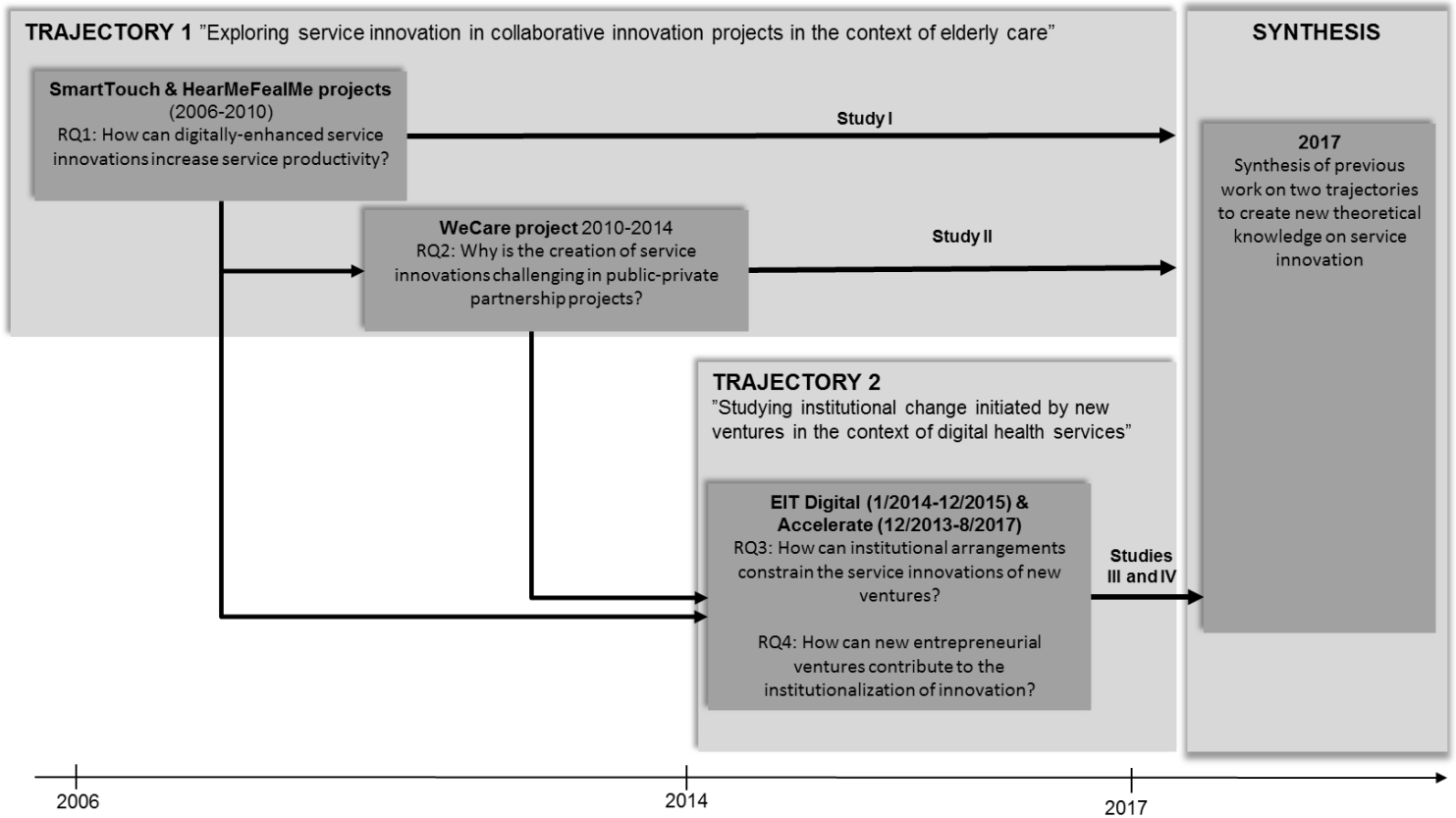


Figure 2. Overview of the research process of the study.

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 generalisability 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 general[4] 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; Järvensivu 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 subjectivity (Järvensivu and Törnroos, 2010). In practice, this community-based knowledge creation has taken place in numerous interviews during which the knowledge is socially constructed between 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-)positivistic case studies (e.g. Yin, 2003b). Stake (2000) noted that an interpretive case study design emphasizes optimization of understanding the case instead of generalisation 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 interpretation 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 (Järvensivu 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 observations. 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 preconceptions', 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 movement 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 project[5] 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,

[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

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.

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

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 two cases explored how digitalization changed service processes and service 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 analyse 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

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

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 to 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 analyse 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[6] 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

[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.

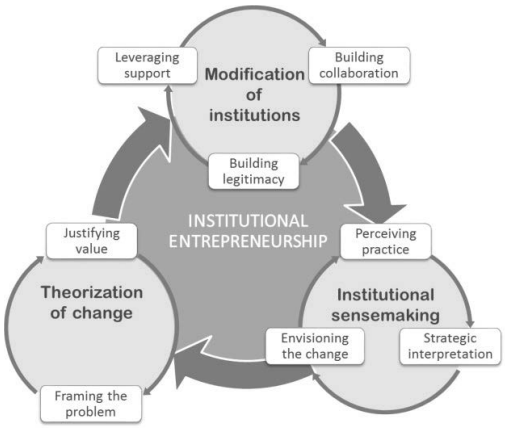


Figure 4. The process of institutional entrepreneurship (Wallin & Fuglsang, 2017).

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.

Context	Aim of the study	Main contribution to the studied phenomenon, empirical insights and theoretical contributions
Creation of service innovations in the context of home care Innovation project under the European innovation programme	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.
	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 Business accelerator programme focusing on digital health	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.

		Theoretical contribution: • 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.
	To understand how new ventures can change institutions to enable the success of service innovations (RQ IV)	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 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[7] 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 digitization 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.

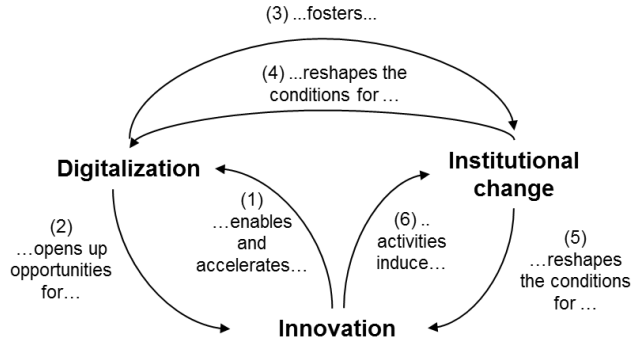


Figure 5. Three interconnected phenomena central to the thesis.

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 Möslein, 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. Moreover, 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 determination 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 context 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 resistance 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 technology 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, managerial 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, repetitive 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 significant 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 capacity 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 innovators 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 example, they may realize that the taken-for-granted beliefs go against the designed value propositions. 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 especially 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 embedded 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 innovations

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 especially 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 development within a restricted and protected incubation environment may have negative consequences on innovation activities. Two effects are identified – institutional constraints and blindness – 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 constraint emerges from the fact that the programmes can be seen as a set of institutions that provides 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 programmes' 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 subsection 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 Analysing 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 emphasise 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*[8] (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 principles[9], 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

[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[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 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.

[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.

7 References

AAL (2009) *Ambient Assisted Living (AAL) Joint Programme: Call for Proposals 2009 - 'ICT based solutions for Advancement of Social Interaction of Elderly People'*. Available at: http://www.aal-europe.eu/aal-2009-2.

AAL (2014) *Ambient Assisted Living Joint Programme - ICT for Ageing Well*. Available at: http://www.aal-europe.eu (Accessed: 26 June 2015).

Aanesen, M., Lotherington, A. T. and Olsen, F. (2011) 'Smarter elder care? A cost-effectiveness analysis of implementing technology in elder care', *Health Informatics Journal*, 17(3), pp. 161–172. doi: 10.1177/1460458211409716.

Abascal, J. and Civit, A. (2000) 'Mobile Communication for People with Disabilities and Older People: New Opportunities for Autonomous Life', in *6th ERCIM Workshop 'User Interfaces for All'*.

Acs, Z. J. (2008) 'Foundations of High Impact Entrepreneurship', *Foundations and Trends in Entrepreneurship*, 4(6), pp. 535–620. doi: http://dx.doi.org/10.1561/0300000025.

Agarwal, R., Gao, G., DesRoches, C. and Jha, A. (2010) 'Research Commentary—The Digital Transformation of Healthcare: Current Status and the Road Ahead', *Information Systems Research*, 21(4), pp. 796–809. doi: 10.1287/isre.1100.0327.

Aiken, M. and Hage, J. (1971) 'The organic organization and innovation', *Sociology*, 5(1), pp. 63–82.

Akaka, M. A. and Vargo, S. L. (2014) 'Technology as an operant resource in service (eco)systems', *Information Systems and e-Business Management*, 12(3), pp. 367–384. doi: 10.1007/s10257-013-0220-5.

Akaka, M. A., Vargo, S. L. and Lusch, R. F. (2013) 'The Complexity of Context: A Service Marketing', *Journal of International Marketing*, 21(4), pp. 1–20.

Akaka, M. A., Vargo, S. L. and Wieland, H. (2016) 'Extending the Context of Innovation: The Co-creation and Institutionalization of Technology and Markets', in Russo-Spena, T., Christian, M., and Nuutinen, M. (eds) *Innovating in practice*. Springer, pp. 43–57. doi: 10.1007/978-3-319-43380-6.

Alam, I. and Perry, C. (2002) 'A customer-oriented new service development process', *Journal of Services Marketing*, 16(6), pp. 515–534. doi: 10.1108/08876040210443391.

Alvesson, M. and Sköldberg, K. (2017) *Reflexive Methodology: New Vistas for Qualitative Research*. 3rd edn. Thousand Oaks, California: Sage Publications Inc.

Anderson, J. G. (2007) 'Social, ethical and legal barriers to E-health', *International Journal of Medical Informatics*, 76(5–6), pp. 480–483. doi: 10.1016/j.ijmedinf.2006.09.016.

Anderson, L. and Ostrom, A. L. (2015) 'Transformative Service Research', *Journal of Service Research*. SAGE PublicationsSage CA: Los Angeles, CA, 18(3), pp. 243–249. doi: 10.1177/1094670515591316.

Anderson, L., Ostrom, A. L. and Bitner, M. J. (2011) *Surrounded by services: A new lens for examining the influence of services as social structures on well-being.*

Anderson, L., Ostrom, A. L., Corus, C., Fisk, R. P., Gallan, A. S., Giraldo, M., Mende, M., Mulder, M., Rayburn, S. W., Rosenbaum, M. S., Shirahada, K. and Williams, J. D. (2013) 'Transformative service research: An agenda for the future', *Journal of Business Research*. Elsevier, 66(8), pp. 1203–1210. doi: 10.1016/J.JBUSRES.2012.08.013.

Archer, M. (2003) *Structure, Agency and the Internal Conversation*. Cambridge: Cambridge University Press.

Arnaert, A. and Delesie, L. (2001) 'Telenursing for the elderly. The case for care via video-telephony', *Journal of telemedicine and telecare*, 7(6), pp. 311–316. doi: 10.1258/1357633011936912.

Arthur, B. W. (2009) *The Nature of Technology: What It Is and How It Evolves*. New York: Free Press.

Asch, D. A. and Volpp, K. G. (2012) 'What Business Are We In? The Emergence of Health as the Business of Health Care', *New England Journal of Medicine*. Massachusetts Medical Society , 367(10), pp. 888–889. doi: 10.1056/NEJMp1206862.

Autio, E., Kenney, M., Mustar, P., Siegel, D. and Wright, M. (2014) 'Entrepreneurial innovation: The importance of context', *Research Policy*. Elsevier B.V., 43(7), pp. 1097–1108. doi: 10.1016/j.respol.2014.01.015.

Autio, E. and Rannikko, H. (2016) 'Retaining winners: Can policy boost high-growth entrepreneurship?', *Research Policy*. Elsevier B.V., 45(1), pp. 42–55. doi: 10.1016/j.respol.2015.06.002.

Barile, S., Saviano, M. and Polese, F. (2014) 'Information asymmetry and co-creation in health care services', *Australasian Marketing Journal (AMJ)*. Elsevier, 22(3), pp. 205–217. doi: 10.1016/J.AUSMJ.2014.08.008.

Barlow, J., Bayer, S. and Curry, R. (2006) 'Implementing complex innovations in fluid multi-stakeholder environments: Experiences of "telecare"', *Technovation*, 26(3), pp. 396–406. doi: 10.1016/j.technovation.2005.06.010.

Barnett, J., Vasileiou, K., Djemil, F., Brooks, L. and Young, T. (2011) 'Understanding innovators' experiences of barriers and facilitators in implementation and diffusion of healthcare service innovations: a qualitative study', *BMC health services research*. BioMed Central Ltd, 11(342), pp. 1–12.

Barras, R. (1986) 'Towards a theory of innovation in services', *Research Policy*, 15, pp. 161–173.

Barrett, M., Davidson, E. and Vargo, S. L. (2015) 'Service Innovation in the Digital Age: Key Contributions and Future Directions', *MIS Quarterly*, 39(1), pp. 135–154.

Battilana, J. (2007) *Initiating divergent organizational change: The enabling role of actors' social position*. 07–053.

Battilana, J. (2011) 'The Enabling Role of Social Position in Diverging from the Institutional Status Quo: Evidence from the UK National Health Service', *Organization Science*, 22(4), pp. 817–834. doi: 10.1287/orsc.1100.0574.

Battilana, J., Leca, B. and Boxenbaum, E. (2009) 'How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship', *The Academy of Management Annals*, 3(1), pp. 65–107. doi: 10.1080/19416520903053598.

Baumol, W. J. (2002) *The free-market innovation machine: analyzing the growth miracle of capitalism*. Princeton University Press.

Beckert, J. (1999) 'Agency, Entrepreneurship, and Institutional Change. The Role of Strategic Choice and Institutionalized Practices in Organizations', *Organization Science*, 20(5), pp. 777–799.

Beirao, G., Patricio, L. and Fisk, R. P. (2011) 'Value cocreation in service ecosystems: Investigating health care at the micro, meso, and macro levels', *Journal of Service Management*, 28(2017), pp. 227–249. doi: 10.1108/JHOM-09-2016-0165.

Benson, J. K. (1977) 'Organizations: A Dialectical View', *Administrative Science Quarterly*, 22(1), pp. 1–21. Available at: http://www.jstor.org/stable/2391741.

Berger, P. L. and Luckmann, T. (1966) 'The social construction of reality', *Penguin Group*, p. 249. doi: 10.2307/323448.

Berggren, C., Magnusson, T. and Sushandoyo, D. (2015) 'Transition pathways revisited: Established firms as multi-level actors in the heavy vehicle industry', *Research Policy*. Elsevier B.V., 44(5), pp. 1017–1028. doi: 10.1016/j.respol.2014.11.009.

Bernardi, R. (2017) 'Innovation in Healthcare through Rhetorical Strategies', *Journal of the AIS*, 18(2), pp. 81–112.

Berwick, D. (2003) 'Disseminating innovations in health care', *JAMA*, 289(15), pp. 1969–1975. doi: doi:10.1001/jama.289.15.1969.

Bessant, J., Lehmann, C. and Möslein, K. (2014) *Driving Service Productivity. Value-Creation Through Innovation*. Spinger International Publishing.

Biemans, W. G., Griffin, A. and Moenaert, R. K. (2016) 'New Service Development: How the Field Developed, Its Current Status and Recommendations for Moving the Field Forward', *Journal of Product Innovation Management*, 33(4), pp. 382–397. doi: 10.1111/jpim.12283.

Bill, J. A. and Hardgrave, R. L. (1981) *Comparative Politics: The Quest for Theory*. Washington, DC, USA: Bell & Howell, University Press of America.

Bitner, M. J. and Gremler, D. D. (2010) 'Technology's Impact on the Gaps Model of Service Quality', in Maglio, P. P., Kieliszewski, C. A., and Spohrer, J. C. (eds) *Handbook of Service Science*. Boston, MA: Springer US (Service Science: Research and Innovations in the Service Economy). doi: 10.1007/978-1-4419-1628-0.

Black, N. (1997) 'Health services research: saviour or chimera?', *The Lancet*, 349(9068), pp. 1834–1836. doi: 10.1016/S0140-6736(96)12164-4.

Blank, S. (2013) 'Why the Lean Start-up changes everything', *Harvard business review*, (May), pp. 635–72.

Bourdieu, P. (1990) *The Logic of Practice*. Stanford, CA: Stanford University Press.

Bowen, S., McSeveny, K., Lockley, E., Wolstenholme, D., Cobb, M. and Dearden, A. (2013) 'How was it for you? Experiences of participatory design in the UK health service', *CoDesign*. Taylor & Francis, 9(4), pp. 230–246. doi: 10.1080/15710882.2013.846384.

van den Broek, J., Boselie, P. and Paauwe, J. (2014) 'Multiple Institutional Logics in Health Care: "Productive Ward: Releasing Time to Care"', *Public Management Review*, 16(1), pp. 1–20. doi: 10.1080/14719037.2013.770059.

Brynjolfsson, E. (1993) 'The productivity paradox of information technology', *Communications of the ACM*, 36(12), pp. 66–77. doi: 10.1145/163298.163309.

Callaghan, G. and Wistow, G. (2006) 'Governance and public involvement in the British National Health Service: Understanding difficulties and developments', *Social Science & Medicine*, 63(9), pp. 2289–2300. doi: 10.1016/j.socscimed.2006.05.023.

Carcary, M. (2009) 'The research audit trail-enhancing trustworthiness in qualitative inquiry', *The Electronic Journal of Business Research Methods*, 7(1), pp. 11–24.

Carlborg, P., Kindström, D. and Kowalkowski, C. (2013) 'A lean approach for service productivity improvements: synergy or oxymoron?', *Managing Service Quality: An International Journal*, 23(4), pp. 291–304. doi: 10.1108/MSQ-04-2013-0052.

Carlborg, P., Kindström, D. and Kowalkowski, C. (2014) 'The evolution of service innovation research: a critical review and synthesis', *The Service Industries Journal*, 34(5), pp. 373–398. doi: 10.1080/02642069.2013.780044.

Caronna, C. A. (2004) 'The Misalignment of Institutional "Pillars": Consequences for the U.S. Health Care Field', *Journal of Health and Social Behavior*. American Sociological Association, 45, pp. 45–58. doi: 10.2307/3653823.

Carter, C. F. and Williams, B. R. (1957) *Industry and technical progress: factors governing the speed of application of science*. London, UK: Oxford University Press.

Chandler, J. D. and Vargo, S. L. (2011) 'Contextualization and value-incontext: How context frames exchange', *Marketing Theory*, 11(1), pp. 35–49. doi: 10.1177/1470593110393713.

Chappell, N. L., Dlitt, B. H., Hollander, M. J., Miller, J. A. and McWilliam, C. (2004) 'Comparative costs of home care and residential care.', *The Gerontologist*, 44(3), pp. 389–400. doi: 10.1093/geront/44.3.389.

Chenail, R. J. (2010) 'Getting Specific about Qualitative Research Generalizability', *Journal of Ethnographic & Qualitative Research*, 5(1).

Chesbrough, H. (2006) *Open Innovation: The New Imperative for Creating And Profiting from Technology*, *booksgooglecom*. Harvard Business Press. Available at: http://www.amazon.com/Open-Innovation-Imperative-Profiting-Technology/dp/1422102831.

Chesbrough, H. and Spohrer, J. (2006) 'A research manifesto for services science', *Communications of the ACM*, 49(7), pp. 33–40. doi: 10.1145/1139922.1139945.

Chowdhury, J. and Johnson, S. (2012) 'Hacking Health: Bottom-up Innovation for Healthcare', *Technology Innovation Management Review*, (July), pp. 31–36.

Ciasullo, M. V., Cosimato, S., Palumbo, R. and Storlazzi, A. (2017) 'Value Co-creation in the Health Service Ecosystems: The Enabling Role of Institutional Arrangements', *International Business Research*, 10(12), p. 222. doi: 10.5539/ibr.v10n12p222.

Ciasullo, M. V, Cosimato, S. and Pellicano, M. (2017) 'Service Innovations in the Healthcare Service Ecosystem: A Case Study', *Systems*, 5(2), p. 37. doi: 10.3390/systems5020037.

Clancy, C. M. (2011) 'Patient Engagement in Health Care', *Health Services Research*. Blackwell Publishing Inc, 46(2), pp. 389–393. doi: 10.1111/j.1475-6773.2011.01254.x.

Cleary, P. D. (1997) 'Subjective and Objective Measures of Health: Which is Better When?', *Journal of Health Services Research and Policy*. SAGE PublicationsSage UK: London, England, 2(1), pp. 3–4. doi: 10.1177/135581969700200102.

Cliff, J. E., Jennings, P. D. and Greenwood, R. (2006) 'New to the game and questioning the rules: The experiences and beliefs of founders who start imitative versus innovative firms', *Journal of Business Venturing*, 21(5), pp. 633–663. doi: 10.1016/j.jbusvent.2005.02.010.

Cooke, P. (1998) 'Introduction: Origins of the concept', in Braczyk, H.-J., Cooke, P., and Heidenreich, M. (eds) *Regional innovation systems: the role of governances in a globalized world*. UCL Press, p. 499.

Coombs and Miles, I. (2000) 'Innovation, Measurement and Services: The new Problematique', in Metcalfe, J. S. and Miles, I. (eds) *Innovation Systems in the Service Economy*.

Creswell, J. W. (2014) *Research Design: Qualitative, quantitative and mixed methods approaches*. 4th edn. Thousand Oaks, California: Sage Publications Inc.

Currie, G., Lockett, A., Finn, R., Martin, G. and Waring, J. (2012) 'Institutional Work to Maintain Professional Power: Recreating the Model of Medical Professionalism', *Organization Studies*,

33(7), pp. 937–962. doi: 10.1177/0170840612445116.

Currie, G. and Spyridonidis, D. (2016) 'Interpretation of Multiple Institutional Logics on the Ground: Actors Position, their Agency and Situational Constraints in Professionalized Contexts', *Organization Studies*, 37(1), pp. 77–97. doi: 10.1177/0170840615604503.

Currie, W. L. and Swanson, E. B. (2009) 'Special issue on institutional theory in information systems research: contextualizing the IT artefact', *Journal of Information Technology*, 24(4), pp. 283–285. doi: 10.1057/jit.2009.17.

Dacin, M. T., Goodstein, J. and Scott, W. R. (2002) 'Institutional theory and institutional change: Introduction to the special Research Forum', *The Academy of Management Journal*, 45(1), pp. 43–56. doi: 10.5465/AMJ.2002.6283388.

Danaher, T. S. and Gallan, A. S. (2016) 'Service Research in Health Care', *Journal of Service Research*, 19(4), pp. 433–437. doi: 10.1177/1094670516666346.

Davis, F. D. (1989) 'Perceived Usefulness, Perceived Ease Of Use, And User Acceptance', *MIS Quarterly*, 13(3), pp. 319–339. doi: 10.2307/249008.

Defazio, D., Lockett, A. and Wright, M. (2009) 'Funding incentives, collaborative dynamics and scientific productivity: Evidence from the EU framework program', *Research Policy*, 38(2), pp. 293–305. doi: 10.1016/j.respol.2008.11.008.

