MASTER

A user-centric implementation model for multi-sided platforms in long-term care facilities in the Netherlands
A case study on SmartWork

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A case study on SmartWork

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Multi-sided platforms, long-term care, implementation sciences, technology adoption, health information technologies, healthcare innovation, interoperability, user-centric innovation, continuous improvement, enabling technologies, agile healthcare

Abstract

Aim & Background

The world population is aging, healthcare costs are rising, and the pressure on healthcare professionals is increasing. Multi-Sided Platforms (MSPs) can contribute to a more sustainable healthcare system. They allow for resource sharing, strategy alignment, and behavioral adaptation in a continuously changing environment, and thereby reducing information asymmetries and costs. Therefore, their implementation in care-based settings is vital. Nevertheless, the adoption and implementation of digital technologies in healthcare are extremely difficult, and relatively little is known about MSPs` particular characteristics and challenges in healthcare. This thesis explores MSP implementation to create an integral understanding of the implementation of MSPs in the long-term care industry in the Netherlands.

Design & Methods

The design for this study is a qualitative in-depth case study on the early implementation of SmartWork, focusing on reducing the caregiver's workload. A conceptual model is created by combining three main MSP characteristics of (1) system interoperability, (2) customer connection, and the (3) continuous improvement of the MSP with the Integrated Technology Implementation Model (ITIM) by Schoville & Titler (2015). An exploratory qualitative methodology was employed in this study to gain insights into the poor understanding of MSP implementations in healthcare. Strategic case documents were analyzed, and 14 semi-structured interviews with experts on the implementation of SmartWork were conducted. A thematic template analysis is used to interpret and analyze the data based on King (2004). The researcher ensured that the meaning of the information corresponded with the original data source.

Results

This study validated and tested the conceptual model for MSP implementations in long-term care facilities. First, results show that within the concept of (1) system interoperability, it is crucial to create industry standards on open data to stimulate data integration, data access, and awareness on data ownership for the MSP implementation. Second, respondents acknowledged that in order to (2) connect the customer to the MSP, (key) users should be incentivized to co-create the MSP, optimize the customer experience, and stimulate flexibility for the organization. Third, to establish an MSP implementation and evolution, platform participants should (3) continuously improve, select, prioritize, implement and incorporate feedback on new features. Results show the essence of a continuous loop of improvement and customer connection to successfully implement MSPs in healthcare. This process is guided by a facilitating role, responsible for clear communication, planning, and change management.

Conclusion & Discussion

The early implementation phase of the SmartWork MSP by the care organization shows the importance of integrating and accessing external data sources on the platform based on establishing industry standards. Accordingly, the process of connecting the customer takes place while simultaneously innovating the platform. Hence, managing the three aspects of MSPs is highly complex and requires the alignment and behavioral adaptation of multiple stakeholders to create a successful MSP implementation and sustain the implementation over time in a continuously changing environment. In addition, MSPs could stimulate agile approaches in healthcare organizations, creating the opportunity to balance continuous improvement to manage platform complexity and improve the quality of the care system.

Preface

In the previous months, I had the great opportunity to expand my interest in the field of technology and healthcare. I have carried out my final master thesis project for the study of Innovation Sciences at the PwC Advisory - Operations team. I focused specifically on the implementation of a multi-sided platform in long-term care facilities in the Netherlands to reduce the administrative burden of healthcare professionals. This amazing experience has inspired me to improve the Dutch care industry with enabling technologies that meet the user’s needs. Before you lies a representation of an implementation model that bridges the gap between technology and people, which was a great experience to work on.

First of all, I would like to thank all my supervisors at the Eindhoven University of Technology. I would like to thank Bert Sadowski for his support through the thesis trajectory, for thinking along with all the creative ideas, and for providing me with constructive feedback. I really enjoyed our collaboration with open and critical discussions on the topic.

Second, I would like to thank my colleagues at PwC that have given me the freedom and responsibilities during my thesis period. I would like to thank Marjon Peeters for her open attitude and constructive support role during the thesis period. In addition, I would like to thank Jasper van der Zwaag for actively involving me in the project. I really enjoyed your positive attitude, fresh perspective, and hard work in combination with your supporting role during the process. You actively took the space to explore new approaches and tackle issues for which I am grateful. Lastly, I would like to thank my PwC colleague Anne van den Boomen who provided me with the confidence, freedom, and trust in several projects to become a trusted advisor in the future. I really enjoyed working with you.

In addition to my supervisors and colleagues, I would like to thank the respondents of this research. Despite this difficult time, especially in healthcare, the respondents still offered help to complete my research. Special thanks go to the professionals of ServiceHeroes developing a vision for the future of healthcare.