Dehzad, F., Hilhorst, C., de Bie, C. and Claassen, E. (2014) 'Adopting health apps, What' s hindering doctors and patients?', *Health*, 6(16), pp. 2204–2217. doi: 10.4236/health.2014.616256.

Denis, J.-L., Hébert, Y., Langley, A., Lozeau, D. and Trottier, L.-H. (2002) 'Explaining Diffusion Patterns for Complex Health Care Innovations', *Health Care Management Review*, 27(3), pp. 60–73. doi: 10.1097/00004010-200207000-00007.

Denzin, N. and Lincoln, Y. (2017) *SAGE Handbook of Qualitative Research*. 5th edn. Thousand Oaks, California: Sage Publications Inc.

DiMaggio, P. (1988) 'Interest and agency in institutional theory', in Zucker, L. (ed.) *Institutional patterns and culture*. Cambridge, MA: Ballinger Publishing Company, pp. 3–22.

DiMaggio, P. and Powell, W. (1983) 'The Iron Cage Revisited: Institutional isomorphism and collective rationality in organizational fields', *American Sociological Review*, 48(2), pp. 147–160.

Djellal, F. and Gallouj, F. (2008) 'A model for analysing the innovation dynamic in services: the case of "assembled" services', *International Journal of Services Technology and Management*, 9(3/4), pp. 285–304. doi: 10.1504/IJSTM.2008.019702.

Djellal, F. and Gallouj, F. (2013) 'The productivity challenge in services: Measurement and strategic perspectives', *Service Industries Journal*, 33(3–4), pp. 282–299. doi: 10.1080/02642069.2013.747519.

Dorado, S. (2005) 'Institutional Entrepreneurship, Partaking, and Convening', *Organization Studies*, 26(3), pp. 385–414. doi: 10.1177/0170840605050873.

Dorado, S. (2013) 'Small Groups as Context for Institutional Entrepreneurship: An Exploration of the Emergence of Commercial Microfinance in Bolivia', *Organization Studies*, 34(4), pp. 533–557. doi: 10.1177/0170840612470255.

Dosi, G. (1988) 'Sources, Procedures, and Microeconomic Effects of Innovation', *Journal of Economic Literature*. American Economic Association, 26(3), pp. 1120–1171. doi: 10.2307/2726526.

Dosi, G., Llerena, P. and Labini, M. S. (2006) 'The relationships between science, technologies

and their industrial exploitation: An illustration through the myths and realities of the so-called “European Paradox”’, *Research Policy*, 35(10), pp. 1450–1464. doi: 10.1016/j.respol.2006.09.012.

Drejer, I. (2004) ‘Identifying innovation in surveys of services: a Schumpeterian perspective’, *Research Policy*, 33(3), pp. 551–562. doi: 10.1016/j.respol.2003.07.004.

Dubois, A. and Gadde, L.-E. (2002) ‘Systematic combining: an abductive approach to case research’, *Journal of Business Research*, 55(7), pp. 553–560. doi: 10.1016/S0148-2963(00)00195-8.

Dubois, A. and Gadde, L.-E. (2014) ‘“ Systematic combining ”— A decade later’, *Journal of Business Research*. Elsevier Inc., 67(6), pp. 1277–1284. doi: 10.1016/j.jbusres.2013.03.036.

Duncan, A. K. and Breslin, M. A. (2009) ‘Innovating health care delivery: the design of health services’, *Journal of Business Strategy*. Edited by V. Kumar. Emerald Group Publishing Limited, 30(2/3), pp. 13–20. doi: 10.1108/02756660910942427.

Eberhardt, B., Fachinger, U. and Henke, K.-D. (2010) ‘Better health and ambient assisted living (AAL) from a global , regional and local economic perspective’, *International Journal of Behavioural and healthcare research*, 2(2), pp. 172–191.

Edvardsson, B. (2013) ‘A new conceptualization of service innovation grounded in S-D logic and service systems’, *International Journal of Quality and Service Sciences*, 5(1), pp. 19–31. doi: 10.1108/17566691311316220.

Edvardsson, B. (2014) ‘Service-dominant logic and service science as lenses for service productivity’, in Bessant, J., Lehmann, C., and Möslein, K. (eds) *Driving Service Productivity*. Spinger International Publishing, pp. 73–91. doi: 10.1007/978-3-319-05975-4.

Edvardsson, B. and Olsson, J. (1996) ‘Key Concepts for New Service Development’, *The Service Industries Journal*, 16(2). doi: 10.1080/02642069600000019.

Eisenhardt, K. M. (1989) ‘Building Theories from Case Study Research’, *The Academy of Management Review*. Academy of Management, 14(4), pp. 532–550. doi: 10.2307/258557.

Eisenmann, T., Ries, E. and Dillard, S. (2011) *Hypothesis-Driven Entrepreneurship: The Lean Startup*.

Eisma, R., Dickinson, A., Goodman, J., Syme, A., Tiwari, L. and Newell, A. F. (2004) ‘Early user involvement in the development of information technology-related products for older people’, *Universal Access in the Information Society*, 3(2), pp. 131–140. doi: 10.1007/s10209-004-0092-z.

Elg, M., Engström, J., Witell, L. and Poksinska, B. (2012) ‘Co-creation and learning in health-care service development’, *Journal of Service Management*. Edited by R. Verma. Emerald Group Publishing Limited, 23(3), pp. 328–343. doi: 10.1108/09564231211248435.

El Enany, N., Currie, G. and Lockett, A. (2013) ‘A paradox in healthcare service development: Professionalization of service users’, *Social Science and Medicine*. Elsevier Ltd, 80, pp. 24–30. doi: 10.1016/j.socscimed.2013.01.004.

Van den Ende, J. and Kemp, R. (1999) ‘Technological transformations in history: how the computer regime grew out of existing computing regimes’, *Research Policy*, 28(8), pp. 833–851. doi: 10.1016/S0048-7333(99)00027-X.

Eparvier, P. (2005) ‘Methods of evolutionism and rivalry with neoclassical analysis. The example of the National System of Innovation concept’, *Journal of Economic Methodology*, 12(4), pp. 563–579. doi: 10.1080/13501780500343664.

European Commission (1995) ‘Green Paper on Innovation’, *Green Papers*, (December), p. 136.

doi: 10.4135/9781412953993.n184.

Fajans, P., Simmons, R. and Ghiron, L. (2006) 'Helping public sector health systems innovate: the strategic approach to strengthening reproductive health policies and programs.', *American journal of public health*. American Public Health Association, 96(3), pp. 435–40. doi: 10.2105/AJPH.2004.059907.

Fisk, R. P., Brown, S. W. and Bitner, M. J. (1993) 'Tracking the evolution of the services marketing literature', *Journal of Retailing*, 69(1), pp. 61–103.

Fitzgerald, L., Ferlie, E. and Hawkins, C. (2003) 'Innovation in healthcare: how does credible evidence influence professionals?', *Health and Social Care in the Community*, 11(3), pp. 219–228. doi: 10.1046/j.1365-2524.2003.00426.x.

Fitzgerald, L., Ferlie, E., Wood, M. and Hawkins, C. (2002) 'Interlocking interactions, the diffusion of innovations in health care', *Human Relations*, 55(12), pp. 1429–1449. doi: 10.1177/001872602128782213.

Fligstein, N. (1997) 'Social skill and institutional theory', *American Behavioral Scientist*, 40(4), pp. 397–405.

Fligstein, N. (2013) 'Understanding stability and change in fields', *Research in Organizational Behavior*. Elsevier Ltd, 33, pp. 39–51. doi: 10.1016/j.riob.2013.10.005.

Focault, M. (1972) *The Archaeology of Knowledge and the Discourse on Language*. New York: Pantheon Books.

Fox, A., Gardner, G. and Osborne, S. (2015) 'A theoretical framework to support research of health service innovation', *Australian Health Review*. Csiro Publishing, 39(1), p. 70. doi: 10.1071/AH14031.

Freeman, C. (1974) *The Economics of Industrial Innovation*. Penguin.

Freeman, J. and Engel, J. S. (2007) 'Models of innovation: Startups and mature corporations', *California Management Review*, 50(1), pp. 93–119.

Freund, L. E. and Spohrer, J. C. (2012) 'The Human Side of Service Engineering', *Human Factors and Ergonomics in Manufacturing & Service Industries*, 0(0), pp. 1–9. doi: 10.1002/hfm.

Friedland, R. and Alford, R. (1991) 'Bringing Society Back In: Symbols, Practices, and Institutional Contradictions', in Powell, W. and DiMaggio, P. (eds) *The new institutionalism and organizational analysis*, pp. 232–263.

Frow, P., McColl-Kennedy, J. R. and Payne, A. (2016) 'Co-creation practices: Their role in shaping a health care ecosystem', *Industrial Marketing Management*. Elsevier B.V., 56, pp. 24–39. doi: 10.1016/j.indmarman.2016.03.007.

Fuchs, V. R. (1965) 'The growing importance of the service industries', *The Journal of Business*, 38, pp. 344–373.

Fuglsang, L. and Sundbo, J. (2002) *Innovation as Strategic Reflexivity*. London: Routledge.

Furrer, O. and Sollberger, P. (2007) 'The dynamics and evolution of the service marketing literature: 1993-2003', *Service Business*, 1(2), pp. 93–117. doi: 10.1007/s11628-006-0006-7.

Gagnon, M.-P., Desmartis, M., Labrecque, M., Car, J., Pagliari, C., Pluye, P., Frémont, P., Gagnon, J., Tremblay, N. and Légaré, F. (2012) 'Systematic Review of Factors Influencing the Adoption of Information and Communication Technologies by Healthcare Professionals', *Journal of Medical Systems*, 36(1).

Gallan, A. S., Jarvis, C. B., Brown, S. W. and Bitner, M. J. (2013) 'Customer positivity and

participation in services: an empirical test in a health care context', *Journal of the Academy of Marketing Science*. Springer US, 41(3), pp. 338–356. doi: 10.1007/s11747-012-0307-4.

Gallouj, F. and Savona, M. (2009) 'Innovation in services: A review of the debate and a research agenda', *Journal of Evolutionary Economics*, 19(2), pp. 149–172. doi: 10.1007/s00191-008-0126-4.

Gallouj, F. and Weinstein, O. (1997) 'Innovation in services', *Research Policy*, 26(4–5), pp. 537–556. doi: 10.1016/S0048-7333(97)00030-9.

Gallouj, F. and Windrum, P. (2009) 'Services and services innovation', *Journal of Evolutionary Economics*. Springer-Verlag, 19(2), pp. 141–148. doi: 10.1007/s00191-008-0123-7.

Galvin, T. L. (2002) 'Examining Institutional Change: Evidence from the Founding Dynamics of U.S. Health Care Interest Associations', *Academy of Management Journal*. Academy of Management, 45(4), pp. 673–696. doi: 10.2307/3069304.

Garmann-Johnsen, N. F. (2015) 'What seems to be the problem?-A study of connections between national contexts and regional e-health strategies', *Health Policy and Technology*. Elsevier, 4(2), pp. 144–155. doi: 10.1016/j.hlpt.2015.02.007.

Garud, R., Gehman, J. and Giuliani, A. P. (2014) 'Contextualizing entrepreneurial innovation: A narrative perspective', *Research Policy*. Elsevier B.V., 43(7), pp. 1177–1188. doi: 10.1016/j.respol.2014.04.015.

Geels, F. W. (2002) 'Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study', *Research Policy*, 31, pp. 1257–1274. doi: 10.1016/S0048-7333(02)00062-8.

Geels, F. W. (2004a) 'From sectoral systems of innovation to socio-technical systems: Insights about dynamics and change from sociology and institutional theory', *Research Policy*, 33(6–7), pp. 897–920. doi: 10.1016/j.respol.2004.01.015.

Geels, F. W. (2004b) 'Understanding system innovations: a critical literature review and a conceptual synthesis', in Elzen, B., Geels, F. W., and Green, K. (eds) *System Innovation and the Transition to Sustainability: Theory, Evidence and Policy*. Edward Elgar.

Geels, F. W. (2005) 'Co-evolution of technology and society: The transition in water supply and personal hygiene in the Netherlands (1850-1930) - A case study in multi-level perspective', *Technology in Society*, 27(3), pp. 363–397. doi: 10.1016/j.techsoc.2005.04.008.

Geels, F. W. (2006) 'Co-evolutionary and multi-level dynamics in transitions: The transformation of aviation systems and the shift from propeller to turbojet (1930-1970)', *Technovation*, 26(9), pp. 999–1016. doi: 10.1016/j.technovation.2005.08.010.

Geels, F. W. and Kemp, R. (2007) 'Dynamics in socio-technical systems: Typology of change processes and contrasting case studies', *Technology in Society*, 29(4), pp. 441–455. doi: 10.1016/j.techsoc.2007.08.009.

Geels, F. W. and Schot, J. (2007) 'Typology of sociotechnical transition pathways', *Research Policy*, 36(3), pp. 399–417. doi: 10.1016/j.respol.2007.01.003.

Genet, N., Boerma, W. G., Kringos, D. S., Bouman, A., Francke, A. L., Fagerström, C., Melchiorre, M. G., Greco, C. and Devillé, W. (2011) 'Home care in Europe: a systematic literature review.', *BMC health services research*. BioMed Central Ltd, 11(1), p. 207. doi: 10.1186/1472-6963-11-207.

Gergen, K. J. (1985) 'The social constructionist movement in modern psychology.', *American Psychologist*, 40(3), pp. 266–275. doi: 10.1037/0003-066X.40.3.266.

Gershuny, J. I. and Miles, I. (1983) *The New Service Economy: The Transformation of*

Employment in Industrial Societies. London, UK: Frances Pinter Publishers.

Giddens, A. (1984) *The Constitution of Society*. Berkeley, US: University of California Press.

Gioia, D. A. and Chittipeddi, K. (1991) 'Sensemaking and Sensegiving in Strategic Change Initiation', *Strategic Management Journal*, 12, pp. 433–448.

Godin, B. (2006) 'The Linear Model of Innovation', *Science, Technology, & Human Values*, 31(6), pp. 639–667.

Gopalakrishnan, S. and Damanpour, F. (1997) 'A Review of Innovation Research in Economics , Sociology and Technology Management', *Omega - International Journal of Management Science*, 25(I), pp. 15–28.

Gray, J. and Rumpe, B. (2015) 'Models for digitalization', *Software and Systems Modeling*. Springer Berlin Heidelberg, 14(4), pp. 1319–1320. doi: 10.1007/s10270-015-0494-9.

Greenwood, R. and Hinings, C. R. (1996) 'Understanding Radical Organizational Change: Bringing together the Old and the New Institutionalism', *The academy of Management Review*, 21(4), pp. 1022–1054.

Greenwood, R., Oliver, C., Sahlin, K. and Suddaby, R. (2008) *The SAGE handbook of Organizational Institutionalism*. Thousand Oaks, California: Sage Publications Inc.

Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. R. and Lounsbury, M. (2011) 'Institutional Complexity and Organizational Responses', *The Academy of Management Annals*, 5(1), pp. 317–371. doi: 10.1080/19416520.2011.590299.

Greenwood, R. and Suddaby, R. (2006) 'Institutional Entrepreneurship in Mature Fields: The Big Five Accounting Firms', *Academy of Management Journal*, 49(1), pp. 27–48. doi: 10.5465/AMJ.2006.20785498.

Greenwood, R., Suddaby, R. and Hinings, C. R. (2002) 'Theorizing change: The role of professional associations in the transformation of institutionalized fields', *Academy of Management Journal*, 45(1), pp. 58–80.

Groen, A., Wakkee, I. and De Weerd-Nederhof, P. (2008) 'Managing Tensions in a High-tech Start-up: An Innovation Journey in Social System Perspective', *International Small Business Journal*, 26(1), pp. 57–81. doi: 10.1177/0266242607084659.

Gronroos, C. (2011) 'Value co-creation in service logic: A critical analysis', *Marketing Theory*, 11(3), pp. 279–301. doi: 10.1177/1470593111408177.

Grönroos, C. (1978) 'A Service-Orientated Approach to Marketing of Services', *European Journal of Marketing*. MCB UP Ltd, 12(8), pp. 588–601. doi: 10.1108/EUM0000000004985.

Grönroos, C. (1982) 'An Applied Service Marketing Theory', *European Journal of Marketing*, 16(7), pp. 30–41. doi: 10.1108/EUM0000000004859.

Grönroos, C. (1984) 'A Service Quality Model and its Marketing Implications', *European Journal of Marketing*. MCB UP Ltd, 18(4), pp. 36–44. doi: 10.1108/EUM0000000004784.

Grönroos, C. and Ojasalo, K. (2004) 'Service productivity - Towards a conceptualization of the transformation of inputs into economic results in services', *Journal of Business Research*, 57(4), pp. 414–423. doi: 10.1016/S0148-2963(02)00275-8.

Grönroos, C. and Ojasalo, K. (2015) 'Service productivity as mutual learning', *International Journal of Quality and Service Sciences*, 7(2/3), pp. 296–311.

Gummesson, E. (1998) 'Productivity, quality and relationship marketing in service operations', *International Journal of Contemporary Hospitality Management*, 10(1), pp. 4–15. doi:

10.1108/IJCHM-01-2014-0017.

Hammar, T., Raatikainen, R. and Perälä, M.-L. (1999) 'Sosiaali- ja terveyspalvelut tulevaisuudessa : 60-65-vuotiaiden odotukset palveluista 80-vuotiaana', *Gerontologia*. Jyväskylä : Kasvun ja vanhenemisen tutkijat ry, 13. Available at: http://www.doria.fi/handle/10024/18186?show=full.

Hampel, C., Lawrence, T. B. and Tracey, P. (2017) 'Institutional Work: Taking stock and Making It Matter', in Greenwood, R., Oliver, C., Lawrence, T. B., and Meyer, R. E. (eds) *The SAGE Handbook of Organizational Institutionalism*. 2nd edn. Thousand Oaks, California: Sage Publications Inc, pp. 558–590.

Hansen, H., Randolph, A., Chen, S., Robinson, R. E., Marin, A., Hwan, J., Hansen, H., Randolph, A., Chen, S., Robinson, R. E., Marin, A. and Hwan, J. (2015) 'Institutional judo: how entrepreneurs use institutional forces to create change', *Organizational Change Management*, 28(6), pp. 1076–1093.

Hardy, C. and Maguire, S. (2008) 'Institutional entrepreneurship', in Greenwood, R., Oliver, C., Suddaby, R., and Sahlin, K. (eds) *The SAGE Handbook of Organizational Institutionalism*. Sage Publications, p. 928. doi: http://dx.doi.org/10.4135/9781849200387.n8.

Hardy, C. and Maguire, S. (2017) 'Institutional entrepreneurship and changing fields', in Greenwood, R., Oliver, C., Lawrence, T. B., and Meyer, R. E. (eds) *SAGE Handbook of Organizational Institutionalism*. 2nd edn. Thousand Oaks, California: Sage Publications Inc, pp. 262–280.

Hardyman, W., Daunt, K. L. and Kitchener, M. (2015) 'Value Co-Creation through Patient Engagement in Health Care: A micro-level approach and research agenda', *Public Management Review*. Routledge, 17(1), pp. 90–107. doi: 10.1080/14719037.2014.881539.

Harjumaa, M. and Isomursu, M. (2012) 'Field Work With Older Users – Challenges in Design and Evaluation of Information Systems', *The Electronic Journal Information Systems Evaluation*, 15(1), pp. 50–62.

Henfridsson, O. and Yoo, Y. (2013) 'The Liminality of Trajectory Shifts in Institutional Entrepreneurship', *Organization Science*, 25(3), pp. 932–950.

Hennala, L., Melkas, H. and Pekkarinen, S. (2011) 'Customers as Innovators in Senior Service Markets: An Examination of Innovation Potential and Characteristics', *International Journal of Service Science, Management, Engineering, and Technology*. Edited by R. D. Tennyson and P. Ordóñez de Pablos. Pennsylvania, USA: IGI Global, 2(1), pp. 30–51.

von Hippel, E. (2005) *Democratizing Innovation*. Available at: http://web.mit.edu/evhippel/www/democ1.htm.

Hirsch, T., Forlizzi, J., Hyder, E., Goetz, J., Kurtz, C. and Stroback, J. (2000) 'The ELDer project: social, emotional, and environmental factors in the design of elderlycare technologies', in *Proceedings on the 2000 conference on Universal Usability - CUU '00*. New York, USA: ACM Press, pp. 72–79. doi: 10.1145/355460.355476.

Holden, R. J. and Karsh, B.-T. (2010) 'The Technology Acceptance Model: Its past and its future in health care', *Journal of Biomedical Informatics*. Elsevier Inc., 43(1), pp. 159–172. doi: 10.1016/j.jbi.2009.07.002.

Holm, P. (1995) 'The Dynamics of Institutionalization: Transformation Processes in Norwegian Fisheries', *Administrative Science Quarterly*. Sage Publications, Inc.Johnson Graduate School of Management, Cornell University, 40(3), p. 398. doi: 10.2307/2393791.

Howells, J. and Green, A. E. (1986) 'Location, Technology and Industrial Organisation in U.K. Services', *Progress in Planning*, 26(2), pp. 83–184.

Hunter, D. (1983) 'Promoting Innovation in the Workplace', *British Medical Journal*, 286, pp. 736–738.

Håkansson, H. and Snehota, I. (1995) *Developing Relationships in Business Networks*. London: Routledge.

Häikiö, J. and et.al. (2007) 'Touch-based user interface for elderly users', in *Proceedings of the 9th international conference on Human computer interaction with mobile devices and services - MobileHCI '07*. New York, USA: ACM Press, pp. 289–296. doi: 10.1145/1377999.1378021.

Illeris, S. (1989) *Services and Regions in Europe*. Aldershot, UK: Gower Publishing Group.

Isomursu, M., Häikiö, J., Wallin, A. and Ailisto, H. (2008) 'Experiences from a Touch-Based Interaction and Digitally Enhanced Meal-Delivery Service for the Elderly', *Advances in Human-Computer Interaction*, 2008, pp. 1–16. doi: 10.1155/2008/931701.

Jacobsson, S., Lindholm-Dahlstrand, Å. and Elg, L. (2013) 'Is the commercialization of European academic R&D weak?—A critical assessment of a dominant belief and associated policy responses', *Research Policy*. Elsevier B.V., 42(4), pp. 874–885. doi: 10.1016/j.respol.2013.01.005.

Jaekel, M., Wallin, A. and Isomursu, M. (2015) 'Guiding Networked Innovation Projects Towards Commercial Success—a Case Study of an EU Innovation Programme with Implications for Targeted Open Innovation', *Journal of the Knowledge Economy*, 6(3). doi: 10.1007/s13132-015-0274-3.

James, J. (2013) 'Health Policy Brief: Patient Engagement', *Health Affairs*, pp. 1–5. doi: 10.1377/hpb2013.4.

Janssen, M. and Moors, E. H. M. (2013) 'Caring for healthcare entrepreneurs - Towards successful entrepreneurial strategies for sustainable innovations in Dutch healthcare', *Technological Forecasting and Social Change*. Elsevier Inc., 80(7), pp. 1360–1374. doi: 10.1016/j.techfore.2012.12.003.

Johne, A. and Storey, C. (1998) 'New service development: a review of the literature and annotated bibliography', *European Journal of Marketing*, 32(3), pp. 184–251.

Joiner, K. and Lusch, R. (2016) 'Evolving to a new service-dominant logic for health care', *Innovation and Entrepreneurship in Health*, 25. doi: 10.2147/IEH.S93473.

Järvensivu, T. and Törnroos, J. Å. (2010) 'Case study research with moderate constructionism: Conceptualization and practical illustration', *Industrial Marketing Management*. Elsevier Inc., 39(1), pp. 100–108. doi: 10.1016/j.indmarman.2008.05.005.

Jørgensen, U. (2012) 'Mapping and navigating transitions - The multi-level perspective compared with arenas of development', *Research Policy*. Elsevier B.V., 41(6), pp. 996–1010. doi: 10.1016/j.respol.2012.03.001.

Kaluzny, A. D. (1974) 'Innovation in health services: Theoretical framework and review of research.', *Health services research*, 9(2), pp. 101–120.

Kemp, R., Rip, A. and Schot, J. (2001) 'Constructing transition paths through the management of niches', in Garud, R. and Karnoe, P. (eds) *Path Dependence and Creation*. London: Lawrence Erlbaum, pp. 269–299.

Kendrick, J. W. (1988) 'Measurement of output and productivity in the service sector', in Inman, R. P. (ed.) *Managing the service economy: prospects and problems*. Cambridge University Press, pp. 111–123.

Kijima, K., Toivonen, M. and Ruutu, S. (2016) 'Service Ecosystems Innovation in Systemic Perspective: Transitions and Coevolutions', in Toivonen, M. (ed.) *Service Innovation: Novel ways*

of creating value in actor systems. Springer Japan, pp. 51–67.

Kindström, D. and Kowalkowski, C. (2009) 'Development of industrial service offerings: a process framework', *Journal of Service Management*, 20(2), pp. 156–172. doi: 10.1108/09564230910952753.

Kline, S. J. and Rosenberg, N. (1986) 'An Overview of Innovation', *European Journal of Innovation Management*, 38, pp. 275–305. doi: 10.1108/14601069810368485.

Kondra, A. and Hinings, C. R. (1998) 'Organizational Diversity and Change in Institutional Theory', *Organization Science*, 19(5), pp. 743–767. doi: 10.1177/017084069801900502.

Koskela-Huotari, K., Edvardsson, B., Jonas, J. M., Sörhammar, D. and Witell, L. (2016) 'Innovation in service ecosystems — Breaking, making, and maintaining institutionalized rules of resource integration', *Journal of Business Research*. Elsevier Inc., 69(8), pp. 2964–2971. doi: 10.1016/j.jbusres.2016.02.029.

Koskela-Huotari, K. and Vargo, S. L. (2016) 'Institutions as resource context', *Journal of Service Theory and Practice*, 26(2), pp. 163–178. doi: 10.1108/JSTP-09-2014-0190.

Kraatz, M. S. and Block, E. S. (2005) 'Organizational Implications of Institutional Pluralism', in Greenwood, R., Oliver, C., Sahlin-Andersson, K., and Suddaby, R. (eds) *The Handbook of Organizational Institutionalism*. 1st edn. Thousand Oaks, California: Sage Publications Inc.

Kvale, S. (1994) 'Validation as Communication and Action: On the Social Construction of Validity.', in *Annual Meeting of the American Educational Research Association*, p. 14. Available at: https://eric.ed.gov/?id=ED371020.

Kvale, S. (1995) 'The Social Construction of Validity', *Qualitative Inquiry*, 1(1), pp. 19–40.

Kwan, K.-M. and Tsang, E. W. K. (2001) 'Realism and Constructivism in Strategy Research: A critical Realist Response to Mir and Watson', *Strategic Management Journal*, 22(12), pp. 1163–1168.

Lancaster, K. J. (1966) 'A New Approach to Consumer Theory', *Journal of Political Economy*. The University of Chicago Press , 74(2), pp. 132–157. doi: 10.1086/259131.

Landström, H. and Lohrke, F. (2010) *Historical foundations of entrepreneurship research*. Edward Elgar. Available at: http://www.e-elgar.com/shop/eep/preview/book/isbn/9781849806947/ (Accessed: 9 December 2017).

Lanzolla, G. and Anderson, J. (2008) 'Digital transformation', *Business Strategy Review*.

LaPiere, R. (1965) *Social Change*. New York: McGraw Hill Book Company.

Lawrence, T. B., Hardy, C. and Phillips, N. (2002) 'Institutional Effects of Interorganizational Collaboration: The Emergence of Proto-Institutions', *Academy of Management Journal*, 45(1), pp. 281–290.

Lawrence, T. B., Leca, B. and Zilber, T. B. (2013) 'Institutional Work: Current Research, New Directions and Overlooked Issues', *Organization Studies*, 34(8), pp. 1023–1033. doi: 10.1177/0170840613495305.

Lawrence, T. B. and Phillips, N. (2004) 'From Moby Dick to Free Willy: Macro-Cultural Discourse and Institutional Entrepreneurship in Emerging Institutional Fields', *Organization*, 11(5), pp. 689–711. doi: 10.1177/1350508404046457.

Lawrence, T. B. and Suddaby, R. (2006a) *Institutions and institutional work*. London, UK: SAGE publications Ltd.

Lawrence, T. B. and Suddaby, R. (2006b) 'Institutions and Institutional Work', in *The SAGE*

Handbook of Organization Studies. 2nd edn. London, UK: SAGE publications Ltd, pp. 215–254. doi: 10.4135/9781848608030.n7.

Lawrence, T. B., Suddaby, R. and Leca, B. (2011) 'Institutional Work: Refocusing Institutional Studies of Organization', *Journal of Management Inquiry*, 20(1), pp. 52–58. doi: 10.1177/1056492610387222.

Leca, B., Battilana, J. and Boxenbaum, E. (2006) 'Taking stock on institutional entrepreneurship: What do we know? Where do we go?', in *Academy of Management Meetings*, pp. 1–44.

Leca, B., Battilana, J. and Boxenbaum, E. (2009) *Agency and Institutions : A Review of Institutional Entrepreneurship*. doi: 10.1111/j.1467-8683.2008.00685.x.

Leggott, K. T., Martin, M., Sklar, D., Helitzer, D., Rosett, R., Crandall, C., Vagh, F. and Mercer, D. (2016) 'Transformation of anesthesia for ambulatory orthopedic surgery: A mixed-methods study of a diffusion of innovation in healthcare', *Healthcare*. Elsevier, 4(3), pp. 181–187. doi: 10.1016/j.hjdsi.2015.09.003.

Lehoux, P., Roncarolo, F., Oliveira, R. and Silva, H. (2016) 'Medical innovation and the sustainability of health systems - a historical perspective on technological change in health', *Health Services Management Research*, 29(4), pp. 115–123.

Levy, D. and Scully, M. (2007) 'The Institutional Entrepreneur as Modern Prince: The Strategic Face of Power in Contested Fields', *Organization Studies*, 28(7), pp. 971–991. doi: 10.1177/0170840607078109.

Lewis, J. and Ritchie, J. (2003) 'Generalising from Qualitative Research', in Ritchie, J. Lewis, J. (ed.) *Qualitative research practice: A guide for social science students and researchers*. Thousand Oaks, California: Sage Publications Inc, pp. 263–286. doi: 10.4135/9781452230108.

Lewis, J., Ritchie, J., Ormston, R. and Morrel, G. (2014) 'Generalizing from qualitative research', in Ritchie, J., Lewis, J., McNaughton, N., and Ormston, R. (eds) *Qualitative research practice: A guide for social science students and researchers*. 2nd edn. Sage Publications, pp. 347–366.

Li, J., Talaei-Khoei, A., Seale, H., Ray, P. and Macintyre, C. R. (2013) 'Health Care Provider Adoption of eHealth: Systematic Literature Review.', *Interactive journal of medical research*, 2(1). doi: 10.2196/ijmr.2468.

Lin, C., Lin, I. C. and Roan, J. (2012) 'Barriers to physicians' adoption of healthcare information technology: An empirical study on multiple hospitals', *Journal of Medical Systems*, 36(3), pp. 1965–1977. doi: 10.1007/s10916-011-9656-7.

Lincoln, Y. S. and Guba, E. G. (1985) *Naturalistic inquiry*. London, UK: SAGE publications Ltd.

Lincoln, Y. S. and Guba, E. G. (2000) 'Paradigmatic controversies, contradictions, and emerging confluences', in Denzin, N. K. and Lincoln, Y. S. (eds) *Handbook of qualitative research*. 2nd edn. London: Sage Publications, pp. 163–188. doi: 10.1111/j.1365-2648.2005.03538_2.x.

Liu, C.-F. (2011) 'Key Factors Influencing the Intention of Telecare Adoption: An Institutional Perspective', *Telemedicine and e-Health*. Mary Ann Liebert, Inc. 140 Huguenot Street, 3rd Floor New Rochelle, NY 10801 USA , 17(4), pp. 288–293. doi: 10.1089/tmj.2010.0184.

Lockett, A., Currie, G., Waring, J., Finn, R. and Martin, G. (2012) 'The role of institutional entrepreneurs in reforming healthcare', *Social Science and Medicine*. Elsevier Ltd, 74(3), pp. 356–363. doi: 10.1016/j.socscimed.2011.02.031.

Longino, H. (2002) *The Fate of Knowledge*. Oxford: Princeton University Press.

Lopreite, M. and Mauro, M. (2017) 'The effects of population ageing on health care expenditure: A Bayesian VAR analysis using data from Italy', *Health Policy*. Elsevier Ireland Ltd, 121(6), pp. 663–674. doi: 10.1016/j.healthpol.2017.03.015.

Lorenzoni, L., Belloni, A. and Sassi, F. (2014) 'Health-care expenditure and health policy in the USA versus other high-spending OECD countries', *Lancet*, 384, pp. 83–92.

Lovelock, C. H. (1983) 'Classifying Services to Gain Strategic Marketing Insights', *Journal of Marketing*. American Marketing Association, 47(3), p. 9. doi: 10.2307/1251193.

Lundvall, B.-A. (2007) 'Innovation System Research and Policy Where it came from and where it might go', in *CAS Seminar, December 4, 2007*. Oslo.

Lundvall, B.-A. (2016) 'National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning', in *The learning economy and the economics of hope*, pp. 85–104. doi: http://dx.doi.org/10.1016/B978-0-7506-7009-8.50019-7.

Lundvall, B.-A., Johnson, B., Andersen, E. S. and Dalum, B. (2002) 'National systems of production, innovation and competence building', *Research Policy*, 31, pp. 213–231.

Lusch, R. F. and Nambisan, S. (2015) 'Service Innovation: A Service-Dominant (S-D) Logic Perspective', *MIS Quarterly*, 39(1), pp. 155–175.

Lusch, R. F. and Vargo, S. L. (2014) *Service-dominant logic: Premises, perspectives, possibilities*. Cambridge University Press.

Länsisalmi, H., Kivimäki, M., Aalto, P. and Ruoranen, R. (2006) 'Innovation in healthcare: a systematic review of recent research', *Nursing Science Quarterly*, 19(1), pp. 66–72.

Macdonnell, M. and Darzi, A. (2013) 'A key to slower health spending growth worldwide will be unlocking innovation to reduce the labor-intensity of care', *Health affairs*. Project HOPE - The People-to-People Health Foundation, Inc., 32(4), pp. 653–60. doi: 10.1377/hlthaff.2012.1330.

Maglio, P. P. and Spohrer, J. (2008) 'Fundamentals of service science', *Journal of the Academy of Marketing Science*, 36(1), pp. 18–20. doi: 10.1007/s11747-007-0058-9.

Maglio, P. P. and Spohrer, J. (2013) 'A service science perspective on business model innovation', *Industrial Marketing Management*. Elsevier Inc., 42(5), pp. 665–670. doi: 10.1016/j.indmarman.2013.05.007.

Maglio, P. P., Vargo, S. L., Caswell, N. and Spohrer, J. (2009) 'The service system is the basic abstraction of service science', *Information Systems and e-Business Management*, 7(4), pp. 395–406. doi: 10.1007/s10257-008-0105-1.

Maguire, S. and Hardy, C. (2009) 'Discourse and Deinstitutionalization: the Decline of DDT', *Academy of Management Journal*, 52(1), pp. 148–178. doi: 10.5465/AMJ.2009.36461993.

Maguire, S., Hardy, C. and Lawrence, T. B. (2004) 'Institutional Entrepreneurship in Emerging Fields: HIV/AIDS Treatment Advocacy in Canada', *Academy of Management Journal*, 47(5), pp. 657–679.

Malerba, F. (2004) *Sectoral Systems of Innovation: Concepts, Issues and Analyses of Six Major Sectors in Europe*. Cambridge, UK: Cambridge University Press.

Manjón, J. V. G. and Merino, E. R. (2012) 'Innovation systems and policy design: The European experience', *Innovation: Management, Policy & Practice*, 14(1), pp. 33–42. doi: 10.5172/impp.2012.14.1.33.

Markard, J. and Truffer, B. (2008) 'Technological innovation systems and the multi-level perspective: Towards an integrated framework', *Research Policy*, 37(4), pp. 596–615. doi: 10.1016/j.respol.2008.01.004.

Markman, G. D., Balkin, D. B. and Schjoedt, L. (2001) 'Governing the innovation process in enterpreneurial firms', *Journal of High Technology Management Research*, 12(2), pp. 273–293.

Markowitz, L. (2007) 'Structural Innovators and Core- Framing Tasks : How Socially Responsible Mutual Fund Companies Build Identity Among Investors', *Sociological perspectives*, 50(1), pp. 131–153. doi: 10.1525/sop.2007.50.1.131.This.

Maroto-Sánchez, A. (2012) 'Productivity in the services sector: conventional and current explanations', *The Service Industries Journal*, 32(5), pp. 719–746. doi: 10.1080/02642069.2010.531266.

Martin, B. R. (2012) 'The evolution of science policy and innovation studies', *Research Policy*. Elsevier B.V., 41(7), pp. 1219–1239. doi: 10.1016/j.respol.2012.03.012.

Martin, G. P. (2008) 'Representativeness, legitimacy and power in public involvement in health-service management', *Social Science and Medicine*. Elsevier Ltd, 67(11), pp. 1757–1765. doi: 10.1016/j.socscimed.2008.09.024.

Maurya, A. (2012) *Running Lean: Iterate from Plan A to a Plan That Works*. 2nd editio. CA, US: O'Reilly Media Inc. doi: 10.2307/302397.

Maurya, A. (2016) *Scaling Lean: Mastering the Key Metrics for Startup Growth*. Portfolio.

May, C. (2013) 'Agency and implementation: Understanding the embedding of healthcare innovations in practice', *Social Science & Medicine*. Elsevier Ltd, 78, pp. 26–33. doi: 10.1016/j.socscimed.2012.11.021.

McClelland, D. C. (1961) *The Achieving Society*. Princeton, NJ: D. Van Nostrand.

McColl-kennedy, J. R., Snyder, H., Elg, M., Witell, L., Helkkula, A., Hogan, S. J., Anderson, L., Mccoll-kennedy, J. R., Snyder, H., Elg, M., Witell, L., Helkkula, A. and Hogan, S. J. (2017) 'The changing role of the health care customer: review, synthesis and research agenda', *Journal of Service Management*, 28(1), pp. 2–33.

McColl-Kennedy, J. R., Vargo, S. L., Dagger, T. S., Sweeney, J. C. and Kasteren, Y. van (2012) 'Health Care Customer Value Cocreation Practice Styles', *Journal of Service Research*, 15(4), pp. 370–389. doi: 10.1177/1094670512442806.

McCraw, T. (2000) *Prophet of Innovation*. Cambridge, MA: Harvard University Press.

Melrose, S. (2009) 'Naturalistic Generalization', in Mills, A. J., Durepos, G., and Wiebe, E. (eds) *Encyclopedia of Case Study Research*. Sage Publications. Available at: https://auspace.athabascau.ca/bitstream/handle/2149/2315/?sequence=1 (Accessed: 21 December 2017).

Melton, H. and Hartline, M. (2010) 'Customer and Frontline Employee Influence on New Service Development Performance', *Journal of Service Research*, 13(4), pp. 411–425.

Menor, L. J., Tatikonda, M. V. and Sampson, S. E. (2002) 'New service development: areas for exploitation and exploration', *Journal of Operations Management*, 20(2), pp. 135–157. doi: 10.1016/S0272-6963(01)00091-2.

Metcalfe, J. S. (2001) 'Modern evolutionary economic perspectives: An overview', in Metcalfe, J. S. and Dopfer, K. (eds) *Frontiers of Evolutionary Economics*. Edward Elgar.

Meuer, J., Rupietta, C. and Backes-Gellner, U. (2015) 'Layers of co-existing innovation systems', *Research Policy*. Elsevier B.V., 44(4), pp. 888–910. doi: 10.1016/j.respol.2015.01.013.

Meyer, J. W. and Rowan, B. (1977) 'Institutionalized Organizations: Formal Structure as Myth and Ceremony', *American Journal of Sociology*, 83(2), pp. 340–363. doi: 10.1086/226550.

Meyer, R. E. (2006) 'Visiting Relatives: Current Developments in the New Sociology of Knowledge', *Organization*, 13(5), pp. 725–738. doi: 10.1177/1350508406067011.

Micelotta, E., Lounsbury, M. and Greenwood, R. (2017) 'Pathways of Institutional Change: An Integrative Review and Research Agenda', *Journal of Management*. doi: 10.1177/0149206317699522.

Mikkonen, M., Väyrynen, S., Ikonen, V. and Heikkilä, M. O. (2002) 'User and Concept Studies as Tools in Developing Mobile Communication Services for the Elderly', *Personal and Ubiquitous Computing*. Springer-Verlag London Limited, 6(2), pp. 113–124. doi: 10.1007/s007790200010.

Miles, I. (2016) 'Twenty Years of Service Innovation Research', in Toivonen, M. (ed.) *Service Innovation: Novel ways of creating value in actor systems*. Tokyo: Springer Japan, pp. 3–34.

Miles, M., Huberman, M. and Saldana, J. (2014) *Qualitative data analysis: A methods sourcebook*. 3rd ed. Sage Publications Inc.

Miller, P. and Bound, K. (2011) *The startup factories : the rise of accelerator programmes to support new technology ventures*. NESTA.

Minniti, M. (2008) 'The role of government policy on entrepreneurial activity: Productive, unproductive, or destructive?', *Entrepreneurship: Theory and Practice*, 32(5), pp. 779–790. doi: 10.1111/j.1540-6520.2008.00255.x.

Mir, R. and Watson, A. (2000) 'Strategic Management and the Philosophy of Science: The Case for a Constructivist Methodology', *Strategic Management Journal*, 21(9), pp. 941–953. doi: 10.1002/smj.43l.

Mohout, O. and Staelraeve, S. (2016) *Europe health tech report 2016*. Available at: https://www.slideshare.net/omohout/europe-health-tech-report-2016 (Accessed: 8 December 2017).

Mutch, A. (2007) 'Reflexivity and the Institutional Entrepreneur: A Historical Exploration', *Organization Studies*, 28(7), pp. 1123–1140. doi: 10.1177/0170840607078118.

Mäkimattila, M., Melkas, H. and Uotila, T. (2017) 'Redesign of Home Care Service Delivery', *International Journal of Information Systems and Social Change*, 8(2), pp. 1–24. doi: 10.4018/IJISSC.2017040101.

Nelson, R. R. and Winter, S. G. (1982) *An evolutionary theory of economic change*. Cambridge: Bellknap Press.

Ng, I., Vargo, S. L. and Smith, L. (2013) 'Reconceptualizing Service through Service-dominant Logic', in Haynes, K. and Grugulis, I. (eds) *Managing Services: Challenges and Innovation*. Oxford Scholarship Online (WMG Service Systems Research Group Working Paper Series). doi: 10.1093/acprof:oso/9780199696086.003.0008.

Nightingale, D. and Cromby, J. (2002) 'Social constructionism as ontology: Exposition and example', *Theory and Psychology*, 12(5).

Nijssen, E. J., Hillebrand, B., Vermeulen, P. A. M. and Kemp, R. G. M. (2006) 'Exploring product and service innovation similarities and differences', *International Journal of Research in Marketing*, 23(3), pp. 241–251. doi: 10.1016/j.ijresmar.2006.02.001.

Normann, R. (2001) *Reframing Business: When the Map Changes the Landscape*. Chichester, UK: Wiley.

North, D. (1990) *Institutions, Institutional Change and Economic Performance*. Cambridge University Press.

O'Connor, S., Hanlon, P., O'Donnell, C. A., Garcia, S., Glanville, J. and Mair, F. S. (2016) 'Barriers and facilitators to patient and public engagement and recruitment to digital health interventions: protocol of a systematic review of qualitative studies', *BMJ Open*, 6(9), p. e010895. doi: 10.1136/bmjopen-2015-010895.

O'Shaughnessy, J. and O'Shaugnessy, N. (2009) 'The service-dominant perspective: a backwards step?', *European Journal of Marketing*, 43(5/6), pp. 784–793. doi: 10.1108/03090560910947043.

Ojasalo, K. (1999) *Conceptualizing productivity in services*. Hanken School of Economics Helsinki, Finland.

Okunade, A. and Murthy, V. (2002) 'Technology as a "Major Driver" of Health Care Costs: A Cointegration Analysis of the Newhouse Conjecture', *Journal of Health Economics*, 21, pp. 147–159. doi: 10.1016/S0167-6296(01)00122-9.

Oliver, C. (1991) 'Strategic Responses To Institutional Processes', *Academy of Management Review*, 16(1), pp. 145–179.

Oliver, C. (1992) 'The antecedents of deinstitutionalization', *Organization Science*, 13(4), pp. 563–588.

Oliver, C. (1997) 'Sustainable Competitive Advantage: Combining Institutional and Resource-Based Views', *Management*, 18, pp. 697–713.

Ordanini, A. and Parasuraman, A. (2010) 'Service Innovation Viewed Through a Service-Dominant Logic Lens: A Conceptual Framework and Empirical Analysis', *Journal of Service Research*, 14(1), pp. 3–23. doi: 10.1177/1094670510385332.

Orlikowsky, W. (1992) 'The Duality of Technology: Rethinking the Concept of Technology in Organizations', *Organization Science*, 3(3), pp. 398–427.

Osterwalder, A. and Pigneur, Y. (2010) *Business model generation*. Hoboken, New Jersey: John Wiley and Sons.

Osterwalder, A., Pigneur, Y., Bernarda, G. and Smith, A. (2014) *Value proposition design*. Wiley.

Ostrom, A. L., Parasuraman, A., Bowen, D. E. and Voss, C. A. (2015) 'Service Research Priorities in a Rapidly Changing Context', *Journal of Service Research*, 18(2), pp. 127–159. doi: 10.1177/1094670515576315.

Pacheco, D. F., York, J. G., Dean, T. J. and Sarasvathy, S. D. (2010) 'The Coevolution of Institutional Entrepreneurship: A Tale of Two Theories', *Journal of Management*, 36(4), pp. 974–1010. doi: 10.1177/0149206309360280.

Papastathopoulou, P. and Hultink, E. J. (2012) 'New Service Development - An analysis of 27 years of research', *Journal of Product Innovation Management*, 29(5), pp. 705–714.

Parasuraman, A. (2002) 'Service quality and productivity: a synergistic perspective', *Managing Service Quality: An International Journal*, 12(1), pp. 6–9. doi: 10.1108/09604520210415344.

Parsons, T. (1934) 'Prolegomena to a theory of social institutions', *American Sociological Review*, 55, pp. 319–339.