This research is the final step in my career at the Eindhoven University of Technology. The study of Innovation Sciences allowed me to study all aspects of innovation from a socio-technological perspective. The study has fully prepared me with a skill set to continuously learn and explore new opportunities.

The last thanks go to my family, friends, and girlfriend, who provided me with a positive and supportive attitude during the thesis process. Sometimes I have experienced a difficult time during the Covid-19 situation. Therefore, I am lucky that I could always approach them for advice and support. Special thanks go to my grandmother, who unfortunately passed away in April 2021. Although she had no idea what I was actually researching, she was my most loyal supporter.

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Martijn Vincent Mes

“We all know the math, but we need a new way to put it together” (PwC - The New Equation, 2021)

List of acronyms

API:	Application Programming Interface
AVG:	General Data Protection Regulation (GDPR)
DOI:	Diffusion of Innovations
EBP:	Evidence-Based Practice
EHR:	Electronic Healthcare Record
HL7:	Health Level Seven International healthcare standards
ITIM:	Integrated Technology Implementation Model
IS:	Implementation Sciences
ISO:	International Organization for Standardization
IT:	Information Technology
MSP:	Multi-Sided Platform
NEN:	The Royal Netherlands Standardization Institute
OECD:	Organization for Economic Co-operation and Development
RIVM:	National Institute for Public Health and Environment
SaaS:	Software as a Service
TAM:	Technology Acceptance Model
WHO:	World Health Organization
WLZ:	Dutch Long-term care act (Wet langdurige zorg)

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1. Introduction

In this chapter, the research problem is described in section 1.1. This is followed by the research questions in section 1.2. Section 1.3 discusses the structure of this thesis.

1.1 Problem statement

The world population is aging, healthcare costs are rising, and the pressure on healthcare professionals is increasing. Specifically, a significant staff shortage throughout the healthcare industry occurs, resulting in overworked staff and reduced quality of care (OECD 2020a, 2020b; Busse, 2019 Sociaal Economische Raad, 2020; PwC, 2018). As such, both scholars and stakeholders emphasize the need for new technologies that can tackle these significant challenges like the increasing time pressure and workload for healthcare professionals and the continuous provision of high-quality care for patients (WHO, 2015; Gagnon et al., 2012; Schnoor et al., 2020). In recent years, Multi-Sided Platform (MSP) technologies have sprouted in different industries (Furstenau & Auschra, 2016). MSPs act as an intermediary to connect two or more mutually dependent user groups (e.g., technology suppliers, caregivers, and patients) (Parker & Van Alstyne, 2012; Anderson et al., 2014). MSPs can help manage the complexity of the service domain by balancing effectiveness, efficiency, and sustainability (Faggini et al., 2019). To foster the longevity of healthcare institutions, continuous value creation for users is required. This value creation can be achieved by enabling interactions and activating specific and dynamic relationships to share resources between different actors. In doing so, actors establish the long-term sustainability of the whole care system by aligning their strategies and adapting to behavioral and contextual changes, boosting resource access, and becoming a reliable source of knowledge by reducing information asymmetries and costs (Faggini et al., 2019; Furstenau et al., 2021).

Within the context of healthcare, the implementation of MSP technologies is a relatively new phenomenon, and more knowledge is necessary on how healthcare organizations can implement MSP technologies (Furstenau et al., 2020; Furstenau & Auschra, 2016; Kuziemsky & Vimarlund, 2018). Although there is a rich understanding of the difficulties surrounding the adoption and implementation of health information technologies, relatively little is known about MSPs' particular characteristics and challenges for healthcare (Furstenau & Auschra, 2016; Kuziemsky & Vimarlund, 2018). Therefore, it is essential to understand how organizations and their stakeholders adopt and connect with MSPs in healthcare**.** Moreover, it is notoriously difficult to implement health information technologies on a larger scale (Cresswell & Sheikh, 2013; Rogers et al., 2020; Schoville & Titler, 2015; Feeley et al., 2020; Kraus et al., 2021). Hence, the field of Implementation Sciences (IS), focusing on digital health interventions, should move forward by developing and validating IS theories because implementation mechanisms tend to measure putative mechanisms instead of immutable determinants of the implementation (Lewis et al., 2020).