Phillips, N. and Tracey, P. (2007) 'Opportunity recognition, entrepreneurial capabilities and bricolage: connecting institutional theory and entrepreneurship in strategic organization', *Strategic Organization*, 5(3), pp. 313–320. doi: 10.1177/1476127007079956.

Pinch, T. and Bijker, W. E. (1987) 'The Social Construction of Facts and Artifacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other', in Bijker, W. E., Hughes, T. P., and Pinch, T. (eds) *The Social Construction of Technological Systems*. Cambridge, MA: MIT Press.

Prey, J. E., Woollen, J., Wilcox, L., Sackeim, A. D., Hripcsak, G., Bakken, S., Restaino, S., Feiner, S. and Vawdrey, D. K. (2014) 'Patient engagement in the inpatient setting: a systematic review', *Journal of the American Medical Informatics Association*. Oxford University Press, 21(4), pp. 742–

750. doi: 10.1136/amiajnl-2013-002141.

Qureshi, I., Kistruck, G. M. and Bhatt, B. (2016) 'The Enabling and Constraining Effects of Social Ties in the Process of Institutional Entrepreneurship', *Organization Studies*, 37(3), pp. 425–447. doi: 10.1177/0170840615613372.

Reay, T. and Hinings, C. R. (2005) 'The recomposition of an organizational field: Health care in Alberta', *Organization Studies*, 26(3), pp. 351–384. doi: 10.1177/0170840605050872.

Reay, T. and Hinings, C. R. (2009) 'Managing the Rivalry of Competing Institutional Logics', *Organization Studies*, 30(6), pp. 629–652. doi: 10.1177/0170840609104803.

Reed, M. (2005) 'Reflections on the "Realist Turn" in Organization and Management Studies', *Journal of Management Studies*. Wiley Online Library, 42(8), pp. 1621–1644. doi: 10.1111/j.1467-6486.2005.00559.x.

Ries, E. (2011) *The Lean Startup*. New York: Crown Business.

Ritchie, J., Lewis, J., Nicholls, C. and Ormston, R. (2014) *Qualitative Research Practice: A guide for social science students and researchers*. 2nd edn. Thousand Oaks, California: Sage Publications Inc.

Rogers, E. M. (1962) *Diffusion of Innovations*. 1st edn. London: The Free Press.

Rogers, E. M. (1995) *Diffusion of Innovations, 4th Edition*. Free Press.

Rogers, E. M. (2002) 'Diffusion of preventive innovations', *Addictive Behaviors*, 27(6), pp. 989–993. doi: 10.1016/S0306-4603(02)00300-3.

Rosenberg-Yunger, Z. R. S., Daar, A. S., Singer, P. A. and Martin, D. K. (2008) 'Healthcare sustainability and the challenges of innovation to biopharmaceuticals in Canada', *Health Policy*, 87(3), pp. 359–368. doi: 10.1016/j.healthpol.2008.02.004.

Roth, A. V and Menor, L. J. (2003) 'Insights into service operations management: a research agenda', *Production & Operations Management*, 12(2), pp. 145–164. doi: 10.1111/j.1937-5956.2003.tb00498.x.

Rowlands, B. H. (2005) '"Grounded in Practice: Using Interpretive Research to Build Theory"', *The Electronic Journal of Business Research Methodology*, 3(1), pp. 81–92. doi: 10.1002/jcp.20352.

Russo-Spena, T. and Mele, C. (2012) '"Five Co-s" in innovating: a practice-based view', *Journal of Service Management*, 23(4), pp. 527–553. doi: 10.1108/09564231211260404.

Santos, F. M. and Eisenhardt, K. M. (2009) 'Constructing Markets and Shaping Boundaries: Entrepreneurial Power in Nascent Fields', *Academy of Management Journal*, 52(4), pp. 643–671. doi: 10.5465/AMJ.2009.43669892.

Scheuing, E. and Johnson, E. (1989) 'A Proposed Model for New Service Development', *Journal of Services Marketing*, 3(2), pp. 25–34.

Schot, J. and Geels, F. W. (2008) 'Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy', *Technology Analysis and Strategic Management*, 20(5), pp. 537–554. doi: 10.1080/09537320802292651.

Schot, J., Hoogma, R. and Elzen, B. (1994) 'Strategies for shifting technological systems: The case of the automobile system', *Futures*. Pergamon, 26(10), pp. 1060–1076. doi: 10.1016/0016-3287(94)90073-6.

Schumpeter, J. A. (1934) *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Eight prin. Cambridge, MA: Harvard University Press.

Schumpeter, J. A. (1942) *Capitalism, socialism, and democracy*. Routledge.

Schwandt, T. A. (1998) 'Constructivist, interpretivist approaches to human inquiry', in Denzin, N. K. and Lincoln, Y. S. (eds) *The Landscape of Qualitative Research: Theories and Issues1*. Thousand Oaks, California: Sage Publications, pp. 221–259.

Schwandt, T. A. (2007) *The Sage Dictionary of Qualitative Inquiry*. 3rd edn. Thousand Oaks, California: Sage Publications Inc.

Scott, W. R. (1987) 'The Adolescence of Institutional Theory', *Administrative Science Quarterly*, 32(4), pp. 493–511.

Scott, W. R. (1995) *Institutions and organizations*. 1st ed. Thousand Oaks, California: Sage Publications.

Scott, W. R. (2008a) 'Approaching adulthood: The maturing of institutional theory', *Theory and Society*, 37(5), pp. 427–442. doi: 10.1007/s11186-008-9067-z.

Scott, W. R. (2008b) 'Three pillars of institutions', in *Institutions and organizations: ideas and interests*, pp. 55–85.

Scott, W. R. (2014) *Institutions and organizations: Ideas, Interests, and Identities*. 4th edn. Sage Publications Inc.

Scott, W. R., Ruef, M., Mendel, P. and Caronna, C. (2000) *Institutional change and healthcare organizations: From professional dominance to managed care*. Chicago: The university of chicago press.

Selznick, P. (1948) 'Foundations of the Theory of Organization', *American Sociological Review*, pp. 25–35. doi: 10.2307/2086752.

Seo, M.-G. and Creed, W. E. D. (2002) 'Institutional Contradictions , Praxis , and Institutional Change: A Dialectical Perspective', *Academy of Management Review*, 27(2), pp. 222–247. doi: 10.1007/sl0437-010-9073-l.

Shane, S. (2009) 'Why encouraging more people to become entrepreneurs is bad public policy', *Small Business Economics*, 33(2), pp. 141–149. doi: 10.1007/s11187-009-9215-5.

Sharif, N. (2006) 'Emergence and development of the National Innovation Systems concept', *Research Policy*, 35(5), pp. 745–766. doi: 10.1016/j.respol.2006.04.001.

Sharma, S., Conduit, J. and Hill, S. R. (2014) 'Organisational capabilities for customer participation in health care service innovation', *Australasian Marketing Journal*. Australian and New Zealand Marketing Academy, 22(3), pp. 179–188. doi: 10.1016/j.ausmj.2014.08.002.

Sherer, S. A., Meyerhoefer, C. D. and Peng, L. (2016) 'Applying institutional theory to the adoption of electronic health records in the U.S', *Information & Management*. Elsevier B.V., 53(5), pp. 570–580. doi: 10.1016/j.im.2016.01.002.

Siegel, H. (2004) 'Relativism', in Niiniluoto, I., Sintonen, M., and Wolenski, J. (eds) *Handbook of epistemology*, pp. 747–780.

Siltaloppi, J., Koskela-Huotari, K. and Vargo, S. L. (2016) 'Institutional Complexity as a Driver for Innovation in Service Ecosystems', *Service Science*, 8(3), pp. 333–343. doi: https://doi.org/10.1287/serv.2016.0151.

Simons, H. (2014) 'Case Study Research: In-Depth Understanding in Context', in Leavy, P. (ed.) *The Oxford handbook of qualitative research*. New York: Oxford University Press, p. 756.

Sjölinder, M. (2006) *Age-related cognitive decline and navigation in electronic environments*. Stockholm. Available at: http://soda.swedishict.se/515/.

Snyder, H., Witell, L., Gustafsson, A., Fombelle, P. and Kristensson, P. (2016) 'Identifying categories of service innovation: A review and synthesis of the literature', *Journal of Business Research*. Elsevier Inc., 69(7), pp. 2401–2408. doi: 10.1016/j.jbusres.2016.01.009.

Spohrer, J. and Maglio, P. P. (2005) 'Emergence of Service Science : Services Sciences , Management , Engineering (SSME) as the Next Frontier in Innovation'.

Spohrer, J., Maglio, P. P., Bailey, J. and Gruhl, D. (2007) 'Steps towards a science of service systems', *IEEE Computer*.

Stake, R. (1995) *The art of case study research*. Sage Publications Inc.

Stake, R. (2000) 'Case studies', in Denzin, N. and Lincoln, Y. (eds) *SAGE Handbook of Qualitative Research*. 2nd edn. Thousand Oaks, California: Sage Publications Inc, p. 1143. Available at: https://www.ellenmacarthurfoundation.org/case-studies/latest.

Stevens, E. and Dimitriadis, S. (2005) 'Managing the new service development process: towards a systemic model', *European Journal of Marketing*, 39(1/2), pp. 175–198. doi: 10.1108/03090560510572070.

Strauss, A. and Corbin, J. (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 2nd edn. Thousand Oaks, California: Sage Publications Inc.

Suchman, M. C. (1995) 'Managing Legitimacy : Strategic and Institutional Approaches', *Academy of Management Review*, 20(3), pp. 571–610.

Suddaby, R. (2006) 'What grounded theory is not', *Academy of Management Journal*, 49(4), pp. 633–642.

Suddaby, R. (2010) 'Challenges for Institutional Theory', *Journal of Management Inquiry*, 19(1), pp. 14–20. doi: 10.1177/1056492609347564.

Suddaby, R. and Greenwood, R. (2005) 'Rhetorical Strategies of Legitimacy', *Administrative Science Quarterly*, 50(1), pp. 35–67.

Suddaby, R., Viale, T. and Gendron, Y. (2016) 'Reflexivity: The role of embedded social position and entrepreneurial social skill in processes of field level change', *Research in Organizational Behavior*. Elsevier Ltd. doi: 10.1016/j.riob.2016.02.001.

Sundbo, J. (1997) 'Management of Innovation in Services', *The Service Industries Journal*, 17(3), pp. 432–455. doi: 10.1080/02642069700000028.

Sundbo, J. (1998) *Theory of Innovation: Entrepreneurs, Technology, and Strategy*. Edward Elgar.

Svejenova, S., Mazza, C. and Planellas, M. (2007) 'Cooking up change in haute cuisine: Ferran Adrià as an institutional entrepreneur', *Journal of Organizational Behavior*, 28(5), pp. 539–561. doi: 10.1002/job.461.

Sweeney, J. C., Danaher, T. S. and McColl-Kennedy, J. R. (2015) 'Customer Effort in Value Cocreation Activities', *Journal of Service Research*, 18(3), pp. 318–335. doi: 10.1177/1094670515572128.

Sävenstedt, S., Sandman, P. O. and Zingmark, K. (2006) 'The duality in using information and communication technology in elder care', *Journal of Advanced Nursing*, 56(1), pp. 17–25. doi: 10.1111/j.1365-2648.2006.03975.x.

Tecco, H. and Zweig, M. (2017) *Digital Health Funding 2017 Midyear Review*. Available at: https://rockhealth.com/reports/2017-midyear-funding-review-a-record-breaking-first-half/ (Accessed: 8 December 2017).

Thakur, R., Hsu, S. H. Y. and Fontenot, G. (2012) 'Innovation in healthcare: Issues and future

trends', *Journal of Business Research*. Elsevier Inc., 65(4), pp. 562–569. doi: 10.1016/j.jbusres.2011.02.022.

Thompson, D. S., Fazio, X., Kustra, E., Patrick, L. and Stanley, D. (2016) 'Scoping review of complexity theory in health services research', *BMC Health Services Research*. BioMed Central, 16(1), p. 87. doi: 10.1186/s12913-016-1343-4.

Toivonen, M. and Tuominen, T. (2009) 'Emergence of innovations in services', *The Service Industries Journal*, 29(7), pp. 887–902. doi: 10.1080/02642060902749492.

Topol, E. (2013) *The Creative Destruction of Medicine: How the Digital Revolution Will Create Better Health Care*. Basic Books.

United Nations (2017) 'World Population Prospects: The 2017 Revision, Key Findings and Advance Tables', p. 46.

Utterback, J. M. (1971) 'The Process of Technological Innovation Within the Firm.', *Academy of Management Journal*. Academy of Management, 14(1), pp. 75–88. doi: 10.2307/254712.

Vargo, S. L. and Akaka, M. (2009) 'Service-Dominant Logic as a Foundation for Service Science: Clarifications', *Service Science*, 1(1), pp. 32–41. doi: 10.1287/serv.1.1.32.

Vargo, S. L. and Akaka, M. A. (2012) 'Value Cocreation and Service Systems (Re)Formation: A Service Ecosystems View', *Service Science*, 4(3), pp. 207–217. doi: 10.1287/serv.1120.0019.

Vargo, S. L. and Lusch, R. F. (2004a) 'Evolving to a New Dominant Logic', *Journal of Marketing*, 68(1), pp. 1–17. doi: 10.1509/jmkg.68.1.1.24036.

Vargo, S. L. and Lusch, R. F. (2004b) 'The Four Service Marketing Myths: Remnants of a Goods-Based, Manufacturing Model', *Journal of Service Research*, 6(4), pp. 324–335.

Vargo, S. L. and Lusch, R. F. (2008) 'Service-dominant logic: continuing the evolution', *Journal of the Academy of marketing Science*, 36(1), pp. 1–10. doi: 10.1509/jmkg.68.1.1.24036.

Vargo, S. L. and Lusch, R. F. (2011) 'It's all B2B…and beyond: Toward a systems perspective of the market', *Industrial Marketing Management*. Elsevier Inc., 40(2), pp. 181–187. doi: 10.1016/j.indmarman.2010.06.026.

Vargo, S. L. and Lusch, R. F. (2016) 'Institutions and axioms: an extension and update of service-dominant logic', *Journal of the Academy of Marketing Science*, 44(1), pp. 5–23. doi: 10.1007/s11747-015-0456-3.

Vargo, S. L. and Lusch, R. F. (2017) 'Service-dominant logic 2025', *International Journal of Research in Marketing*. Elsevier B.V., 34(1), pp. 46–67. doi: 10.1016/j.ijresmar.2016.11.001.

Vargo, S. L., Maglio, P. P. and Akaka, M. A. (2008) 'On value and value co-creation: A service systems and service logic perspective', *European Management Journal*, 26(3), pp. 145–152. doi: 10.1016/j.emj.2008.04.003.

Vargo, S. L., Wieland, H. and Akaka, M. A. (2015) 'Innovation through institutionalization: A service ecosystems perspective', *Industrial Marketing Management*. Elsevier Inc., 44, pp. 63–72. doi: 10.1016/j.indmarman.2014.10.008.

Vargo, S. L., Wieland, H. and Akaka, M. A. (2016) 'Innovation in Service Ecosystems', *Journal of Serviceology*, 1(1), pp. 1–5.

Veblen, T. (1989) *The Theory of Leisure Class*. Reprinted. New Jersey: Transacion Publishers.

Venkatesh, V. and Davis, F. D. (2000) 'A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies', *Management Science*. INFORMS, 46(2), pp. 186–204. doi: 10.1287/mnsc.46.2.186.11926.

Venkatesh, V., Morris, M. G., Davis, G. B. and Davis, F. D. (2003) 'User Acceptance of Information Technology: Toward a Unified View', *MIS Quarterly*, 27(3), pp. 425–478. doi: 10.2307/30036540.

Viitamo, E. and Toivonen, M. (2013) 'Is the concept of service productivity compatible with the framework of service- dominant logic?', in *Economies et Sociétés, Séries EGS*. Available at: http://www.reser.net/materiali/priloge/slo/viitamo_et_al.pdf (Accessed: 10 November 2017).

Waelbroeck, P. (2013) 'Digital Music', in Towse, R. and Christian, H. (eds) *Handbook on the Digital Creative Economy*. Cheltenham, UK: Edward Elgar, pp. 389–398.

Wallin, A. and Fuglsang, L. (2017) 'Service innovations breaking institutionalized rules of health care', *2017*, 28(5), pp. 972–997. doi: https://doi.org/10.1108/JOSM-04-2017-0090.

Wanzenböck, I., Scherngell, T. and Fischer, M. M. (2013) 'How do firm characteristics affect behavioural additionalities of public R&D subsidies? Evidence for the Austrian transport sector', *Technovation*, 33(2–3), pp. 66–77. doi: 10.1016/j.technovation.2012.11.006.

Weick, K. E. (1995) 'What theory is not, theorizing is', *Administrative Science Quarterly*, 40(4), p. 385. doi: 10.2307/2393789.

Weick, K. E., Sutcliffe, K. M. and Obstfeld, D. (2005) 'Organizing and the Process of Sensemaking', *Organization Science*, 16(4), pp. 409–421. doi: 10.1287/orsc.1050.0133.

Wieland, H., Hartmann, N. N. and Vargo, S. L. (2017) 'Business models as service strategy', *Journal of the Academy of Marketing Science*. Journal of the Academy of Marketing Science, pp. 1–19. doi: 10.1007/s11747-017-0531-z.

Wieland, H., Vargo, S. L. and Akaka, M. A. (2016) 'Zooming Out and Zooming In: Service Ecosystems as Venues for Collaborative Innovation', in Toivonen, M. (ed.) *Service Innovation: Novel ways of creating value in actor systems*. Tokyo: Springer, pp. 35–50.

Williamson, O. E. (2000) 'The New Institutional Economics: Taking Stock, Looking Ahead', *Journal of Economic Literature*, 38(September), p. pp.595-613.

Wirtz, J. and Zeithaml, V. (2017) 'Cost-effective service excellence', *Journal of the Academy of Marketing Science*. Journal of the Academy of Marketing Science, pp. 1–22. doi: 10.1007/s11747-017-0560-7.

Witell, L., Snyder, H., Gustafsson, A., Fombelle, P. and Kristensson, P. (2016) 'Defining service innovation: A review and synthesis', *Journal of Business Research*, 69(8), pp. 2863–2872. doi: 10.1016/j.jbusres.2015.12.055.

Wolcott, H. (1990) 'On Seeking- and Rejecting-Validity in Qualitative Research', in Eisner, E. and Peshkin, A. (eds) *Qualitative Inquiry in Education: Continuing Debate*. New York: Teachers College Press, pp. 121–152.

Yazan, B. (2015) 'Three approaches to case study methods in education: Yin, Merriam, and Stake', *The Qualitative Report*, 20(2), pp. 134–152.

Yin, R. K. (2003a) *Applications of case study research*. 2nd edn. Thousand Oaks, California: Sage Publications.

Yin, R. K. (2003b) *Case Study Research: Design and Methods*. 3rd edn. Thousand Oaks, California: Sage Publications Inc.

Yin, R. K. (2009) *Case study research: design and methods*. 4th edn. Thousand Oaks, California: Sage Publications Inc.

Yoo, Y., Lyytinen, K., Thummadi, V. and Weiss, A. (2010) 'Unbounded Innovation with Digitalization: A Case of Digital Camera', *Annual Meeting of the Academy of Management*, pp. 1–41. doi: 10.1287/orsc.1120.0771.

Zeithaml, V. A., Parasuraman, A. and Berry, L. L. (1985) 'Problems and Strategies in Services Marketing', *Journal of Marketing*. American Marketing Association, 49(2), p. 33. doi: 10.2307/1251563.

Zhang, X., Yu, P., Yan, J. and Spil, I. T. A. M. (2015) 'Using diffusion of innovation theory to understand the factors impacting patient acceptance and use of consumer e-health innovations: a case study in a primary care clinic.', *BMC health services research*. BioMed Central, 15, p. 71. doi: 10.1186/s12913-015-0726-2.

Zucker, L. (1977) 'The Role of Institutionalization in Cultural Persistence', *American Sociological Review*, 42(5), pp. 726–743.

Appendices: Original publications

Article 1

Häikiö, J., Wallin, A. & Isomursu, M., 2010. Digitally-enhanced services for the elderly. *International Journal of Services Sciences*, 3(2/3), pp. 232-249. Available at: http://dx.doi.org/10.1504/IJSSCI.2010.032225

Digitally-enhanced services for the elderly

Juha Häikiö*, Arto Wallin and Minna Isomursu

VTT Technical Research Centre of Finland,
Kaitoväylä 1, FI-90571,
Oulu, Finland
E-mail: juha.haikio@vtt.fi
E-mail: arto.wallin@vtt.fi
E-mail: minna.isomursu@vtt.fi
*Corresponding author

Abstract: During the last decades, both the public and private sectors have started adopting ICT not only for back office service management, but also for end-user service access. ICT-supported digitally-enhanced services can provide benefits both for service providers in the form of more efficient service delivery and management and for the customers in the form of better service access and availability. The research presented in this paper explores issues related to bringing digital service access points into the everyday lives of elderly users and examines the effects of digitally-enhanced services. The paper analyses two case studies exploring digitally-enhanced services that aim to help elderly people in their everyday lives. The results indicate that the analysed services can improve the efficiency of the service processes. However, service efficiency does not directly translate into a better service experience for the user. For achieving significant improvements in the lives of the elderly, other value measures and better understanding of service value potential from the viewpoint of elderly users are needed.

Keywords: digital services; elderly users; near field communication; NFC; service process; service provider.

Reference to this paper should be made as follows: Häikiö, J., Wallin, A. and Isomursu, M. (2010) 'Digitally-enhanced services for the elderly', *Int. J. Services Sciences*, Vol. 3, Nos. 2/3, pp.232–249.

Biographical notes: Juha Häikiö is a Research Scientist at the VTT Technical Research Centre of Finland and works in a research team called Service Technologies. He holds an MSc in Information Processing Science. His research interests include empirical methods, mobile usability, user-centred design, service user experience and technology and elderly. He has recently focused on the effects of aging to the use and adoption of ICT-supported digital services in his research work.

Arto Wallin is a Research Scientist at the VTT Technical Research Centre of Finland. He has been working at VTT for eight years with various research subjects including software architectures, software testing, information security and mobile business. He holds an MSc in Information Engineering and another MSc in Economics and Business Administration. His recent research interests are focused on adoption of innovations, ICT impact on productivity and socio-economic impacts of mobile services.

Minna Isomursu leads a research team called Service Technologies at the VTT Technical Research Centre of Finland. Her research interests include human-computer interaction with ubiquitous computing, user experience and value creation evaluation methodologies, participatory design, and social media. She has almost 20 years of research experience from both industrial perspective (e.g., Nokia Mobile Phones) as well as academic (e.g., Professor at the University of Oulu and Visiting Researcher at Fraunhofer IESE, Germany). With her research, she hopes to contribute to a future where computing would create value both for individual users and society as a whole.

1 Introduction

There are both human and economic reasons to support independent living of elderly people at home. The elderly themselves regard independent living as a positive alternative compared to moving to institutional care (Hammar et al., 1999) and maintaining autonomy is one of the quality of life (QOL) issues facing frail older adults (Mitchell and Kemp, 2000). While the working age population decreases in developed countries, the amount of elderly people in need of care increases. Full-time residential care is more expensive than private residential care (Tang and Venables, 2000). Thus, supporting the independent living of the elderly at home is also economically reasonable.