For these reasons, this study will use an in-depth case-based approach to delve into the factors that influence the implementation of an MSP that integrates several technologies into one user-focused interface, i.e., SmartWork (Service Heroes, n.d.). The SmartWork technology is a professional-oriented technological platform that integrates multiple interfaces into one comprehensive platform system with a specific focus on long-term care. The platform reduces the employee workload saving time for the primary caregiving process, making SmartWork relevant for implementation in long-term care facilities. This study explores the steps used to implement an MSP in the context of long-term care. In line with the argumentation of Feeley et al. (2020), the technology provides a new information technology (IT) infrastructure that attempts to promote the interoperability of systems in healthcare. System interoperability is at the core of MSPs and defines the ability of software systems to exchange, use and interpret information (Feeley et al., 2020). MSP-based systems allow for the integration of fragmented technologies into one interface (Zenooz & Fox, 2019; Tiwana, 2013). To create value from digital platform technologies, a new generation of interoperable IT is necessary because today's IT infrastructures fall short in supporting value-based outcomes. Accordingly, care organizations struggle to implement interoperability into their infrastructures, as data standards are poorly defined, and vendors lack the capability to aggregate and share data (Feeley et al., 2020). Furthermore, there is no real consensus on overcoming barriers to the interoperability of systems (Pine, 2019). So, interoperability is a significant factor for the successful implementation of platform technologies in healthcare settings (Feeley et al., 2020: Schoville & Title, 2015). Field research is needed to identify the drivers and barriers for implementing the SmartWork platform to reduce the work pressure on care professionals.

Schoville and Titler (2015) proposed a framework on the adoption and implementation of digital technologies in care-based settings in the Integrated Technology Implementation Model (ITIM). The ITIM provides insight into the elements that facilitate the implementation of MSP technologies in care-based settings as it combines 51 dominant frameworks on adoption and implementation sciences (Schoville & Titler, 2015). Therefore, the ITIM is suitable to map the factors that influence the large-scale implementation of general healthcare technologies. However, to use the generic ITIM for MSP technologies such as SmartWork in long-term care facilities, an adjusted version will be made as the ITIM is not yet applied for MSPs. The adjusted version creates the opportunity to study the gap in the literature on the characteristics and challenges of platforms in healthcare (e.g., Furstenau & Auschra, 2016; Kuziemsky & Vimarlund, 2018). Hence, this study aims to analyze how MSPs can be implemented based on an adjusted ITIM for MSPs, adopting SmartWork as a case study, ultimately reducing the administrative burden on healthcare professionals in long-term care facilities.

1.2 Research question

This thesis aims to create a critical understanding of the implementation of MSPs in the long-term care facilities in the Netherlands with a focus on system interoperability, customer connection, and continuous improvement of MSPs. This will be done by adjusting the ITIM for MSPs in long-term care facilities. The model will be used to study and analyze the conceptual elements and their relations that influence its implementation. The character of the ITIM perspective emphasizes the exploratory nature of this thesis as the study explores the implementation of MSPs in long-term care facilities with a case study on SmartWork. The central question in this thesis is:

Why and how can MSPs be implemented in long-term care facilities in the Netherlands based on the ITIM?

This study differentiates between three sub-questions to answer the main research question. According to the researchers' knowledge, the ITIM has not yet been applied in long-term care facilities, focusing on MSP technologies. Therefore, this study assesses the applicability of the ITIM for MSP technologies in healthcare in sections 3.1 and 3.2. Sub-question one is:

To what extent is the ITIM applicable for the implementation of MSPs in long-term care facilities?

The ITIM framework defines 11 determinants for the implementation of general healthcare technologies. A detailed clarification of the determinants is required to apply the ITIM to fit the implementation of MSP technologies based on its main characteristics. MSPs in healthcare are characterized by the lack of system interoperability and the ability to connect customers to the platform to create a critical mass (e.g., Feeley et al., 2020; Faggini et al., 2019; Furstenau & Auschra, 2016; Pine, 2019; Evans & Schmalensee, 2016; Zenooz & Fox, 2019; Huckman & Uppaluru, 2015). Moreover, MSP technologies are characterized by their ability to continuously improve over time to survive (Tiwana, 2013; Tiwana et al., 2010). In addition, a sustainable healthcare system benefits from the willingness of actors to align their strategies and continuously adjust and adapt their behavior to contextual changes (Faggini et al., 2019). This continuous evolution process of iterative feedback loops over time is lacking in the ITIM by Schoville & Titler (2015). These three aspects lay the foundation for sub-question two and will be discussed in section 3.3:

How can the ITIM be adjusted into a usable model based on system interoperability, customer connection, and continuous improvement for the implementation of MSPs in long-term care facilities?

The ITIM is adjusted for the main characteristics of MSP technologies in healthcare. Hence, the implementation of the SmartWork MSP in long-term care facilities in the Netherlands could provide insights on applying the adjusted ITIM for the three main MSP characteristics of (1) system interoperability, (2) customer connection, and (3) continuous improvement of the MSP, which is discussed in section 5. Therefore, sub-question three is:

What insights does the application of the adjusted ITIM provide about continuous improvement, customer connection, and system interoperability during the implementation of SmartWork in long-term care facilities in the Netherlands?

1.3 Thesis structure

This study adopts an exploratory approach to study the implementation of MSPs in long-term care facilities in the Netherlands. The exploratory nature allows for the investigation of not clearly defined problems such as implementing MSPs in healthcare. As the implementation of MSPs in healthcare is in the preliminary stage, conducting exploratory research provides a better understanding of the existing problems and determinants in MSP implementations.

Section 2 includes a literature study on the trends in the long-term care industry in the Netherlands to create a contextual background for this study`s environment. Further, section 2 studies the main characteristics of MSPs in healthcare from the existing literature.

Section 3 provides the conceptual analysis of this study. Little research is conducted into the implementation of MSPs in the context of healthcare. Various implementation frameworks are assessed, out of which the ITIM by Schoville & Titler (2015) is chosen for the specific context of MSP technologies. The model combines various concepts from the Technology Adoption Models (TAM) literature and Implementation Sciences (IS) literature. The ITIM identifies 11 determinants that are central to adopting and implementing general health information technologies. The researcher adjusted the ITIM for MSP technologies based on three main concepts of (1) system interoperability, (2) customer connection, and (3) continuous development combining both social and technical elements for implementation. Section 3 provides a new conceptual model for the implementation of MSPs in the context of healthcare.

Section 4 provides the methodology of this study. The model is further studied in a practical setting using a leading-edge case study on the multi-sided SmartWork platform to improve the workflow of healthcare professionals in long-term care facilities. The adjusted ITIM is put into a practical setting based on the adjustments in the theoretical constructs. The three adjusted conceptual concepts and their determinants are tested and validated using strategic case documents and semi-structured interviews with experts on the implementation of SmartWork in the long-term care organization. During the data gathering, the researcher provided the respondents with the space to explain the relationships between concepts and the importance of the concepts for the SmartWork implementation.

Section 5 presents the results. A final conceptual model is created where determinants are combined, removed, and added when they are perceived as important for the implementation of SmartWork by experts in the field. The conceptual model provides a practical tool to apply the ITIM for MSP technologies and to create in-depth insights into (1) system interoperability, (2) customer connection, and (3) continuous improvement.

Section 6 presents the conclusions and discussions of this study. Section 6.1 answers the research question and reflects upon the results. The theoretical contributions, practical contributions, and policy implications are discussed in section 6.2. In addition, the various limitations of this study are discussed in section 6.3, and the recommendations for further research are discussed in section 6.4.

2. Theoretical background

This section provides the theoretical background of this study. Section 2.1 provides a theoretical definition and background on current trends in long-term care in OECD countries and the Netherlands. Thereafter, section 2.2 provides a theoretical background for MSPs in healthcare.

2.1 Long-term care

The healthcare industry provides support activities in daily life beyond merely curing diseases. The daily support activities such as household tasks, dressing, washing, and medical care define long-term care (OECD, 2019). Long-term care is available, often 24 hours a day, for people that require a continuous intensive form of supervision or care, with a specific focus on frail elderly people or people with mental disabilities (Zorgwijzer, n.d.). The following two sections distinguish between long-term care in OECD countries versus the Netherlands.

2.1.1 Long-term care in OECD countries

As the population of elderly people is rising in the entire society, new challenges within long-term care occur. Recent studies by the OECD (2019) and United Nations (2017) show that the European elderly population above 65 is growing towards 35% of the total population by the end of 2050. As the population becomes older, the prevalence of age-related issues will increase, such as reduced physical fitness, mental disabilities, chronic diseases, depression, and dementia (WHO, 2018). Accordingly, the demand for long-term care is expected to rise. Currently, there is a great variety in the total spending of the country's GDP on long-term care. The expenditure on long-term care varies from 3.7% in the Netherlands and 0.2% in Hungary and Estonia, depicted in Figure 1 (OECD, 2019). Moreover, there is a general shortage of care professionals in OECD countries that continues to rise as current trends continue (Scheffler & Arnold, 2019).

The severe reduction of the support ratio between healthcare professionals and care recipients might increase pressure throughout the healthcare system (Bemelmans et al., 2012). This pressure on care professionals causes burnouts and prolonged illness and distinguishes between two elements. First, there is the physical burden due to the high physical workload in the daily tasks of caregivers. Second, healthcare professionals experience mental pressure relating to the pace of performing tasks and the emotional burden of being a healthcare professional (Kowalczuk et al., 2020; Scheffler & Arnold, 2019). Subsequently, due to sick leave, a staff shortage throughout the industry occurs, creating a high turnover of caregivers (EY, 2020).