Digital services provide possibilities for supporting independent living of elderly people. However, there are several barriers that currently prevent or make it difficult for the elderly to fully benefit from ICT-supported services. Age-related decline in vision and psychomotor skills can make it difficult to use small devices, such as mobile phones (Sjölinder, 2006). Small mobile phone screens and buttons can complicate or prevent the use of a service. Poor interfaces might lead to rejection (Abascal and Civit, 2000) and the elderly may have a negative view of their skills to use new technologies (Eisma et al., 2004). In addition, elderly people are often inexperienced with new technologies and also unaware about the internet or current mobile phone services (Sjölinder, 2006). Regardless of these challenges, it has 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).

The digital services used in the case studies reported in this paper employ mobile phones and mixed reality interfaces implemented through near field communication (NFC), a wireless short-range connectivity technology that has evolved from existing contactless identification and interconnection technologies (NFC Forum, 2009). NFC-enabled mobile phones with mixed reality user interfaces have touch functionalities, i.e., the user can touch NFC tags placed in his/her physical environment using the NFC reader embedded in the phone. Touch has been seen as a promising interaction technique in many studies (Anokwa et al., 2007; Riekki et al., 2006; Rukzio et al., 2006), especially for older users (Rukzio et al., 2006).

This research explores the question of how digitally-enhanced services for home-dwelling elderly people can support independent living and increase service efficiency. The case studies contribute towards a better understanding of technology and service design from the viewpoints of elderly users and service providers.

2 Related work

Productivity is traditionally defined as the ratio between outputs produced and inputs used, given that the quality of the outputs is kept constant (e.g., Sink, 1985). However, several studies have pointed out that the requirement for constant output quality is often problematic in the service sector (e.g., Chase and Haynes, 2000; Gummesson, 1998). To resolve this problem, Grönroos and Ojasalo (2004) suggest that service productivity should take two viewpoints into consideration:

1 cost-efficiency of service production

2 perceived quality of service.

The measurement of the benefits and costs of information technology in healthcare service processes has been studied widely (e.g., Chaudhry et al., 2006). Southon et al. (1999) note that benefits can be measured at two levels, either broad (e.g., quality of care) or very detailed (e.g., number of phone calls). However, the general level is often too vague to relate to and benefits at the detailed level are too numerous and trivial for assessing a complete set of benefits.

As NFC technology is fairly new, its possibilities in services have not been widely researched. However, some earlier studies explore the use of NFC as part of services in different domains, such as libraries (Bae et al., 2007), eldercare (Häikiö et al., 2007b) and healthcare (Morak et al., 2007).

In general, e-services have been studied rather widely in recent years. Studies cover several service domains, such as e-groceries, e-learning and e-logistics. E-logistics has been studied from several perspectives, such as impact of information technology on the competitive advantage of logistics firms (Lai et al., 2006) and industrial adoption of RFID technology to support logistics processes (e.g., Curtin et al., 2007).

Studies of e-groceries have mainly focused on different physical distribution models of e-commerce products (Weltevreden, 2008; Yrjölä, 2001), the cost-effectiveness of e-groceries (Kämäräinen et al., 2001) and challenges of consumer adoption of grocery shopping (Huang and Oppewal, 2006). Although some studies have identified that current retail systems do not take the needs of the elderly and disabled into account (Meenely et al., 2009; Heikkilä et al., 1998), the number of studies focusing on those user segments is very limited. A shopping behaviour study conducted with people aged 60+ in North Ireland provides an explanation. Its results indicate that the lack of proper equipment and knowledge decreases elderly consumers' willingness to buy e-groceries (Meenely et al., 2009).

QOL is an elusive, multidimensional and very context-dependent concept. Measurement of QOL typically includes objective measurements, such as income and health condition and subjective measurements, such as happiness and well-being (Mitchell and Kemp, 2000). Hirsch et al. (2000) have explored the design of eldercare technologies and found that the two main factors affecting QOL are independence and engagement. Independence describes the ability to exercise control over one's life. Engagement describes the feeling of connectedness with the world and other human beings. The elderly may often feel a loss of autonomy, choice and decision-making associated with life satisfaction (Mitchell and Kemp, 2000). The most important areas of choice for the elderly in nursing homes have been found to concern daily activities, such as food (Kane and Caplan, 1990).

3 Research methodology

According to Yin (2003), a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context. The case studies presented in this paper were planned and conducted in a real life environment with city authorities organising and managing daily service processes in elderly care. Case study planning and implementation also involved the participation of service partners cooperating with city elderly care in service production and delivery as well as technology providers. On a broader scale, these case studies were part of a larger technology research project exploring NFC use in various domains.

Results are mostly based on qualitative and inductive research, although some quantitative methods are also used. Research consists of two case studies employing an embedded design. Both studies had two units of analysis: firstly, the elderly, with a focus on subjective user experience, and secondly, the order and delivery process from the service provider viewpoint.

The data was analysed in two stages. In the first stage, both case studies were analysed independently by categorising and sorting. The focus was to identify coherent themes and discrepancies from the collected data through content analysis (Weber, 1990). For quantitative data, basic statistical procedures (means, distribution over time, etc.) were used. In the second stage, a comparative case study analysis was conducted in order to find similarities and differences between the two cases.

Table 1 Data collection methods used and valid cases in the case studies

Method	*Meal service*	*Product order service*
Initial interviews	• 9 elderly clients	• 16 elderly clients
Final interviews	• 9 elderly clients	• 13 out of 16 elderly clients
	• Nursing staff (2 employees)	• Nursing staff (6 employees)
	• 3 managers of the meal producer company	• 2 business development managers of the centrally organised retailing company
	• 1 driver of the logistics service provider	• 1 shop manager
	• 1 manager of the logistics service provider	
Participant observation	• 9 elderly clients	• 5 out of 16 elderly clients
Database analysis	• Automatically generated activity logs	• Automatically and manually created logs from delivery process
Diary	• 5 out of 9 elderly clients	• Not used

The case studies were analysed from different methodological and theoretical angles. In order to find alternative explanations and increase the accuracy of empirical research, four types of triangulations, as introduced by Stake (1995), were applied:

- *Data triangulation:* Multiple data sources were used in data collection (see Table 1).
- *Theory triangulation:* Cases were studied from multiple theoretical perspectives (usability, user experience and service productivity).

- *Methodological triangulation:* Multiple methods were used to study units of analysis (semi-structured qualitative interviews, quantitative archival analysis, self-reporting and observation).
- *Investigator triangulation:* Interviews were performed mainly by two authors with divergent backgrounds. In addition, two other researchers were involved in interviewing. The data was analysed by a group of three researchers (one did not participate in data collection).

4 Case studies

This section presents an overview and the results of two case studies where elderly users adopted digital services to support their everyday activities. Table 2 presents the background information about the studies. Both case studies dealt with the very basic everyday activity of ordering and preparing meals. The first case study has been presented in detail earlier in Häikiö et al. (2007a, 2007b) and Isomursu et al. (2008). The first digital service interface was integrated into a meal delivery service that provided complete daily meals to old people who were not capable of preparing balanced meals themselves. The second digital service interface was integrated with a home shopping service, i.e., the users could order daily consumer goods for home delivery.

Table 2 Summary of the analysed case studies

	Case study 1: meal service	*Case study 2: product order service*
End-users	9 elderly clients (+ 5 logistics drivers)	16 elderly clients (+ 3 nurses)
Time period	Autumn 2006	May and June 2008
Duration	8 weeks	5 weeks
Location	Oulu, Finland	Oulu, Finland
End-user device	Nokia 3220 (elderly) Nokia 5140i (drivers)	Nokia 6131 NFC
Goal of the trial	Provide easy meal delivery service for elderly clients. Improve the effectiveness of meal delivery.	Investigate suitability of digital product ordering system to elderly persons with varying physical and cognitive skills

4.1 Case study 1: meal service

The new digital service interface adopted in the first case study enhanced the meal service by enabling clients to choose which meal they wanted to have delivered the next day or cancel the delivery. Earlier, the same meal was delivered to all clients daily; to cancel a delivery, a client had to phone the service provider. The average age of the users was 76.6 years (see Table 3). The service interface was constructed by attaching NFC tags to a menu in a plastic stand. A mobile phone with an integrated NFC reader was used to select meals, i.e., the user touched a tag in the menu with the phone (see Figure 1). The user did not need to use the phone keypad or navigate mobile application menus. In case of repeated selections, the last selection made was valid.

Figure 1 Plastic stand with three NFC tags and a replaceable paper menu

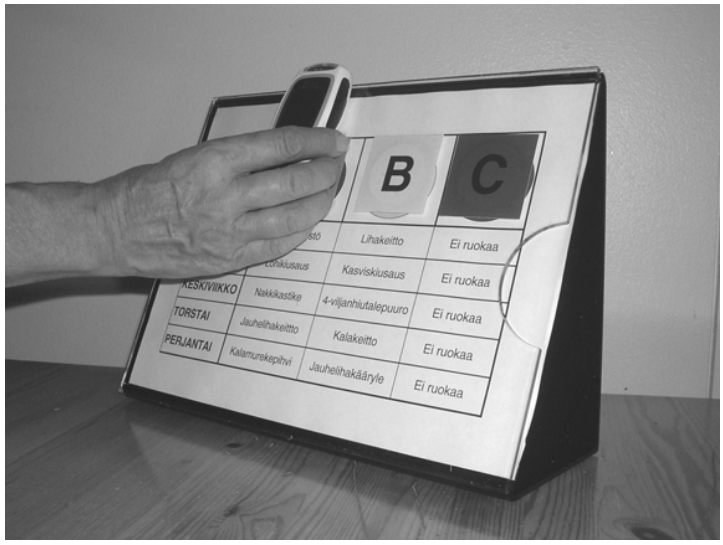
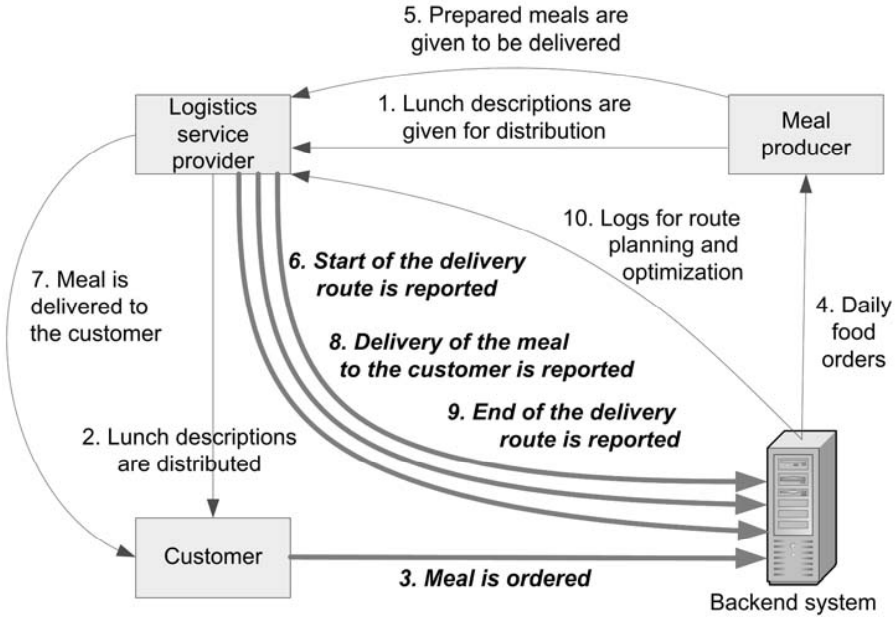


Figure 2 Ordering and delivery process of the meal service trial



Kitchen and elderly care personnel could use the web interface to access information about meal orders. The day after meal selection, the logistics service delivered meals to the clients' homes. The drivers also used NFC-enabled mobile phones during the case study. After each meal delivery, the driver touched a confirmation tag located at the client's home. The touch automatically generated a timestamp and sent it to the back-end

system with the other delivery information. Elderly care personnel and the managers of the logistics service provider could access the delivery information through the web interface. Thus, they were able to monitor delivery progress in real-time and react immediately to any problems. The drivers also placed new paper menus into the plastic stands every Friday.

The ordering and delivery process phases are illustrated in Figure 2. Thick arrows (3, 6, 8 and 9) represent actions that are initiated with an NFC-enabled mobile phone. Thin arrows (1, 2, 4, 5, 7 and 10) represent materials transferred in the process.

The trial application was developed iteratively so that all actors were able to give feedback during development. Experiences from all actors in the meal service process were collected both during and after the trial.

Results: Even though the meal service interface did not require users to operate a mobile keypad, we found out that it was difficult for many participants to use a keypad due to reduced vision and motor skills. In a training session, some users had difficulties with pressing the keys and some interviewees commented that the keys were too small for them. Regardless of their reduced motor skills, all participants could easily learn and adopt touching with a mobile phone during the training session. Those participants who had difficulties with keypads were able to adopt touching equally as well as those who could use keypads. Problems with mobile buttons were observed during the study; clients and delivery personnel reported that some clients had problems with turning their mobile on and off because of the placement and size of the power button.

Placing a meal order required only one action: touching a tag. It did not require remembering multiple activity steps and thus did not cause much memory load. The interviews indicated that the participants usually had no problems with remembering to place their orders. Only one user told that he knew he had forgotten to place his meal order once. Although participants said that they remembered to place their orders, some of them were worried and stressed by remembering to place an order daily. Many users created memorisation strategies, such as placing their orders routinely at a certain time of day.

The NFC reader was located in the changeable mobile phone shell. Finding the right touch point often required some training. However, all users were able to touch a tag with ease by the end of the training session. However, we believe that they would not have been able to use the application without hands-on training.

The menu table decreased the intuitiveness of interaction. Prior to touching, the user had to check the meal that corresponds with tag label A or B and also read the row showing the next day's meal. Interpreting the menu table caused some problems in the early phase of the training session. However, in the final interview, all participants said that the menu table was easy to use.

The final interviews showed that attitudes towards the NFC-based meal order application varied among the elderly participants. Table 3 presents meal-ordering preferences. Five out of nine participants preferred NFC-based ordering over the earlier practice and were also willing to use the service in the future. Four participants liked the old, conventional practice better. As Table 3 shows, willingness to adopt the new practice was correlated with whether or not the user had owned a mobile phone before the trial. Even though prior use of a mobile phone clearly correlated with the willingness to adopt the application, it did not have an impact on the ability to learn and use the trial application. All users easily adopted touch-based interaction. Although earlier experience

of a mobile phone did not have an effect on proficiency with the application, it did impact on how the users were able to operate the phone. Users with no prior experience had difficulties with basic functionalities, such as charging batteries and turning the phone on and off.

Table 3 Preferences for the meal ordering practices

User	*Age*	*Gender*	*Own mobile phone*	*Preferable meal ordering practice*
U1	< 60	Male	No	Conventional
U2	69	Male	Yes	Touch-based
U3	72	Female	Yes	Touch-based
U4	80	Male	No	Conventional
U5	80	Male	Yes	Conventional
U6	80	Female	Yes	Touch-based
U7	81	Male	Yes	Touch-based
U8	84	Male	Yes	Touch-based
U9	88	Male	No	Conventional

Many elderly clients refused to participate in the trial when they heard it involved the use of a mobile phone. Many of those who decided to participate were unsure about their ability to place orders without help and needed much encouragement in the beginning. None of them broke off the trial and all were able to successfully use the service interface.

Delivery personnel experienced the touch-based service interface as very easy to learn, adopt and use. The primary benefit the logistics service gained from the digitally-enhanced service was the possibility to monitor deliveries in real-time through the web interface. Real-time monitoring enabled elderly care personnel to estimate delivery times accurately when asked by the clients. The meal producer regarded improved service quality as the main benefit. Health regulations require warm meals to be delivered in a two-hour time frame, highlighting the importance of exact delivery information. The back-end system generates automatic logs that can be easily used for the quality assurance of meal deliveries. Delivery monitoring may also enhance the quality of customer service. For example, when a client complains that the meal has not arrived, an elderly care worker can check the delivery status from the web application and provide accurate information to the worried customer. Moreover, improved transparency may enable efficiency improvements, as the logistics service provider can use reported delivery times to optimise service delivery processes.

4.2 Case study 2: product order service

Shopping assistance is a service that is regularly provided to elderly citizens who are unable to go shopping unassisted. In a typical scenario, an elderly care worker goes to the home of an elderly client, writes down the shopping list, goes to the shop, picks up groceries and finally delivers them. This whole process normally takes from 45 minutes to over one hour per client (as estimated by homecare personnel). Not only is this process very inefficient, it is also definitely not what well-educated elderly care workers are

trained to do. Therefore, elderly care is actively searching for solutions that could improve service effectiveness and enable elderly care workers to concentrate on the tasks that they are trained for. If the NFC-based product order service is considered in terms of the operation models of electronic commerce (EC) of groceries by Heikkilä et al. (1999), it mainly follows the intermediate EC model, in which a home helper delivers orders.

The trial group of the digital product order service consisted of 16 elderly people with varying levels of physical and cognitive deficiencies. For the purpose of the analysis, the elderly participants were classified into three categories based on their physical and cognitive skills and need for support based on the classifications by Saranummi (2001), Gregor et al. (2002) and Hawthorn (2003):

Group 1 Older persons who might have minor constraints in some areas. They are able to cope mostly independently in everyday life, but may occasionally need support in everyday activities.

Group 2 Older persons who need several support services or support from relatives or friends to continue living independently. They may have common infirmities and may need several assistive devices to help them in their everyday life.

Group 3 Older persons whose long-time disabilities have a clear effect on their aging. They need several support services daily and their everyday life is limited mainly to their home.

Table 4 The elderly participants of the NFC-based product order service trial

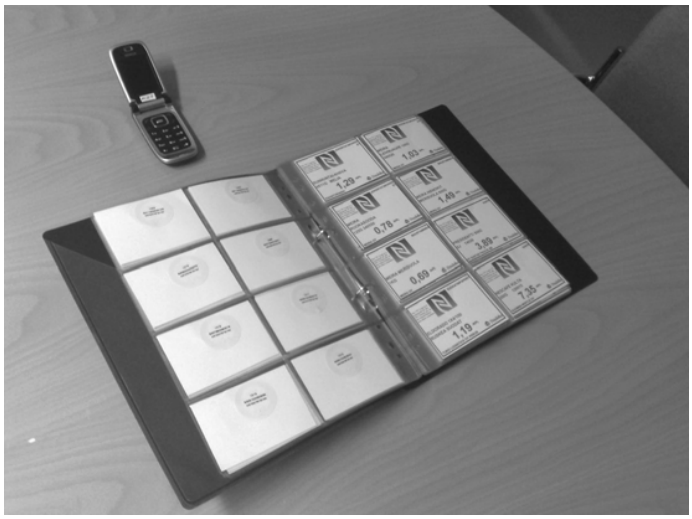
User	*Gender*	*Age*	*Own mobile phone*	*Computer use*	*Group (1, 2 or 3)*
U1	Male	80	No	No	3
U2	Female	72	Yes	No	3
U3	Female	82	No	No	3
U4	Female	88	No	No	3
U5	Female	87	No	No	3
U6	Female	90	No	No	3
U7	Female	83	No	No	3
U8	Male	93	Yes	Yes	3
U9	Male	59	Yes	Yes	1
U10	Female	74	Yes	Yes	2
U11	Female	84	No	No	2
U12	Female	76	Yes	Yes	1
U13	Female	82	Yes	Yes	1
U14	Female	65	Yes	Yes	1
U15	Female	86	Yes	No	2
U16	Female	82	No	No	2

Table 4 presents the background information about the elderly trial participants. The average age of the participants was 80 years. Three out of 16 elderly participants were males and 13 were females. Eight participants had used a mobile phone before the trial, mainly for receiving and making calls.

Based on the information from the homecare nursing staff, it was decided that nurses would assist all homecare clients (users U1–U8) with using the trial service.

The user interface for selecting products consisted of a folder with NFC tag-equipped product cards listing the grocery items available for order and an NFC-enabled mobile phone. The folder and the phone used are shown in Figure 3. The attached tags can be seen on the left page on the back of the product cards. A blue N-shaped symbol indicates where the user should touch. Before the trial started, the participants selected which product cards they wished to include in their folder from the product list of the shop.

Figure 3 The folder with product cards and the phone used for ordering

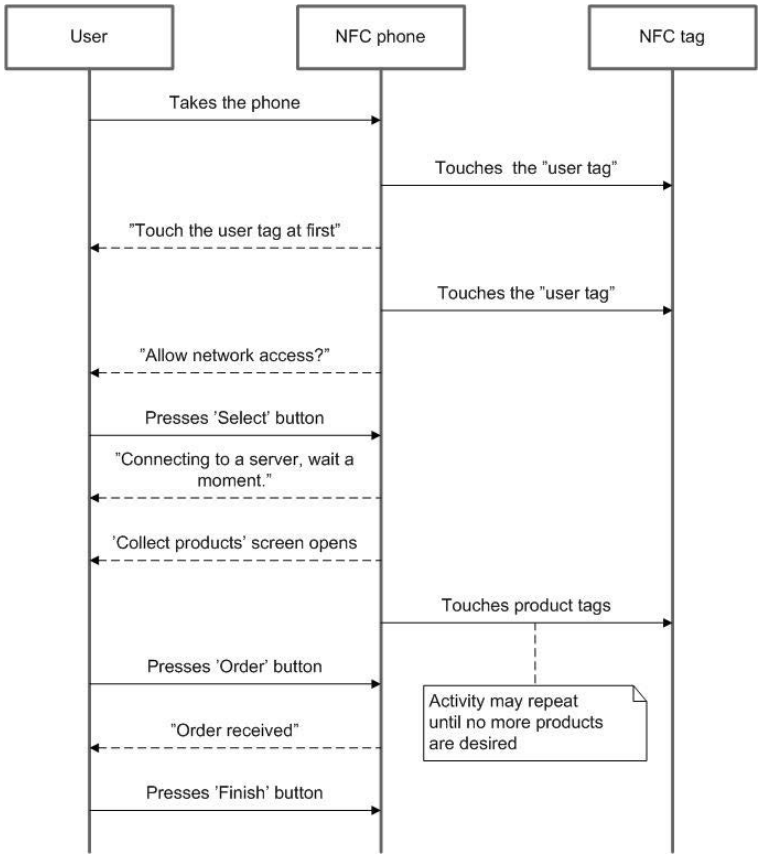


The trial participants placed their product orders by touching tags in the product folder with an NFC-enabled mobile phone. There were two fixed delivery days, Tuesday and Friday. The deadline for the order was 9 PM on the evening before the delivery day. Only one order per client was processed – the latest order in the back-end system was valid. Shop personnel collected items into a delivery box. The delivery was done by the local residents' association. The box was always delivered to the home of the client.

The product ordering process was started by touching the 'user tag' twice to open the mobile application and connect to the system. If the user had an unfinished order, the application asked if the user wanted to continue the earlier order. The user could select products from the folder by touching product cards equipped with NFC tags. A maximum of eight tagged product cards were placed on one page. Tag folder pages had to be kept separate during touching in order to avoid reading data from the wrong tag. If pages were not separated, the reader read the data at random from a tag within its reading range. If the user wanted to have many pieces of the same item, the tag had to be touched multiple times. A list of selected items was displayed on the mobile phone screen. The user

selected ‘order’ to complete the order, which was then sent to the back-end system. The back-end system then sent a text message stating that the order was successful. Figure 4 presents the steps of the order process. In addition to visual feedback, tactile feedback (vibrating alert) was used to indicate when data was read successfully from a tag.