Besides the increasing pressure on caregivers, the healthcare industry is a critical service domain since it deals with the health and wellbeing of people (Faggini et al., 2019). Therefore, several issues arise, such as the effectiveness of the healthcare service, cost efficiency, and the ability to provide quality care services in a personalized way (Saviano et al., 2017; Palumbo, 2017). Furthermore, as the European welfare systems cannot cope with the rising demand for long-term care, sustainable service delivery in long-term care is one of the main challenges for innovation (Haseltine, 2018).

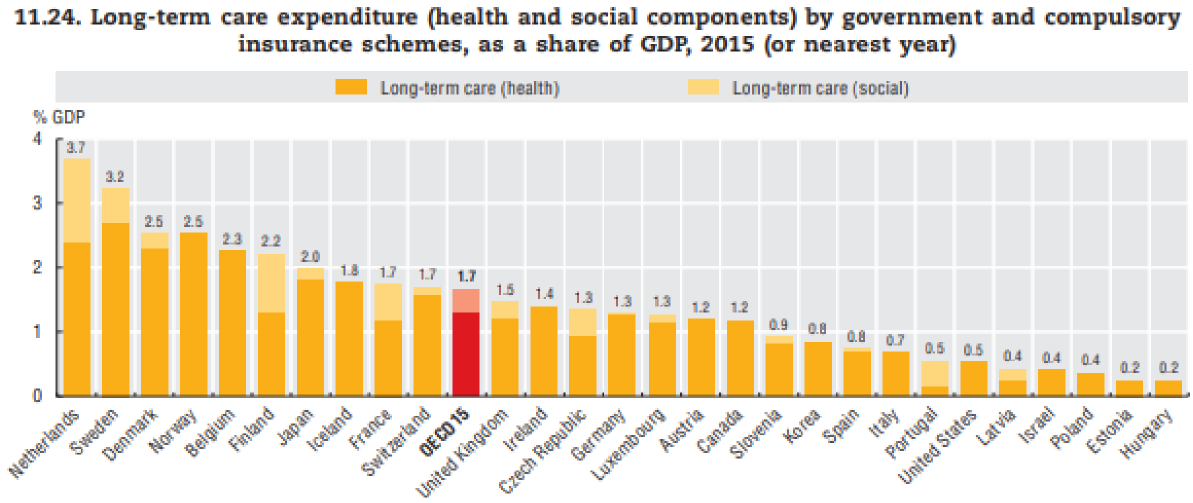

Figure 1: *The long-term care expenditure as a share of the national GDP (OECD, 2017)*

2.1.2 Long-term care in the Netherlands

The Dutch healthcare system is based on solidarity, meaning that long-term care is a public good. Long-term care is publicly funded through the Long-term Care Act (Wlz) (Zorginstituut Nederland, n.d.). Similar trends occur within the Dutch long-term care facilities: the demand for care services and the demand for healthcare professionals are rising (UWV, 2020). The increasing staff shortage and working pressure in long-term care facilities are already significant problems in the Netherlands that continue to increase (UWV, 2020; Sociaal Economische Raad, 2020; CBS, n.d.). Currently, one in seven people in the Netherlands is employed in the Dutch care industry. This is predicted to rise to one in four by 2030 (Ministerie van Volksgezondheid Welzijn en Sport, 2018; CBS, n.d). The Dutch workforce will decrease due to the retirement of a large segment of the population, which in combination with the increasing elderly population, will strengthen the pressure on the healthcare system (PwC, 2018; Haseltine, 2018).

A recent PwC study for the Dutch Ministry of Health, Welfare, and Sport shows that the Dutch care offices often lack the knowledge to purchase and develop the right technological innovations for long-term care organizations (Ahli, 2019). Subsequently, the awareness and positive impact of digital technologies in Dutch long-term care facilities is generally low. The usage of digital technologies is not self-evident, while the impact on caregivers and patients might be huge (Vilans, 2018). Platform technologies could play a significant role in solving these problems (Faggini et al., 2019; Furstenau et al., 2021). For this reason, the following section dives into the characteristics of MSP technologies in healthcare.