Figure 4 Steps of the product order



Results: Some trial participants found the shopping user interface challenging to use. It required the user to read the order on the screen of a mobile phone and operate its keypad. Some users had difficulties with the small font and small buttons. Many elderly trial participants were not able to read small text from the screen or the product cards. Naturally, that made it difficult to make shopping-related decisions.

Decreased motor skills also hindered usage. Not all users were able to touch tags without help. The user interface format required two functional, coordinated hands, which was a significant hurdle for users with decreased motor skills.

Our experiences indicate that the elderly participants would not have been able to use the service without a training session at the beginning of the trial. A mobile phone was a totally new device to some of them and none were familiar with the model used in the test. So, in addition to training on the service and application, they needed guidance on basic mobile phone functionalities, such as opening its flap and switching it on and off.

Many users wanted to have the option of updating their product folder during the trial. However, this was impossible in this trial. Also, the trial interface could not provide pricing information. This caused some confusion and was clearly not acceptable, even when the service forces the user to use a single product provider and the user cannot compare the prices of different providers.

Table 5 presents how independently the participants used the product order service and how willing they would be to use the service in the future. As the table shows, eight out of 16 users were not able to place a single product order during the trial period without help. Seven of these participants needed a lot of support to cope in their everyday life (Group 3) and one of them (U16) often needed support from a relative. However, U16 was also able to independently take care of several everyday things (Group 2). Six participants said that they had not received any help with placing their orders during the trial period. Four out of six of these participants were the persons who were mainly capable of coping independently in their everyday life (Group 1). Users with their own mobile phones and who were familiar with computers were most likely to use the trial service with minimal help. Six out of eight mobile phone users placed their orders always or usually without assistance. There was a clear correlation between the degree of age-related decline and need for assistance in placing orders.

Table 5 Independent use of the service and willingness to use the service in the future

User	*Gender*	*Age*	*Mobile phone use*	*Computer use*	*Group (1, 2 or 3)*	*Independent use of the service*	*Use of the service in the future*
U1*	Male	80	No	No	3	No	-
U2*	Female	72	Yes	No	3	No	-
U3	Female	82	No	No	3	No	-**
U4	Female	88	No	No	3	No	-**
U5	Female	87	No	No	3	No	No
U6	Female	90	No	No	3	No	Maybe
U7	Female	83	No	No	3	No	Yes
U8*	Male	93	Yes	Yes	3	Seldom	-
U9	Male	59	Yes	Yes	1	Always	Yes
U10	Female	74	Yes	Yes	2	Mostly	Yes
U11	Female	84	No	No	2	Always	Yes
U12	Female	76	Yes	Yes	1	Always	No
U13	Female	82	Yes	Yes	1	Always	Maybe
U14	Female	65	Yes	Yes	1	Always	Yes
U15	Female	86	Yes	No	2	Always	No
U16	Female	82	No	No	2	No	No

Notes: *A user did not participate in the final interview.
**A user did not respond to the question.

The eight homecare clients who needed several support services were not able to choose products without help from the nurses. Thus, nurses were always involved in the ordering

process, both in selecting items and placing orders. Only one of these homecare clients (U8) placed a few orders without assistance during the trial. Six out of eight homecare clients were not able to place their orders by using the trial service due to age-related decline in vision, motor and cognitive skills. One user did not want to use the service interface and only volunteered for the trial if the nurse placed the orders for her.

The interviewed nurses estimated that the service interface would be most valuable for clients who can place orders without assistance. However, the nurses also had observed that a service of this kind can have a positive effect on elderly clients by activating them and providing possibilities for both physical and cognitive rehabilitation. Altogether, nursing staff's attitude towards the service was very positive.

Five out of 11 respondents were willing to use the service in the future. Two participants were not sure and four participants were not willing to use the service in the future. Some of those participants who were able to move outside their homes stated that visiting the shop is important for them and they will continue doing so as long as possible. However, these clients valued the home delivery service that carried heavy bags directly to their home.

Measurements of the product ordering and delivery lead time indicate that the digitally-enhanced service process reduced the total time used for ordering and delivery. During the trial, the average time used for ordering and delivery per client was reported to be 39 minutes (normally 45–60 minutes). Thus, the total effectiveness of grocery ordering and home delivery was increased when the ordering was done digitally (either by the client or elderly care worker) and the groceries were picked and delivered by specialised personnel.

5 Discussion

Our results show that integrating technology into the lives of elderly users is challenging. It is much easier to justify and prove the benefits for the service provider compared with showing that adopting new services provides value for elderly users. The traditional measures used for showing the benefits of adopting information systems, such as faster operation or cost cuttings, do not fit well in measuring the value created for elderly users. These studies highlight the following potential benefits for elderly users:

- Increased independence through opportunities for making everyday life decisions. Our results show that digital service access can enable elderly meal care users to choose their meals and participate in grocery shopping and thus be active in their everyday life decisions, which has been shown to contribute to life satisfaction (Kane and Caplan, 1990).
- Rehabilitation and maintaining skills related to daily activities by activating the elderly in everyday activities both physically and mentally. In the home shopping case study, we found that skills that are not practised are forgotten. Elderly people who had not had an opportunity to do their grocery shopping could no longer select food items. A digital service interface could be valuable in maintaining valued skills related to choosing one's food (Kane and Caplan, 1990) and thus increase both the feeling of engagement with everyday surroundings and independence through the ability to participate in daily choices.

For service providers, the benefits can be measured in better cost-efficiency and perceived service quality (Grönroos and Ojasalo, 2004). The following issues were found to improve the management of service processes:

- Better visibility of the delivery processes, which can be used for more efficient route planning and quality control. Both cases provide an example of food delivery, where regulations and food quality require fast delivery. Routes were not optimised during the study period described here, but it was evident that the gathered data could be used in optimisation.
- More efficient service processes as information can be transferred quickly and automatically between actors. The meal order study allowed the service customer, i.e., the elderly users, to give input to the service process cost-efficiently.
- Rearrangement of work processes. Service delivery tasks are assigned to specialised personnel who can do these tasks more efficiently than elderly care workers. The home shopping study removed the need for elderly care personnel to walk to the nearest shop and back by establishing data transfer between home and shop, thereby, optimising human resources.

All these issues can contribute to cost and time savings in service provision. However, the results related to saving working time in these cases are only indicative, as measures are based mainly on the subjective estimates of the trial delivery participants. The time recording systems established for recording working time during the studies were not used properly or the data provided was not reliable because the service content was not always consistent (e.g., the tasks performed when visiting an elderly user varied from time to time). Also, scale economics are required for achieving profitability. The number of customers needs to be significantly greater than the small groups examined in this research to make scale economics work for these services.

Even though the first case study showed very encouraging results on using mobile phones in service access, the second study revealed that challenges still exist. Firstly, in the second case study, the motor and cognitive skills of the users had declined more clearly than the participants' skills in the first case study. Some participants in the second study were not able to touch a tag with a mobile phone without assistance. In addition, many of them had problems with reading the product information on product cards or a mobile screen due to impaired vision. Secondly, the user interface in the second study required sequential actions, reading a mobile screen and pressing keys. Also, combining a folder-based interface with a mobile phone required two-handed use. All these combined made the user interface too complex for most users.

Altogether, the elderly found it easier to adopt the meal order service due to its direct interaction mechanism. The shopping interface cannot be realised with a one-touch UI paradigm, as it essentially requires several selections and confirmation. Also, a small mobile screen is not optimal for displaying lists and especially for managing long lists. However, our experiences indicate that the more complex nature of the task was not the only reason for the worse user experience. The meal ordering user interface was developed in cooperation with all actors, including representatives of elderly users. This resulted in several iterations; interaction problems could be eliminated in each. The shopping interface was not iteratively refined with end-user representatives. This

experience shows that the iterative development of user interfaces is especially crucial and beneficial when their target users are elderly people.

The meal ordering study shows that it is difficult to achieve significant improvements in the QOL when the users are already satisfied with the service, even though service providers had recognised potential for improving the service provision process. The clients were extremely satisfied with the meal ordering service as it was before the trial. Therefore, they did not have a specific need to improve something they were already satisfied with. QOL can probably be enhanced better by targeting efforts at service processes and activities that elderly users experience as problematic. The service value proposition, i.e., increasing independence and engagement through the ability to make choices regarding meals, was not co-created (Prahalad and Ramaswamy, 2004) with elderly users. The two meal choices provided failed to create value for all users. The study revealed that value could have been created, for example, through providing more differentiation between choices (e.g., a healthier option). Earlier studies have also emphasised the investigation of the aspirations and needs of elderly people (e.g., Abascal and Civit, 2000; Rietsema and Melenhorst, 1998). However, optimising service delivery processes from the viewpoint of the service provider can of course also provide indirect benefits to elderly users in the form of better cost-efficiency and service quality.

Familiarity with mobile phones had a clear positive effect on the willingness to use digital service access in both case studies. Many users with no prior experience of mobile phones and computers were not willing to participate in the trial or use the trial services. On the other hand, our experiences show that digital service access with a touch-based user interface (realised, for example, using NFC technology) can provide accessible solutions for elderly users who would not be able to use mobile phones for service access through traditional user interaction methods (i.e., screen and keypad).

Results suggest that digital service access and control can help to improve service process effectiveness. In the product order study, the most promising way to improve efficiency is associated with the rearrangement of work processes, as the service process tasks could be performed by trained personnel and the work effort of elderly care personnel was saved for actual elderly care. In the meal order study, digital service control enables an easy way to provide transparency in logistics processes and digital service access can create possibilities for service providers to deliver enhanced customer service cost-efficiently.

6 Conclusions

In spite of the challenges identified in the case studies reported in this paper, it can be suggested that novel natural and intuitive interaction techniques, such as touch-based interaction with a mobile phone, can enable the implementation of digital service access points for services that would otherwise be inaccessible for the elderly. This supports the independence of the elderly and can provide possibilities for both physical and cognitive rehabilitation. However, it must be remembered that elderly people are a diverse group in terms of skills, capabilities and needs, so designing interfaces and services that would be optimal for all elderly people is impossible.

Even though both the services presented in this paper are very similar in nature, they had differences in the ease of use. A fundamental reason for complexity in the use of the product order service resulted from its more complex requirements. Instead of numerous

options – as in the product order service – the meal order service provided only 15 selectable options in one view. This gives a totally different starting point for the design of digital service access.

From the elderly care viewpoint, the drastic ongoing change in the population age structure increases pressure to rationalise elderly care services. The research presented here explores the possibilities of digital service access in providing more efficient elderly care services with improved service quality. The research also contributes towards building methodology and frameworks for evaluating such technology in real world contexts.

Our experiences indicate that involving the elderly closely in the design and decision-making processes can significantly contribute towards more usable and valuable service concepts for the elderly. Also, analysis and a thorough understanding of the actual needs of the elderly are crucial for targeting activities that have high potential for improving QOL. In other words, design and development of digital services should be user-driven from the beginning.

Further research can focus on studying how to involve elderly people more closely in the design and development process of digitally-enhanced services. In addition, when studying service productivity in future research, it is recommended to seek more accurate measures for service quality in order to achieve more reliable service productivity-related measurements.

Acknowledgements

We would like to thank the administrative units of the City of Oulu, who were actively involved in the trials. This work was done in two projects, which have been partly funded by Tekes, the Finnish Funding Agency for Technology and Innovation. The first project is called SmartTouch (ITEA 05024). It is a project within ITEA 2 (Information Technology for European Advancement), a EUREKA strategic cluster programme. The second project is called HearMeFeelMe. It is the project within the Ambient Assisted Living (AAL) joint programme.

References

Abascal, J. and Civit, A. (2000) 'Mobile communication for people with disabilities and older people: new opportunities for autonomous life', *Proceedings of the 6th ERCIM Workshop*.

Anokwa, Y., Borriello, G., Pering, T. and Want, R. (2007) 'A user interaction model for NFC enabled applications', *Proceedings of the Fifth IEEE International Conference on Pervasive Computing and Communications Workshops (19–23 March 2007) PERCOMW*, IEEE Computer Society, Washington DC, pp.357–361.

Bae, K-J., Jeong, Y-S., Shim, W-S. and Kwak, S-J. (2007) 'The ubiquitous library for the blind and physically handicapped – a case study of the LG Sangnam Library, Korea', *IFLA Journal*, Vol. 33, No. 3, pp.210–219.

Chase, R. and Haynes, R. (2000) 'Service operations management: a field guide', in T. Swartz and D. Iacobucci (Eds.): *Handbook of Services Marketing and Management*, pp.455–472, Sage Publications, Thousand Oaks, CA.

Chaudhry, B., Wang, J., Wu, S., Maglione, M., Mojica, W., Roth, E., Morton, S. and Shekelle, P. (2006) 'Systematic review: impact of health information technology on quality, efficiency, and costs of medical care', *Annals of Internal Medicine*, Vol. 144, No. 10, pp.742–752.

Curtin, J., Kauffman, R. and Riggins, F. (2007) 'Making the MOST out of RFID technology: a research agenda for the study of the adoption, usage and impact of RFID', *Information Technology and Management*, Vol. 8, No. 2, pp.87–110.

Eisma, R., Dickinson, A., Goodman, J., Syme, A., Tiwari, L. and Newell, A.F. (2004) 'Early user involvement in the development of information technology-related products for older people', *Universal Access in the Information Society*, Vol. 3, No. 2, pp.131–140.

Gregor, P., Newell, A.F. and Zajicek, M. (2002) 'Designing for dynamic diversity – interfaces for older people', *Conference Proceedings of Assets 2002*, pp.151–156.

Grönroos, C. and Ojasalo, K. (2004) 'Service productivity: towards a conceptualization of the transformation of inputs into economic results in services', *Journal of Business Research*, Vol. 57, pp.414–423.

Gummesson, E. (1998) 'Productivity, quality and relationship marketing in service operations', *International Journal of Contemporary Hospitality Management*, Vol. 10, No. 1, pp.4–15.

Häikiö, J., Isomursu, M., Matinmikko, T., Ailisto, H. and Huomo, T. (2007a) 'Experiences from adopting assistive technology', *FICCDAT/ICTA: The 2nd International Conference on Technology and Aging*, Paper T0130.

Häikiö, J., Wallin, A., Isomursu, M., Ailisto, H., Matinmikko, T. and Huomo, T. (2007b) 'Touch-based user interface for elderly users', *Proceedings of the 9th International Conference on Human Computer Interaction with Mobile Devices and Services, MobileHCI '07*, ACM, New York, NY, Vol. 309, pp.289–296.

Hammar, T., Raatikainen, R. and Perälä, M-L. (1999) 'Sosiaali – ja terveyspalvelut tulevaisuudessa: 60–65 – vuotiaiden odotukset palveluista 80-vuotiaana', free translation in English is 'Social and health services in the future: expectations about services among 60 to 65-year-olds', *Gerontologia*, Vol. 13, No. 4, pp.189–199.

Hawthorn, D. (2003) 'How universal is good design for older users?', *Proceedings of the 2003 ACM Conference on Universal Usability (CUU03)*, pp.38–45.

Heikkilä, J., Kallio, J., Saarinen, T. and Tuunainen, V.K. (1999) 'EC of groceries for elderly and disabled – comparison of alternative service models', *Information Technology and People*, Vol. 12, No. 4, pp.389–402.

Heikkilä, J., Kallio, J., Saarinen, T. and Virpi, K. (1998) 'Grocery shopping for the elderly and disabled: Finnish EC experiments', *Electronic Markets*, Vol. 8, No. 2, pp.389–402.

Hirsch, T., Forlizzi, J., Hyder, E., Goetz, J., Stroback, J. and Kurtz, C. (2000) 'The ELDer project: social emotional, and environmental factors in the design of eldercare technologies', in *Proceedings of Conference on Universal Usability*, Arlington, USA.

Huang, Y. and Oppewal, H. (2006) 'Why consumers hesitate to shop online: an experimental choice analysis of grocery shopping and the role of delivery fees', *International Journal of Retail and Distribution Management*, Vol. 34, Nos. 4–5, pp.334–353.

Isomursu, M., Häikiö, J., Wallin, A. and Ailisto, H. (2008) 'Experiences from a touch-based interaction and digitally enhanced meal-delivery service for the elderly', *Advances in Human-Computer Interaction*, Vol. 2008, Article ID 931701.

Kämäräinen, V., Småros, J., Jaakola, T. and Holmström, J. (2001) 'Cost-effectiveness in the e-grocery business', *International Journal of Retail & Distribution Management*, Vol. 29, No. 1, pp.41–48.

Kane, R. and Caplan, A. (1990) *Everyday Ethics: Resolving Dilemmas in Nursing Home Life*, Springer Publishing Company, New York.

Lai, F., Zhao, X. and Wang, Q. (2006) 'The impact of information technology on the competitive advantage of logistics firms in China', *Industrial Management & Data Systems*, Vol. 106, No. 9, pp.1249–1271.

Meenely, L., Strugnell, C. and Burns, A. (2009) 'Elderly consumers and their food store experiences', *Journal of Retailing and Consumer Services*, forthcoming.

Mikkonen, M., Väyrynen, S., Ikonen, V. and Heikkilä, M.O. (2002) 'User and concept studies as tools in developing mobile communication services for the elderly', *Personal Ubiquitous Computing*, Vol. 6, No. 2, pp.113–124.

Mitchell, J.M. and Kemp, B.J. (2000) 'Quality of life in assisted living homes: a multidimensional analysis', *Journal of Gerontology: Psychological Sciences*, Vol. 55B, No. 2, pp.117–127.

Morak, J., Kollmann, A., Hayn, D., Kastner, P., Humer, G. and Schreier, G. (2007) 'Improving telemonitoring of heart failure patients with NFC technology', in *Proceedings of the Fifth IASTED International Conference: Biomedical Engineering*, Innsbruck, Austria, 14–16 February, pp.258–261, ACTA Press, Anaheim, CA.

NFC Forum (2009) *About NFC*, available at http://www.nfc-forum.org/aboutnfc/ (accessed on 15 March 2009).

Prahalad, C.K. and Ramaswamy, V. (2004) 'Co-creation experiences: the next practice in value creation', *Journal of Interactive Marketing*, Vol. 18, No. 3, pp.5–14.

Riekki, J., Salminen, T. and Alakärppä, I. (2006) 'Requesting pervasive services by touching RFID tags', *IEEE Pervasive Computing*, Vol. 5, No. 1, pp.40–46.

Rietsema, J. and Melenhorst, A-S. (1998) 'User involvement in gerontechnology: early stage user-understanding to empower technology development', in E. Ballabio (Ed.): *Improving the Quality of Life for the European Citizen*, IOS Press, Amsterdam.

Rukzio, E., Leichtenstern, K., Callaghan, V., Schmidt, A., Holleis, P. and Chin, J. (2006) 'An experimental comparison of physical mobile interaction techniques: touching, pointing and scanning', *Eighth International Conference on Ubiquitous Computing (Ubicomp 2006)*.

Saranummi, N. (2001) 'Hyvinvointi – ja terveysalan teknologia – ja palvelutuotteet', free translation in English is 'Technology and service products in welfare and healthcare', *TEKES, Teknologiakatsaus*, 103/2001.

Sink, D.S. (1985) *Productivity Management: Planning, Measurement and Evaluation, Control and Improvement*, John Wiley & Sons, New York, NY.

Sjölinder, M. (2006) 'Age-related cognitive decline and navigation in electronic environments', Doctoral thesis, Stockholm University.

Southon, G., Sauer, C. and Dampney, K. (1999) 'Lessons from a failed information systems initiative: issues for complex organisations', *International Journal of Medical Informatics*, No. 55, pp.33–46.

Stake, R. (1995) *The Art of Case Research*, Sage Publications, Thousand Oaks, CA.

Tang, P. and Venables, T. (2000) 'Smart homes and telecare for independent living', *Journal of Telemedicine and Telecare*, Vol. 6, No. 1, pp.8–14.

Weber, R.P. (1990) *Basic Content Analysis*, Sage, Newbury Park, California.

Weltevreden, J. (2008) 'B2c e-commerce logistics: the rise of collection-and-delivery points in The Netherlands', *International Journal of Retail and Distribution Management*, Vol. 36, No. 8, pp.638–660.

Yin, R. (2003) *Case Study Research: Design and Methods*, 3rd ed., Sage Publications, Thousand Oaks, CA.

Yrjölä, H. (2001) 'Physical distribution considerations for electronic grocery shopping', *International Journal of Physical Distribution & Logistics Management*, Vol. 31, No. 10, pp.746–761.

Article 2

Wallin, A., Harjumaa, M., Pussinen, P. & Isomursu, M., 2015. Challenges of new service development: Case video-supported home care services, Service Science, 7(2), pp. 1-19. Available at: http://dx.doi.org/10.1287/serv.2015.0097

Article 3

Wallin, A., 2017. Transforming healthcare through entrepreneurial innovations - An institutional view. International Journal of e-services and Mobile Applications, Vol. 9, Iss. 1, pp. 1-17.
Available at: http://dx.doi.org/10.4018/IJESMA.2017010101

International Journal of e-services and Mobile Applications
Volume 9, Issue 1, January-March 2017

Transforming Healthcare through Entrepreneurial Innovations: An Institutional View

Arto Wallin, VTT Technical Research Centre of Finland, Oulu, Finland

ABSTRACT

Although digitalization has profoundly changed the business logic in many industries, the healthcare sector still operates in many areas as in the pre-digital era. During recent years, humans have witnessed the rise of new digital health ventures, many of which have revolutionary ideas of how to transform business logics in the organizational fields of healthcare. However, in many cases the institutional arrangements of the field are so strong that new ventures face major challenges in breaking the institutional elements that prevent the introduction and diffusion of service innovations. This paper studies the cases of five companies that aim to transform specific niche areas in healthcare and how these entrepreneurs perceive the influence of institutional elements on their actions.

Keywords: Constraints, Digital Health, Entrepreneurial Innovation, Healthcare, Institutional Change, Institutional Fit, Institutions

1. INTRODUCTION

During the past 20 years, information and communication technologies (ICT) have profoundly changed our everyday lives and transformed business logics in several industries. On the one hand, ICT has enabled massive digital transformation in several previously product-oriented industries. As a result information intensive goods such as software, music and movies have been relabelled as digital services and behave like services or "as-a-service" (Ng, Vargo, & Smith, 2013). On the other hand, digitalization is transforming other industries, such as banking, from physical service activities to standardized digital services that behave more like goods (Ng et al., 2013). Although digitalization in healthcare has progressed at a much slower pace, policy makers across the globe are now looking to digitalize healthcare systems in order to make them safer, more affordable and more accessible (Agarwal, Gao, DesRoches, & Jha, 2010).

Renewal in healthcare has long been understood as the adoption of new medical tools and drugs (Djellal & Gallouj, 2008). At the same time entrepreneurial innovations, which challenge the status quo-preserving industry incumbents by breaking established institutions and development paths (Autio, Kenney, Mustar, Siegel, & Wright, 2014; Garud, Gehman, & Giuliani, 2014; Schumpeter, 1934) seemed to be very rare. Despite considerable institutional barriers to entrepreneurial innovation, it finally seems that the major transformation of the healthcare industry is inevitable. The major pressure for change in the sociotechnical regimes (Geels & Schot, 2007) of healthcare comes from two directions. Firstly, major changes at the landscape level, for example, the age-dependency ratio and spiraling healthcare costs, have created an urgent need to rethink how the effectiveness of the health and social care service can be improved. Secondly, an increasing number of new ventures, referred to as digital health start-ups within the start-up scene, are building up momentum for major changes. These ventures, which are often located at the periphery of the field, contribute to major transformations by developing ICT-enabled service innovations to change some niche areas of healthcare. Thereby, they act as institutional entrepreneurs who, regardless of their initial intentions to change institutional arrangements, initiate and actively participate in the implementation of changes that diverge from existing institutions (Battilana, Leca, & Boxenbaum, 2009).