2.2 MSPs in healthcare

This section dives into the characteristics of MSP technologies in the context of healthcare. Section 2.2.1 provides the context and definitions for MSPs in care-based settings. Section 2.2.2 describes the characteristics of MSPs in healthcare. Accordingly, section 2.2.3 dives into the modular feature of MSPs. Section 2.2.4 describes how platforms should be open or closed organized. Finally, section 2.2.5 defines the role of APIs to ensure system interoperability.

2.2.1 MSPs in healthcare: Context and definitions

In recent years, MSP implementation is a new technological phenomenon in healthcare (Kuziemsky & Vimarlund, 2018; Furstenau et al., 2020; Furstenau & Auschra, 2016). In the context of care-based settings, Herman et al., (2020) define an MSP as: *"the technology that provides a software-based upon which interactions and transactions between several actors can take place and can be applied in healthcare to promote communication, data analysis and to create an opportunity to advance patient healthcare education"* (Herman et al., 2020, p. 2). An MSP can be defined as a two-sided market or a two-sided network (Anderson et al., 2014). The platform takes an intermediary role between two distinct user groups providing mutual network benefits. To be more specific, the stakeholders on the platform can take on three different roles. First of all, there is the platform owner that builds and maintains the platform. The second actor that uses the platform is defined as the actual end-user of the platform. The third stakeholder on the platform is called the complementor. The complementor provides the input for the platform, such as application interfaces (Tiwana, 2013; Furstenau et al., 2020). So, if the organization creates an interaction between two distinct affiliated customers, one speaks of an MSP (Hagiu & Wright, 2015; Abdelkafi et al., 2019).

According to Economides and Katsamakas (2006), platforms are "*the hubs of the value chains in technology industries"* (Economides & Katsamakas, 2006. p. 1056). Within the theoretical field of MSPs, there are various discourses such as the industry infrastructure (Gawer & Cusumano, 2014; Furstenau et al., 2020), modes of networking (Raivio & Luukkainen, 2011), platform ecosystem (Parker & van Alstyne, 2008; Parker et al., 2016), cross-side network effects (Anderson et al., 2014) and strategy (van Alstyne et al., 2016). In recent years, MSPs have predominantly been studied in for-profit sectors. However, the public domain is an upcoming field of research to study social entrepreneurship (Furstenau et al., 2020; Logue & Grimes 2019; Dacin et al., 2010). This public aspect is described as a situation where *"individuals and organizations use a business logic in a novel and entrepreneurial way to improve the situation of segments of the population that are […] themselves not capable of changing this situation"* (Saebi et al. 2019, p. 70).

2.2.2 MSP characteristics

MSP technologies are characterized by four elements: (1) *simplicity*, meaning that the platform should be decomposable into major (modular) subsystems and explicate the interaction between the complementors and the platform, (2) *resilience*, meaning that the platform couples through different interfaces that do not change over time to increase stability. In addition, it should reduce the dependencies between complementors, (3) *maintainability* of the platform, meaning that changes can be made cost-effectively, and the architecture should be composable into separate entities (Tiwana, 2013), and (4) *evolution* over time. To be more specific, evolution means that the platform should continuously deal with changing interfaces of complementing technologies dynamically (Tiwana, 2013; Tiwana et al., 2010; Faggini et al., 2019). In care-based settings, users have a central role in the implementation of MSPs and creating value-based outcomes. Therefore, user-driven innovation, participation, and engagement are essential to implement MSPs in care-based settings (Furstenau et al., 2021; Zenooz & Fox, 2019; Feeley et al., 2020). This continuous development process is strongly interlinked with sustaining the technology during and beyond the implementation process (Moore et al., 2017).

MSPs can create rapid growth-stimulating economies of scale (Kim & Yoo, 2019). However, users can use multiple platforms. Therefore, it is essential to create compelling value for platform participants and complementors (Tiwana, 2013; Kuziemsky & Vimarlund, 2018). The phenomenon of a continuous evolution of the MSP allows the creation of value for its participants by anticipating changes in the environment. Respectively, the MSP might reach economies of scale if it supersedes the "critical mass" of platform users (Navidi et al., 2020). The critical mass is created if the platform gains a stable and large enough market share (Kim & Yoo, 2019). So, the evolution and self-sustaining characteristics of the MSP are endangered if there is a lack of members of each group of participants on the platform (Evans & Schmalensee, 2016). Therefore, in the complex and critical healthcare service domain, the active involvement of platform participants is essential to establish a critical mass and value-based care services (Evans & Schmalensee, 2016; Faggini et al., 2019; Feeley et al., 2020). Consequently, one could say that platforms, as social-technical changing systems (e.g., Tiwana, 2013) in care-based settings, are predominantly user-driven instead of technology-driven evolving systems.

2.2.3 Modular architectures

According to Baldwin and Clark (2006), a platform is an "*architecture of participation"* (Baldwin & Clark, 2006 p. 1116). The platform architecture is a blueprint of the system. The complementors of the platform should be motivated and capable of innovating around the technological platform. The motivation without the capability to innovate and vice versa are worthless (Tiwana, 2013). The platform architecture determines the degree to which the innovations developed by the complementors are visible. Therefore, it influences their subsequent integration into the platform, creating economies of scale (Kim & Yoo, 2019). The platform architecture serves two primary purposes. First of all, the platform should be decomposable into autonomous applications. This process of creating subsystems is described as "*modularization*". Second, the platform should facilitate the ongoing integration of systems that are provided by complementors of the platform. Modularization and integration allow for the creation of a cohesive platform system (Tiwana, 2013).

The process of modularization ranges along a continuum that can vary to create completely open or closed systems. Openness is defined by Tiwana (2013) as the standardization of interfaces, meaning the independent reintegration of complementors after they are developed. In software engineering, the ability to integrate and separate subsystems is described as "composability" and impacts the platform`s stability. The complexity of the systems grows when separate systems on the platform are interconnected (Tiwana, 2013; Baldwin et al., 2000). Therefore, it is essential to take the element of decomposability into account, which is defined as *"the degree to which the components of an ecosystem are designed to be independent of each other such that changes within one component do not affect others in the ecosystem"* (Tiwana, 2013, p. 106). Closed systems keep the innards proprietary (Tiwana, 2013). The ability to split the MSP into decomposable elements stimulates the speed and diversity of the constituents' adaptive experiments (Tiwana et al., 2010; Simon, 2002). So, adaptation allows for a greater fitness within the continuously changing environment (Tiwana et al., 2010).

2.2.4 Organizing platforms

Platform technologies can be open or closed interfaces (West, 2003; Parker & Van Alstyne, 2012; Boudreau, 2010; Tiwana, 2013; Tag, 2008). A platform can be described as open when there are no restrictions placed on the participation in its use, commercialization, or development (Eisenmann et al., 2009; Parker & van Alstyne, 2012). Open platforms are extendable towards third-party producers that can build extensions for the platform (Tiwana, 2013; Parker & Van Alstyne, 2012; Tag, 2008). Compared with closed platforms, open platforms allow for more intense competition between consumers of the platform (Parker & Van Alstyne, 2012; Tag, 2008). On the other hand, a closed platform places restrictions on the usage of the platform. Companies generally prefer to keep their platforms closed to gain short-term profits. Closed models tend to have a limited scope and market penetration, whereas opening up a platform can be costless and more valuable for customers (Parker & van Alstyne, 2012; Boudreau, 2010; Tag, 2008). Platform technologies exhibit different levels of openness, ranging from open sources to open interfaces (Eisenmann et al., 2009; Abdelkafi et al., 2019). The degree of openness influences the ability to create and capture value. As a result, complementors might fear joining the platform due to the fear of the owner's control (Abdelkafi et al., 2019). The inability to select optimal levels of openness for the platform is one of the major reasons for platform failures due to high levels of interdependencies and dynamic effects (Van Alstyne et al., 2016; Gawer & Cusumano, 2015). Rather, openness is something that may need to vary in the lifecycle of a platform (Papachristos & Van de Kaa, 2019; Papachristos, 2020).

Eisenmann et al. (2009) identify four models for organizing platforms, (1) the proprietary model, (2) the licensing model, (3) the joint venture model, and (4) the shared model. First of all, there is the proprietary model. The proprietary model is originally closed. Successful proprietary platforms can extract a large share of the generated economic value, leaving little for the demand and supply-side users. Second, there is the shared or open model, which puts no restrictions on participation. Third, the licensing model knows a single sponsor of the platform and then licenses the platform technology to multiple providers. Several factors influence the drive to license the technology. License companies possess unique capabilities to meet differentiated user needs. Moreover, implementation and adoption can be boosted by using the marketing network of the partners involved. Lastly, to reduce the vulnerability, a second source of supply might be demanded by its customers. A licensee model allows for this input. A fourth model is the joint venture model. Within a joint venture model, there are multiple sponsors of the platform and one entity that serves as the platform provider (e.g., blended online newspapers). The third and fourth models are hybrid models combining both open and closed elements (Eisenmann et al., 2009; Parker & Van Alstyne, 2012). The decision to open up a platform entails the trade-off between opening up data sources and appropriability (West, 2003). Therefore, firms need to select an optimal level of openness to maintain and sustain their platform (Parker & Van Alstyne, 2008; Gawer & Cusumano, 2002; West, 2003; Boudreau, 2010; Van Alstyne et al., 2016). Table 1 depicts the four different models.