While healthcare transformation is ongoing in practice, different research streams have slowly begun to adopt institutional approaches to studying the transformation. In the service research, service-dominant logic (SDL) has been extended by an institutional approach, which highlights actor-generated institutions and institutional arrangements (i.e. an interdependent set of institutions) as the fifth axiom (Vargo & Lusch, 2016). Also, actors and actions aimed at initiating and implementing institutional change have received notable academic attention (e.g. Pacheco, York, Dean, & Sarasvathy, 2010), but there is surprisingly little research on institutional entrepreneurship in the healthcare domain. This paper aims to increase the understanding of how different institutional elements constrain entrepreneurial innovation in the context of healthcare, and provide new insights into ongoing digitalization in healthcare from the perspective of digital health ventures. Accordingly, the research question is:

> How institutional constraints are experienced by new ventures that aim to introduce ICT-enabled service innovations to niche areas of healthcare?

The rest of the paper is outlined as follows: section two explores existing research that is relevant for the study; in section three, the research methodology and context is shortly introduced; and then the findings of the study are described in section four; section five starts with theoretical discussion, which is continued by presenting managerial implications; finally, the conclusions of the study are summarised.

2. RELATED RESEARCH

2.1. Linking Service Innovation Research with Institutional Theory

Service innovations have been studied extensively during recent years and many disciplines have contributed to the current understanding of how innovations are initiated, developed and adopted by various actors and diffused to the markets (see reviews Carlborg, Kindström, & Kowalkowski, 2013; Gallouj & Savona, 2008). At the same time, research on institutional theory and change has risen to prominence as a popular and powerful explanation for both individual and organizational action (Dacin, Goodstein, & Scott, 2002). Although institutional scholars often study phenomenon closely linked to innovation, and also institutional constraints that render radical innovation illegitimate (van Dijk, Berends, Jelinek, Romme, & Weggeman, 2011), for some reason it has so far had surprisingly little influence on the research of service innovations.

A service ecosystems approach to innovation (Vargo, Wieland, & Akaka, 2015) is one of the rare attempts to bridge these research streams. A service ecosystems approach can be seen as an extension to service-dominant logic (Vargo & Lusch, 2004, 2008, 2016) that helps to change the perspective of value creation from linear and sequential to a more complex and dynamic system view, in which value creation practices are guided by institutions and institutional arrangements (Wieland, Koskela-Huotari, & Vargo, 2015). Consequently, it also helps to refocus the study of innovation from development and adoption to improving the understanding of how institutions are formed and reformed, and how institutionalization occurs and influences innovations (Vargo et al., 2015). Although the service ecosystem approach is highly conceptual, it can help scholars to reach a more unified and comprehensive understanding and to further develop existing theories, for example, in service research, entrepreneurship and international business.

2.2. Three Institutional Pillars as Theoretical Lenses

When institutional change of complex systems is analysed through the service ecosystem framework, it may be very difficult to grasp all the important institutions and institutional arrangements through a single perspective. Due to the extremely complex phenomenon, Scott (1995, 2014) suggests analysing institutions and institutional change through three institutional pillars – not as an integrated analytical concept, but rather as three theoretical lenses that all can be used to view the same phenomenon.

Firstly, the regulative lens is at its best in identifying explicit regulatory elements of institutions and institutional arrangements. Regulative elements not only constrain and regularise but also enable and empower the behaviour of social actors and action through formal or informal rules (Scott, 2014). Secondly, the normative lens helps to view institutional elements through the values of social actors (i.e. conceptions of what is preferred or desirable) and normative systems specifying how things should be done (Scott 2014). Thirdly, the cultural-cognitive lens is

particularly valuable to analyse shared conceptions that constitute the nature of social reality. This lens emphasizes actors' internal interpretative processes, which are shaped by external cultural frameworks through which meaning is made (Scott 2014).

All of the lenses are highly important in analysing complex service ecosystems, as particular institutions are made up of different combinations of these institutional elements (Scott, 2008). These elements provide stability and meaning to social life (Scott 2014) and these elements thereby constrain actions aiming to break or loosen existing institutional arrangements (Battilana et al., 2009; Levy & Scully, 2007). These elements are also valuable from the viewpoint of opportunities for institutional change, which is defined by Dorado (2005) as the likelihood that an organizational field will permit actors to identify and introduce new institutional arrangements and to mobilize the resources required to make the transformation enduring. Consequently, each of the three institutional pillars can be seen as both constraint and opportunity for entrepreneurial activities aiming to create new kind of business that requires institutional change.

2.3. Actors Changing Institutions

Although institutional theory has been traditionally interested in how institutions influence actors, there is a growing stream of research that focuses on how actors can change institutions. Eisenstadt (1980) was the first to use the notion of institutional entrepreneur to characterise actors who serve as a catalyst for structural change. Building on Eisenstadt's work, DiMaggio (1988) introduced the concept of institutional entrepreneurship in institutional analysis, with the aim of providing an explanation of how actors can shape institutions despite pressures towards stasis (Leca, Battilana, & Boxenbaum, 2008). Since the early work of DiMaggio, research on institutional entrepreneurship has grown into a compelling and diverse literature that focuses on the self-interested agent who commands and mobilizes resources to alter or create new institutional structures (Pacheco et al., 2010).

Two main research steams that are focused on the concept of institutional entrepreneurship are sociology-based institutional theory and economics-based institutional economics (Pacheco et al., 2010). Whereas institutional economists considered institutional entrepreneurs as self-interested agents that influence the transformation of institutions to capture economic benefits (North, 1990), institutional theorists have very limited discussion related to economic motivation per se (Pacheco et al., 2010). Although these concurrent streams have many common characteristics, those are mostly unlinked with each other. Scott's (2014) work can be used to bridge this gap; he suggests that institutional agents differ in whether they employ primarily regulative, normative, or cultural-cognitive tools in their construction efforts. Thereby, a more holistic view is crucial for studying institutional entrepreneurs.

2.4. Institutional Change in the Field of Healthcare

Healthcare has a dual identity in a modern economy as it has been both the forerunner and laggard of innovation at the same time. On the one hand, healthcare has been a field that has continuously introduced new revolutionary scientific breakthroughs, which help to save or improve the lives of billions of people worldwide. On the other hand, healthcare has been a laggard in systemic service innovations that also require transformation of the logic of the organizational field. A field's logic, referred as institutional logic in institutional theory, is based on a shared understanding between the actors in the field about the goals to be pursued and how they are to be pursued (Battilana et al., 2009). Greenwood & Suddaby (2006) summarize that institutional logics are "taken-for-granted, resilient social prescriptions, sometimes encoded in laws, specifying the boundaries of a field, its rules of membership, and the role identities and appropriate organizational forms of its constituent communities". Due to the organizational fields' resistance to change, there has been notable academic interest in understanding what is preventing the change. Particularly, health specific outlets have published studies on challenges related to the adoption of new ICT-enabled innovations (see reviews: Gagnon et al., 2012; Li et al., 2013).

Although the challenge of initiating and implementing change in healthcare has been discussed widely in the technology adoption and innovation literature, there are some limitations to these approaches. Firstly, studies often take quite a narrow perspective; for example, they analyse barriers in adopting some specific technology based solution from the viewpoint of certain patient or professional groups (Lin, Lin, & Roan, 2012), but do not fully grasp the socially constructed broader institutional setting where the change should take place. Secondly, many information systems research articles especially focus on the adoption of a specific digital system in healthcare (e.g. Li et al., 2013). However, these articles mainly focus on identifying what the barriers are for accepting new

technology in an existing institutional setting, therefore missing the 'bigger picture' and neglecting the question of what can be done to initiate and implement change in the institutional setting. A recent article from Dehzad et al. (2014) is one rare example that analyses barriers to transforming the logic of healthcare from the treatment of diseases to the prevention of diseases. Their study identifies key barriers to the adoption of mobile health, where the three main barriers are integration and interoperability with existing health IT systems, business case, and conservative culture. The findings of this study highlight a third challenge, which is that the categories such as conservative culture are so overarching that there is an evident need to dig deeper into these categories with the help of proper analytical tools and theories. As a result, there is clear demand for integrating institutional theory with other scholarly streams aiming to understand the digital transformation in the field of healthcare.

3. METHODOLOGY

3.1. Research Design and Context

This study adopts a qualitative research approach, using a case study methodology. Case study is especially suitable as a research method in this context due to the high complexity of the phenomenon and early stage of this field of inquiry (Yin, 2009). Also, the study can be categorized as a micro-approach of innovation, focusing on the study of individual actors, especially on entrepreneurial founders and teams (Garud et al., 2014).

The article is based on cross-case analysis of five entrepreneurial ventures aiming to introduce and diffuse ICT-enabled service innovation to transform a specific niche area of the healthcare system. Interviewees represented founders and/or managers of these companies. With the help of these cases the paper aims to explore and explain how new entrepreneurial ventures experience and respond to various types of institutional constraints related to the introduction and adoption of innovations. Table 1 describes the case companies and the contexts in which they operate and which they aim to transform.

Table 1. Data related to case companies

	Institutional context	**Type of innovation**	**# of interviews**	**Maturity of the firm / growth phase**
Firm A	Ophthalmology	Disruptive technological innovation that enables cheaper and easier treatment and prevention of eye diseases.	3	+ 5 years / International growth
Firm B	Diabetes treatment	Technological innovation to improve self-treatment of diabetes and improve communication between patient and health care professionals	1	+5 years / International growth
Firm C	Mental care	Digital solution to change mental care procedures by enabling self-care and improving the communication between patient and healthcare professions during the outpatient care.	2	2-5 years / trial phase
Firm D	Neuroradiology	Digital solution to automatize manual work related to radiological image analysis.	1	0-2 / early sales phase

Firm E	Prevention of chronic diseases	Digital solution to enable prescribing physical activities for patients to prevent chronic diseases.	1	0-2 years / trial phase

3.2. Data Collection and Analysis

The data collection began by conducting narrative interviews of entrepreneurial founders or managers of 20 digital health start-ups. These companies were participating in the European start-up accelerator program with an aim to introduce digital health innovations to international markets. Next the author made an initial analysis of each of the companies and categorized them based on the target market and level of required institutional change. From the 20 cases five cases were selected for a more detailed analysis based on following criteria: 1) the company was targeting the healthcare market therefore excluding, for example, innovations targeted only at consumers, and 2) the company was active in initiating and promoting the institutional change in the specific field of healthcare. The final case companies presented in this article were from Ireland, Belgium, Netherlands, and two from Finland. Data from each individual case were then analysed in-depth through content coding and theme-based categorization with the help of NVivo software. After each case was analysed individually, the analysis turned to cross-case analysis with the aim of identifying consistent patterns and themes between cases.

The research process followed an iterative process of cycling between empirical data and theories from existing literature (Dubois & Gadde, 2002). The study was started by focusing on the intersection of service research and theory of institutional entrepreneurship. However, as data collection and analysis started to build new insights analysis was broadened to include other relevant theoretical discussions, for example, from institutional theory, strategy and entrepreneurship, and innovation management. Therefore, the author utilized theoretical triangulation (Patton, 1999) to capture and interpret the phenomenon as a whole. Slowly this abductive process directed to the formulation of practical managerial implications as well as refining the findings into contributions for ongoing theoretical discussions in service research.

4. FINDINGS

This section aims to shed light on how institutional constraints are experienced by new ventures that pursue the introduction and diffusion of ICT-enabled service innovations to some niche areas in the field of healthcare. As the institutional constraints come with many names and shapes, ranging from “conscious to unconscious and from the legally enforced to taken-for-granted”, three pillars of institutions: regulative, normative and cultural-cognitive (Scott 2014) are utilized as lenses to view these constraints from three different angles.

4.1. Regulative Institutional Constraints

From the regulative perspective, the case companies were constrained by many different kinds of regulatory rules. Most of the rules are set by the state that either directly or indirectly monitors and sanctions activities that do not conform to these rules. Regulations already start to impact entrepreneurial activities in the establishment phase, but regulations related to the establishment of new business were not considered to be a major constraint for entrepreneurial activities. However, regulations related to the introduction of new solutions to the healthcare market were experienced as a major issue when innovating in the field of digital health.

In general, new ventures take some elements of the regulative system as constraints that they need to cope with and some other elements are seen as challenges that need to be changed. Firstly, laws are a type of regulative elements that all studied companies take-for-granted and, at least do not admit to disobeying. There are, however, a few challenges with the laws that internationally focused start-up companies face. For one thing, the legal and regulatory framework varies between European countries, which can cause additional surprises to these small companies who lack legal expertise and therefore have limited understanding of how regulatory systems work.

But (within our) company we do not have any, (not much) regulatory background so we don't have lawyers or something.

Secondly, the more international entrepreneurs are the better they know that general obedience to laws differs between countries. In the end, laws written in the books may be different than informal rules in the field. It takes a lot of understanding of the culture and shared values of the community to know when written law is definitive, and when there is flexibility in interpretation of the law. For example, one company had experienced that it was almost impossible to have fair competition in some Asian countries without bending the laws, as there seemed to be informal rules of bargaining that overruled the official laws. This type of situation where informal rules are stronger that written laws can be a major obstacle for law-abiding entrepreneur's internationalization plans.

One particular aspect of the healthcare field is that technological innovations have very strict regulatory controls. Medical device classification is part of regulatory control that entrepreneurs think they need to comply with if they are, for example, to sell their solution as a medical device or the data is used for the purpose of medical decision making. However, some new entrepreneurs experience this part of regulatory control as burdensome, and entrepreneurs carefully weigh the costs and benefits of the medical device classification process compared to labelling the innovation as a wellbeing product.

We've been meeting some regulatory specialists and they've all advised that it's still a prevention health promotion tool rather than an actual medical device. But once we get into, clinical pathways or, I suppose pathways specific for different chronic diseases, then it'll be considered a medical device. So, we would have to go through all the processes…

In the matter of following regulations and standards, entrepreneurs are not only motivated by legal sanctions, but they also act to pursue their self-interest since they often believe that, for example, medical device classification will open new markets, enable new revenue flows and set barriers for competitors. However, at the same time as they believe that classification may have a positive impact on their revenue generation in the future, they struggle to access the correct information, understand requirements, and follow the process through successfully.

Despite a willingness to comply with many regulations, there were also some regulative institutional arrangements that the case ventures diverged from. Government reimbursement for certain types of care procedures is a type of regulative element that most of the studied companies aim to change even though they understand that it is far from simple. Firstly, companies need to justify the institutional change of reimbursement system, which can be challenging for a small company as one of the interviewees points out: "The big challenge that we're facing at the moment is how to get these types of [digital] tools reimbursed as you also need to properly validate them". Secondly, the experience of understanding how a reimbursement system works and how decisions upon it are made in the home country was difficult for some entrepreneurs, and the complexity increases radically when different national reimbursement systems need to be changed. Since implementing change country-by-country may be out of reach for individual companies, entrepreneurs put their trust in collective power to change the reimbursement system, where many actors who have a joint interest to change the system can implement the change together.

It's possible to have an influence. Probably we won't be able to do everything by ourselves, but it is a shared problem with many other companies. On the other hand I think that while we are just creating this for ourselves but there are some other companies that are having the same problems that have a little bit more traction with these organizations already.

The reason why the established reimbursement system is not taken-for-granted is that start-ups see reimbursement more as a power-game, where different stakeholders in the organizational field aim to play the game so that it is most beneficial for them. Entrepreneurs also truly believe that their solution would improve the effectiveness of care without the extra money needed for reimbursement. Therefore, when the healthcare system already provides reimbursement to a care procedure, entrepreneurs aim to change the reimbursement system so that new innovations would be accepted under the reimbursement scheme.

4.2. Normative Institutional Constraints

From the normative perspective, entrepreneurial actions are guided and constrained by values, norms and social roles. Scott (2014) defines values as "conceptions of the preferred or the desirable" whereas norms specify, "how things should be done." Standards are also important normative elements to which existing structures or behaviours can be compared and assessed.

4.2.1. Changing the Roles of Medical Professionals

When service innovation aims to change a 'standardized role' at the field, the proposed change can be difficult to implement and diffuse. Change can be particularly difficult if it can be interpreted to weaken the social position of the healthcare professionals who are high in the hierarchical level or who have very strong professional identity. For example, in the case of the ophthalmology, one of the interviewed persons said that the union of medical professionals acted very actively in order to prevent the transfer of clinical tasks from ophthalmologists to other healthcare professionals, which would have enabled a new type of business to be created. Hence, entrepreneurs should be careful when planning business that requires changing institutionalized roles in the field. Another entrepreneur, who had initially aimed to develop an innovation that would change the role of professionals also noticed this. However, they identified it as a big challenge that professionals would interpret the change as being aimed at reducing their work and thereby possibly also their income. Because it was expected to cause too much resistance, the company decided to change their strategy: "if you can't beat them, work with them".

So it is about the amount of care that [professionals] provide and not about the effectiveness, which is a big bottleneck. Because it means that everything you do to make it better … it will have impact on somebody's salary, and this is something that people don't normally like.

4.2.2. Digitalization of Clinical Tasks

Another case company aims to radically improve the way certain neurological diseases are diagnosed. Although this case also requires change in institutionalized roles of medical professionals, the interviewed entrepreneur expected that the implementation of the change might be easier. The reason is that it seems to be inevitable that the tasks related to the diagnostics, which have been strongly based on manual work, need to change radically as the speed, accuracy, and reliability of computer-based analysis will continue to improve.

But these are things that a computer is much better at of course … some might see it as competition, but others might see it as a (source of) complementary information.

Although some conservative medical professionals might want to act as institutional defenders to prevent this kind of change, it is likely that the growing business orientation in the healthcare field will force through changes that are proven to significantly improve the effectiveness of clinical tasks. This type of business-orientation is strongest in the private sector, which is therefore seen as the most potential customer in the early phase. However, as financial resources have become scarcer in public healthcare, it has forced many public health organizations to change the institutional logic from medical professionalism towards more business-like professionalism. Thereby, it is likely that the public healthcare will follow the private sector in implementing the digitalization of clinical tasks when there is clear proof of increased effectiveness.

4.2.3. Changing Standardized Processes

Besides the need to change the behaviour of the patient and medical professionals, other operations in the field of healthcare also have institutional elements that may constrain entrepreneurial innovations. For example, in the diabetes management case one main constraint for the adoption was experienced as the standardized procurement process of diabetes management devices within the existing healthcare system, which emphasized price as the main procurement decision criteria. Therefore, the company was 'forced to act' as an institutional entrepreneur, since it was not able to sell significantly better solutions with a higher initial purchase price, before first initiating the change of the procurement process of healthcare providers.

4.3. Cultural-Cognitive Constraints

Cultural-cognitive constraints are challenging from the viewpoint of entrepreneurial innovations. For one thing, entrepreneurs may not even recognise these cultural-cognitive elements as constraints as the entrepreneur cannot conceive of any other way of acting. In that case these deep foundations of institutional forms provide unconscious guidance for entrepreneurial choices and acts. Secondly, when an entrepreneur has a vision that includes changing some cultural-cognitive element, it may be very difficult to change taken-for-granted assumptions, and premises that underlie established institutional logic.

I suppose inertia or doing nothing is (our) big competitor. People not doing, because that's what happens a lot of the time. It's waiting until someone needs medication and then giving them medication, so that's probably the biggest competitor.

The main cultural-cognitive constraints, which all entrepreneurs had stumbled on, was a significant inertia to transforming the general institutional logic of healthcare from the cure of medical problems to their prevention. This inertia is reflected from cultural and cognitive frames to the norms and regulations in society. Moreover, the inertia can be found at many different levels in the society, for example, in political decision-making, choices of medical professionals, and also in the everyday lives of the customers of healthcare services (called patients in the care model). Even though the transformation to prevention is recognised to be highly necessary at many levels, the implementation of the change is truly challenging, which is described by the frustration of one interviewee: "the prevention exists only in public speeches". Although entrepreneurs had at least learned to understand that the size of this constraint was significant, some businesses still relied on the anticipated transformation.

4.3.1. Political Perspective

Interviewees shared the opinion that at the political level there is interest towards prevention, but when hard financial decisions are made short term financial constraints overrule long term benefits. This leads also to inertia in implementing needed legal and regulative changes related to, for example, the reimbursement of preventive care.

And they're of the opinion that, well we have X amount of money and so, the government are gonna spend that on an extra bed in rather than, a new technology for prevention. That's what we've come up against with the government.

4.3.2. Healthcare Organizations' Perspective

The work and income of many established actors in the field of healthcare is still dependent on the number of treatments given to the patients. Consequently, interviewed entrepreneurs experienced that most of the healthcare organizations are not motivated to change their care-based business logic to prevention-based logic. One of the main reasons may be that company's management lack incentives and might be afraid of cannibalizing their existing business, which could look bad in the short term. However, some entrepreneurs were relying on new kinds of healthcare organizations whose business logic is built on prevention and these companies were seen as transformers of healthcare and ideal partners or early stage customers.

I think that almost all health care is aimed at, incidents you could say. So if I need to have a surgery or I broke my bone then, they will fix it. Healthcare is not aimed at continuous help and support chronic diseases so our whole system is aimed at something, different than managing your health for a long term.

4.3.3. The Perspective of Professionals

Entrepreneurs thought that healthcare professionals were a diverse group of individuals where you can find innovators and early adopters who are motivated to test new innovations and adopt those into their daily work if they can see the benefits from it. However, the majority of professionals are not as responsive to innovations that require change in their taken-for-granted daily practices. One presumed reason for this was that since professionals are very busy in their work they follow certain patterns of action to reduce cognitive load and make their work more effective. Therefore, when you ask them to break their existing patterns, they feel stressed about new practices even though in principle they would consider higher-level goals relevant. Hence, the same professionals, who support transformation from sporadic interventions that focus on the treatment of acute health problems to more continuous and preventive care, might silently create inertia to change by simply choosing not to adopt new practices.

4.3.4. The Perspective of Service Consumers

Consumers of the health services are a major concern when innovation requires changing institutional schemas, beliefs and patterns of action. At this level, institutional change is likely to be easier if the consumer has clear problems in her life that she is looking to solve and the innovation promises to help. For example, the manager of the company that provides new ICT-based service for people suffering from diabetes didn't consider changes in daily behaviour to be a problem for adoption. The reason is that diabetes is a continuous problem and diabetics are

often quite well motivated to change their behaviour as there are evident threats if health behaviour is not changed. However, people who don't have clear medical problems or whose medical problems have been solved are a very challenging target group for preventive health solutions. When adoption of innovation requires 'reprogramming' of the institutionalized patterns in a life, it can be too much to ask without a current or enduring motivational factor.

5. DISCUSSION

The findings of the study explore the constraints that digital health ventures face when they aim to introduce service innovation with a new kind of business logic into healthcare markets. The section starts with a theoretical discussion about institutional constraints with an aim to elaborate the concept of institutional fit and analyse impact of institutional complexity on constraints. Then some practical implications of the work are highlighted that are expected to have notable value for entrepreneurs and management of the new ventures. Finally, the limitations of the work are addressed that can open avenues for further research.

5.1. Concept and Framework of Institutional Fit

Scholarly streams of strategic management and institutional theory have examined the influence of the external environment to organizations. In strategic management, the particular interest has been on the fit of an organization to its environment and its impact on firm performance (Burton & Obel, 2004; Volberda, van der Weerdt, Verwaal et al., 2012). In institutional theory the main point of view has been that organizations are driven by isomorphic processes through which they gain better compliance with the institutional environment (e.g. DiMaggio & Powell, 1983; Scott, 2014). The compliance with the environment has been also referred to as institutional fit, which Kondra & Hinings (1998) define as an organization's "degree of compliance with the organizational form of structures, routines and systems prescribed by institutional norms".

Based on the findings, the author introduces three main theoretical contributions to these discussions and particularly to service research. Firstly, the study shows that institutional fit is a valuable concept; however, it is rarely used and practically non-existent in service literature. The concept can be helpful in examining and explaining why certain institutional arrangements are experienced as constraints by some service innovators and opportunities by others. The article proposes strengthening the concept of institutional fit as a cognitive framework through the use of institutional pillars introduced by Scott (2014). The main benefit of the elaborated concept and the cognitive framework depicted in Figure 1 is to view the institutional fit through three somewhat divergent conceptions. With help of this conceptualization, we are closer to capturing the full range of institutional forces affecting organizations, their performance, and strategies, which institutional entrepreneurs choose to initiate and implement in divergent changes.

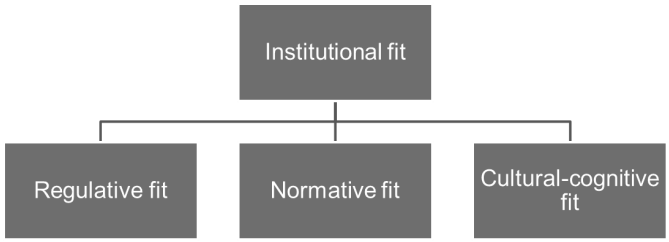


Figure 1. Elaborated framework for institutional fit

Secondly, the author claims that when an organization aims to introduce and diffuse an innovation to an organizational field, which requires notable change in the institutional logic of the field, it is better that the organization is not fully fit within the current institutional context. Nevertheless, there is a thin line as to what level of institutional misfit is acceptable. On the one hand, an organization needs to have certain level of institutional fit as, for example, it enhances the legitimacy and power of organizations (Volberda et al., 2012). From the perspective

of a start-up aiming to change part of the healthcare system, this is highly relevant, as a new venture that lacks these ingredients is in a very difficult position to initiate and introduce change in a highly institutionalized environment. On the other hand, diffusing new institutional logic to the field requires breaking some of the existing institutional arrangements. Therefore, a start-up that doesn't feel the same pressure of institutional isomorphism as established actors in the field might be in a better position to introduce radical changes. Hence, a lack of fit with the current institutional arrangements can be expected to positively influence a willingness to change institutions. This is likely to be part of the reason why so many established organizations in the field of healthcare nowadays look to initiate and implement radical innovations with the help of start-ups.

Thirdly, the study shows that institutional entrepreneurs employ different strategies in their efforts to change institutions depending on the institutional context and type of institutional fit they experience and thereby the constraints and opportunities they perceive. For example, a lack of regulative fit can be perceived as a major constraint by start-ups as divergent change in regulative systems often requires considerable political power, which is recognized as a weak point. On the contrary, a lack of normative fit is seen as more of an opportunity and start-ups utilize, for example, field trials as a strategy to demonstrate the effectiveness of a new solution in order to justify the change of norms in healthcare. Cultural-cognitive fit and related constraints seem to be less understood, especially by early stage start-ups. The change of patients' taken-for-granted practices and beliefs is experienced to be very complex and requires different strategies depending on the customer segment. However, there is a mutual understanding that strategy to promote the change via key opinion leaders can be very effective at the cultural-cognitive level of healthcare professionals.

5.2. Institutional Complexity – Constraint or Opportunity?

Our data shows that digital health start-ups operate in the intersection of multiple organizational fields, and are confronted by multiple partly conflicting institutional logics. Some may see the number of organizational fields as a multiplier for institutional constraints, which are, hence, impossible to tackle. However, start-up entrepreneurs see conflicting institutional logics as an opportunity to introduce new kinds of business logic to an established organizational field by fusing key elements of different logics together (Tracey, Phillips, & Jarvis, 2011) or by re-creating new institutional logic for the field.

Figure 2 depicts the intersection of three organizational fields that studied digital health start-ups positioned. Firstly, many of the analysed companies have a strong information technology (IT) background, which can be seen as an organizational field with specific role identities (e.g. engineers, UX designers), codes of conduct, and culture, which considers technology as a legitimate mechanism to improve the world. Institutional logic of this field can be described on a high level, as the shared understanding of using technology to solve problems and fulfil needs. Secondly, all studied innovations were supposed to be used in some specific organizational field of healthcare, which also has clearly defined roles (e.g. highly specialized medical practitioners and nurses, and patients), standard care practices and often rather heavy regulations to specify boundaries of the field. The institutional logic of this field is at a high level based on medical professionalism, where the goal is that professionals cure patients with evidence-based methods. Finally, all studied companies were active in the field of start-ups or in a 'start-up ecosystem'. In addition to start-up companies, this field consists of many different types of public and private organizations supporting the establishment and growth of start-ups. Although it may seem to outsiders that there are no rules in the field of start-ups, there are many informal rules and patterns of behaviour to which entrepreneurs feel the pressure of compliance. For example, start-ups follow many normative processes and practices that help them to secure funding targeted to high-growth ambition start-ups (e.g. business angel and venture capital funding). In addition, the institutional logic of the start-up field defines certain legitimate roles (e.g. founder, CEO, CTO), organizational forms, and appropriate goals for the business.

One major challenge for digital health start-ups, is their position they are at the intersection of these three fields with three partly conflicting institutional logics. Although information technology has a long tradition in the field of healthcare, institutional logic in the start-up field is in many ways rather contradictory to the logic in traditional field of healthcare. For example, the norm for the organizational structure of a start-up is very flat, whereas healthcare organizations are often highly hierarchical. The 'start-up culture' emphasizes informality and creativity, and encourages breaking existing institutional arrangements. This may create tension between actors in the start-up field and more traditional healthcare organizations. However, start-ups coming from outside or peripheral to the field of health are free from many taken-for-granted assumptions that may set cognitive limits on actors located

centrally in the field of healthcare. Therefore, digital health start-ups may be better positioned to radically change institutional arrangement in the field of healthcare.

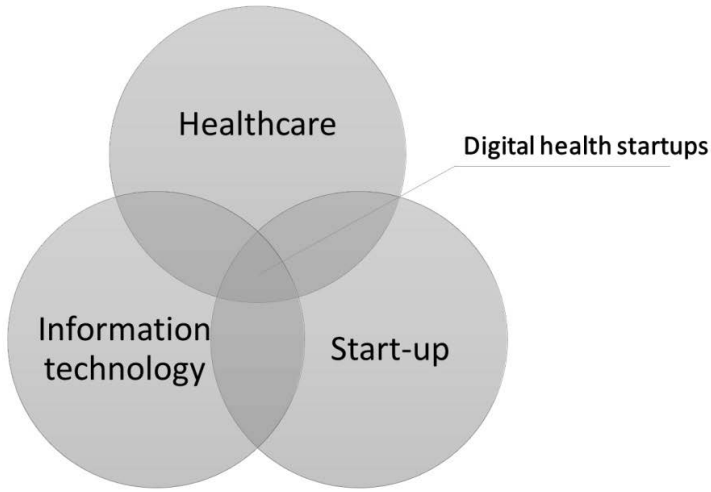


Figure 2. Position of digital health start-ups

5.3. Managerial Implications

Based on the findings, the study presents three propositions for entrepreneurial innovators who aim to transform healthcare.

- P1: Understand multiple institutional contexts that influence your business

For a digital health start-up entrepreneur, it may be beneficial to not fully understand the complexity of the field of healthcare. The loose attachment to institutional arrangements in the field may give space for a new kind of thinking that can eventually lead to the transformation of the whole field. However, when an entrepreneur has the vision for change, it is important to pursue a better understanding of what the current institutional logic is in the field and how the proposed business fits in that logic. Furthermore, it is crucial to understand that a new business is likely to be influenced by institutional logics of different organizational fields to which the new business is linked and these logics may be in conflict.

- P2: View the institutional fit from three complementary perspectives

Because service ecosystems related to healthcare innovations often include extremely complex set of institutions and institutional arrangements, it can be beneficial to use different 'institutional lenses' to evaluate the institutional fit of the business. Firstly, regulative fit helps an entrepreneur to understand what regulations new business must comply with (in different phases of the innovation process) and to evaluate what regulative elements you may be able to either avoid or even change. As there are many complex healthcare and country specific regulations, this is the area where an entrepreneur can seek advice from legal and regulatory experts who know the rules of the game in specific countries.

Secondly, normative fit describes how your business complies with norms, values and standards in a certain institutional environment. Normative fit can be viewed from a more general level (e.g. compliance with values of healthcare in general) or from a more specific level (e.g. how your innovation complies with goals, means, and standardized practices of standardized occupational role in healthcare). In addition, normative fit may be important with other fields e.g. normative fit to a digital health start-up ecosystem is likely to be important when applying for external funding.

Thirdly, cultural-cognitive fit helps an entrepreneurial innovator to evaluate the fit to the cultural setting and highlight cognitive frames that guide the behaviour of people. This lens may be less needed when business is

established in an entrepreneur's own cultural and/or social environment. However, when aiming at international markets cultural-cognitive elements can play a major role in understanding the behaviour of distant institutional environments as the cultural-cognitive level may also have a strong impact on norms and regulations in the organizational field. Therefore, it is crucial for entrepreneurs to spend time or, for example, hire local staff in order to learn about other cultures where the business is aimed.

- P3: Pick your 'institutional battles'

As start-up companies usually have very limited resources and institutional change may take a very long time, entrepreneurs should carefully choose the institutional change efforts on which they spend their valuable resources. Based on the findings study identifies three high level strategies worth considering. First, choosing the challenging but inspiring battles that can lead to big victories (e.g. profoundly changing the institutional logic of a specific organizational field) may be good strategy if the entrepreneur can convince investors to provide funding for the long war. This strategy can be successful if the entrepreneur is able to seize the right moment when the pressure from different sources builds up to the point where major institutional change takes place. However, if fierce resistance turns into stabilized war, it may lead to a cash burning problem where investors find it difficult to see the viability of future investments, which can be disastrous for the entrepreneur.

A second alternative strategy is to aim to implement smaller institutional changes in the areas, where institutional defence is not expected to be strong. In this case the entrepreneur works really hard to initiate and implement institutional change (e.g. to change certain institutionalized practices of some specific professional group), but is not aiming to change the whole logic of the field. Therefore, the entrepreneur either avoids fields where the company's institutional fit is evaluated to be poor or aims to build compliance with most of the existing institutional arrangements. Moreover, the entrepreneur designs the business in a way that only few institutional elements need to be changed to build a profitable business.

The third strategy is a hybrid of the first two. Accordingly, the entrepreneur starts business in the area where entry barriers are low and the company has a good institutional fit and, hence, only small institutional change is required. It is therefore possible to start generating revenue relatively fast. However, initial business operations are mainly a means of providing funding for the innovation activities and for the challenging the long term institutional work that is required to implement major transformation.

5.4. Limitations and Further Research

The main limitations of the study are linked to the selection of the case study as a research strategy, a common argument against the use of case studies is that they provide little basis for scientific generalization. However, the study does not aim for statistical generalization, but the goal is to expand and generalize theories through analytical generalization for which the research design is appropriate (Yin, 2009). Moreover, the author utilized cross-case analysis to provide deeper understanding and explanation (Miles, Huberman, & Saldana, 2014) of the institutional constraints that start-up entrepreneurs perceive, and in order to improve the validity and generalizability of the findings (Miles et al., 2014) through replication logic (Eisenhardt, 1989; Yin, 2009).

Due to a rather limited number of cases, the study provides only a preliminary explanation of differences in institutional constraints between the studied niche areas of healthcare. Therefore, this study opens avenues for further studies on institutional constraints. Firstly, the study calls for more longitudinal and in-depth studies; since data initially suggests that perceived constraints change over time. Secondly, the author claims that there is a need for more in-depth studies within specific niche areas of health (e.g. mental care) that take into account different stakeholders who aim to change institutional arrangements and their perceptions on constraints. Third, cross-industry analysis could provide valuable insights from other industries where institutional constraints are found to be less prominent and, provide, for example, policy implications for changes at the regulative level. Finally, as the institutional constraints differ between countries, there is need for analysis that includes companies from more diverse countries (i.e. outside Western/North Europe) thereby enabling more accurate explanations of causal relationships between institutional arrangements and perceived constraints for introducing innovations to markets.

6. CONCLUSION

The aim of the work was to explore and explain how entrepreneurs perceive institutional constraints in the context of creating ICT-enabled service innovation for healthcare. The findings, derived from the cross-case analysis of five case studies, suggest that although entrepreneurs see lot of opportunities in healthcare transformation, there are various institutional elements that are perceived as constraints for business. The study contributes to service innovation research by bridging the gap between highly conceptual academic contributions and practice in the field. Furthermore, the study promotes the idea of service science as an inter-disciplinary research stream (Chesbrough & Spohrer, 2006) by bringing related, but so far quite distant streams of research, closer to each other (institutional theory, strategy and entrepreneurship, and innovation management). The theoretical contribution of the study focuses on strengthening the concept of institutional fit and discussion on institutional complexity from the entrepreneurial perspective. As a practical contribution study highlights three managerial propositions for future entrepreneurs operating in emerging and cross-cutting organizational field of digital health.

To conclude, entrepreneurial innovation in the field of healthcare is extremely challenging. The innovations are traditionally developed by established organizations in the field that are well aligned with the field's institutional logic and possess the power and legitimacy to introduce changes. These organizations may, however, lack incentives to initiate radical transformations to the field. Conversely, start-up entrepreneurs are full of passion and have ambitious visions to transform healthcare profoundly through digitalization and the introduction of technological innovations. Although these entrepreneurs may be praised in speeches, in practice entrepreneurs face various institutional constraints, which make their job very challenging. Despite various challenges, start-up entrepreneurs are collectively building the pressure for major transformation, which has already started to break deeply rooted institutional arrangements. Consequently, the healthcare industry may soon be forced to truly face the transformation that already has profoundly changed many other industries.

REFERENCES

Agarwal, R., Gao, G., DesRoches, C., & Jha, A. (2010). Research Commentary—The Digital Transformation of Healthcare: Current Status and the Road Ahead. *Information Systems Research, 21*(4), 796–809. doi:10.1287/isre.1100.0327

Autio E. Kenney M. Mustar P. Siegel D. Wright M. (2014). Entrepreneurial innovation: The importance of context.Research Policy, 43(7), 1097–1108. 10.1016/j.respol.2014.01.015

Battilana J. Leca B. Boxenbaum E. (2009). How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship.The Academy of Management Annals, 3(1), 65–107. 10.1080/19416520903053598

Burton R. Obel B. (2004). Strategic organizational diagnosis and design: The dynamics of fit (3rd ed.). Kluwer Academic Publishers. 10.1007/978-1-4419-9114-0

Carlborg P. Kindström D. Kowalkowski C. (2013, March). The evolution of service innovation research: A critical review and synthesis.Service Industries Journal. doi:10.1080/02642069.2013.780044

Chesbrough H. Spohrer J. I. M. (2006). A research manifesto for services science.Communications of the ACM, 49(7), 33–40. 10.1145/1139922.1139945

Dacin M. T. Goodstein J. Scott W. R. (2002). Institutional theory and institutional change: Introduction to the special Research Forum.Academy of Management Journal, 45(1), 43–56. 10.2307/3069284

Dehzad F. Hilhorst C. De Bie C. Claassen E. (2014). Adopting health apps, What's hindering doctors and patients?Health, 6(16), 2204–2217. 10.4236/health.2014.616256

DiMaggio P. (1988). Interest and agency in institutional theory. In ZuckerL. (Ed.), Institutional patterns and culture (pp. 3–22). Cambridge, MA: Ballinger Publishing Company.

DiMaggio P. Powell W. (1983). The Iron Cage Revisited: Institutional isomorphism and collective rationality in organizational fields.American Sociological Review, 48(2), 147–160. 10.2307/2095101

Djellal F. Gallouj F. (2008). A model for analysing the innovation dynamic in services: The case of assembled services.International Journal of Services Technology and Management, 9(3/4), 285–304. 10.1504/IJSTM.2008.019702

Dorado S. (2005). Institutional Entrepreneurship, Partaking, and Convening.Organization Studies, 26(3), 385–414. 10.1177/0170840605050873

Dubois A. Gadde L.-E. (2002). Systematic combining: An abductive approach to case research.Journal of Business Research, 55(7), 553–560. 10.1016/S0148-2963(00)00195-8

Eisenhardt K. M. (1989). Building Theories from Case Study Research.Academy of Management Review, 14(4), 532–550. doi:10.2307/258557

Eisenstadt S. N. (1980). Cultural orientations, Institutional entrepreneurs, and social change: Comparative analysis of traditional civilizations.American Journal of Sociology, 85(4), 840–869. 10.1086/227091

Gagnon M.-P. Desmartis M. Labrecque M. Car J. Pagliari C. Pluye P. Légaré F. (2012). Systematic Review of Factors Influencing the Adoption of Information and Communication Technologies by Healthcare Professionals.Journal of Medical Systems, 36(1), 241–277. 10.1007/s10916-010-9473-420703721

Gallouj F. Savona M. (2008). Innovation in services: A review of the debate and a research agenda.Journal of Evolutionary Economics, 19(2), 149–172. 10.1007/s00191-008-0126-4

Garud R. Gehman J. Giuliani A. P. (2014). Contextualizing entrepreneurial innovation: A narrative perspective.Research Policy, 43(7), 1177–1188. 10.1016/j.respol.2014.04.015

Geels F. W. Schot J. (2007). Typology of sociotechnical transition pathways.Research Policy, 36(3), 399–417. 10.1016/j.respol.2007.01.003

Greenwood R. Suddaby R. (2006). Institutional Entrepreneurship in Mature Fields: The Big Five Accounting Firms.Academy of Management Journal, 49(1), 27–48. 10.5465/AMJ.2006.20785498

Kondra A. Hinings C. R. (1998). Organizational Diversity and Change in Institutional Theory.Organization Science, 19(5), 743–767. 10.1177/017084069801900502

Leca, B., Battilana, J., & Boxenbaum, E. (2008). *Agency and Institutions: A Review of Institutional Entrepreneurship*. Doi:10.1111/j.1467-8683.2008.00685.x

Levy D. Scully M. (2007). The Institutional Entrepreneur as Modern Prince: The Strategic Face of Power in Contested Fields.Organization Studies, 28(7), 971–991. 10.1177/0170840607078109

Li J. Talaei-Khoei A. Seale H. Ray P. Macintyre C. R. (2013). Health Care Provider Adoption of eHealth: Systematic Literature Review.Interactive Journal of Medical Research, 2(1). doi:10.2196/ijmr.246823608679

Lin C. Lin I. C. Roan J. (2012). Barriers to physicians' adoption of healthcare information technology: An empirical study on multiple hospitals.Journal of Medical Systems, 36(3), 1965–1977. 10.1007/s10916-011-9656-721336605

Miles M. Huberman M. Saldana J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). Sage Publications Inc.

Ng I. Vargo S. Smith L. (2013). Reconceptualizing Service through Service-dominant Logic. In HaynesK.GrugulisI. (Eds.), Managing Services: Challenges and Innovation. Oxford Scholarship Online; 10.1093/acprof:oso/9780199696086.003.0008

North D. (1990). Institutions, Institutional Change and Economic Performance. Cambridge University Press. 10.1017/CBO9780511808678

Pacheco D. F. York J. G. Dean T. J. Sarasvathy S. D. (2010). The Coevolution of Institutional Entrepreneurship: A Tale of Two Theories.Journal of Management, 36(4), 974–1010. 10.1177/0149206309360280

Patton M. Q. (1999). Enhancing the quality and credibility of qualitative analysis.Health Services Research, 34(5), 1189–1208.10591279

Schumpeter J. (1934). The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Scott W. R. (1995). Institutions and organizations (1st ed.). Thousand Oaks, California: Sage Publications.

Scott W. R. (2008). Approaching adulthood: The maturing of institutional theory.Theory and Society, 37(5), 427–442. 10.1007/s11186-008-9067-z

Scott W. R. (2014). Institutions and organizations: Ideas, Interests, and Identities (4th ed.). Sage Publications Inc.

Tracey P. Phillips N. Jarvis O. (2011). Bridging Institutional Entrepreneurship and the Creation of New Organizational Forms: A Multilevel Model.Organization Science, 22(1), 60–80. 10.1287/orsc.1090.0522

van Dijk S. Berends H. Jelinek M. Romme G. L. Weggeman M. (2011). Micro-Institutional Affordances and Strategies of Radical Innovation.Organization Studies, 32(11), 1485–1513. 10.1177/0170840611421253

Vargo S. Wieland H. Akaka M. A. (2015). Innovation through institutionalization: A service ecosystems perspective.Industrial Marketing Management, 44, 63–72. 10.1016/j.indmarman.2014.10.008

Vargo S. L. Lusch R. F. (2004). Evolving to a New Dominant Logic.Journal of Marketing, 68(1), 1–17. 10.1509/jmkg.68.1.1.24036

Vargo S. L. Lusch R. F. (2008). Service-dominant logic: Continuing the evolution.Journal of the Academy of Marketing Science, 36(1), 1–10. 10.1007/s11747-007-0069-6

Vargo S. L. Lusch R. F. (2016). Institutions and axioms: An extension and update of service-dominant logic.Journal of the Academy of Marketing Science, 44(1), 5–23. 10.1007/s11747-015-0456-3

Volberda H. W. van der Weerdt N. Verwaal E. Stienstra M. Verdu J. (2012). Contingency Fit, Institutional Fit, and Firm Performance: A Metafit Approach to Organization-Environment Relationships.Organization Science, 23(4), 1040–1054. 10.1287/orsc.1110.0687

Wieland H. Koskela-Huotari K. Vargo S. L. (2015). Extending actor participation in value creation: An institutional view.Journal of Strategic Marketing. doi:10.1080/0965254X.2015.1095225

Yin R. K. (2009). Case study research: design and methods (4th ed.). Thousand Oaks, California: Sage Publications Inc.

Article 4

Wallin, A. & Fuglsang, L., 2017. Service innovations breaking insti-tutionalized rules of health care. Journal of Service Management, Vol. 28 Issue: 5, pp.972-997.
Available at: https://doi.org/10.1108/JOSM-04-2017-0090

Aalto-DD 105/2018
VTT SCIENCE 176

ISBN 978-952-60-8019-2 (printed)
ISBN 978-952-60-8020-8 (pdf)
ISSN 1799-4934 (printed)
ISSN 1799-4942 (pdf)

978-951-38-8638-7 (printed)
978-951-38-8637-0 (pdf)
2242-119X (printed)
2242-1203 (pdf)

Aalto University
School of Science
Department of Industrial Engineering and Management
www.aalto.fi

BUSINESS + ECONOMY

ART + DESIGN + ARCHITECTURE

SCIENCE + TECHNOLOGY

CROSSOVER

DOCTORAL DISSERTATIONS