Table 1. *Platform model matrix obtained from Eisenmann et al. (2009).*

		Who provides the Platform? (Provider)	
		One Firm	**Many Firms**
Who controls the platform technology? (Sponsor)	**One Firm**	***Proprietary***	***Licencing***
	Many Firms	***Joint venture***	***Shared***

2.2.5 APIs & system interoperability in healthcare

Recently, Application Programming Interfaces (APIs) are rising in healthcare to integrate complementary technologies into technological platforms. APIs define the interaction between multiple software applications or mixed hardware intermediaries (Tiwana, 2013; Feeley et al., 2020; Huckman & Uppaluru, 2015). In healthcare, it allows for the connection between different medical applications used by insurers, healthcare service providers, and patients (Huckman and Uppaluru 2015). APIs stimulate the integration of features that are not envisioned in their current state. Therefore, they allow for rich and embedded real options. The API can become the platform industry standard and can be simultaneously owned by the single platform owner (Tiwana, 2013). So, APIs present a recent and promising form of healthcare delivery as they become more available and accessible in the context of healthcare (Huckman and Uppaluru 2015).

APIs contribute to the interoperability of modular systems. Poor interoperability is widely acknowledged as one of the main barriers to data exchange between entities and value-based outcomes for healthcare users (Pine, 2019; Huckman & Uppaluru, 2015; Feeley et al., 2020). Interoperability within healthcare is, according to Stanford Medicine (2018), defined as: "*The capacity of health information systems to work together within and across organizational boundaries in order to advance the effective delivery of healthcare data and information for patients, practitioners, and providers"* (Stanford Medicine, 2018 p. 10). So, APIs are designed to enable the extraction of external data sources and control how interfaces communicate (Tiwana, 2013; Feeley et al., 2020). In addition, APIs allow for the standardization of the interaction between application interfaces and facilitate mutual data access. Therefore, it reduces the duplication efforts by developers (Tiwana, 2013). In healthcare, this allows for the exchange of data between various systems. Three key metrics for the interoperability between systems are the ability to integrate data, receive or distribute the data, and the ability to fund the exchange of data (Holmgren et al., 2017; Stanford Medicine, 2018).

According to Stanford Medicine (2018), the concept of an API is strongly interlinked with the democratization of data, meaning that a care provider should focus on areas where public value creation and satisfaction rates will be highest. The individual who manages their own care process can reduce pressure on the care system, improve overall public health and reduce costs (Stanford Medicine, 2018; Holmgren et al., 2017). As a result, a collaboration between multiple actors in platform structures is necessary to achieve value for its users and providers (Feeley et al., 2020; Stanford Medicine, 2013). On the contrary, information blocking in APIs complicates the extraction of specific complex care data from external providers. Subsequently, developers have to work around the APIs limiting the in-depth and analytical possibilities of care data (Feeley et al., 2020; Desai, 2016). According to Tiwana (2013), the openness of an API ranges along a continuum of completely closed to open. Therefore, API openness is a matter of degree defining the relationship between complementors and the platform owner. Respectively, lacking one of the elements for interoperability can be a major barrier to the implementation of MSP technologies (Stanford Medicine, 2018; Feeley et al., 2020).

In conclusion, there is no real consensus on overcoming barriers to interoperability in care settings (Pine, 2019). Existing barriers for interoperability are privacy concerns (Azarm-Daigle et al., 2015; Pine, 2019), the complexity of the care organizations and their institutional arrangement (Biernholtz & Bietz, 2003; Pine, 2019), the heterogeneity of systems, the selection of source systems that are not interoperable with the (platform) technology (Desai, 2016; Pine, 2019) and the incompatibility of standards for health information systems (Begoyan, 2007; Pine, 2019). Interoperability is strongly interlinked with data portability since individuals have the right to obtain and reuse their personal data (European Commission, 2018). Therefore, data exchange and data access in the form of interoperability are essential for implementing MSP technologies (Pine, 2019). However, platforms in healthcare are dealing with highly regulated environments. As a result, the question of control (e.g., health data, ownership of the platform) is complex (Furstenau & Auschra, 2016). Platform technologies in healthcare need rigid control, certification, privacy, and security (Huckman & Uppaluru, 2015; Diamond & Shirky, 2008). Organizations should manage these regulatory aspects into their platform as privacy issues negatively influence the individual choice for adopting technologies, resulting in a failing large-scale implementation (Dhagarra et al., 2020). Finally, as standards for data exchange are often defined in healthcare, they contribute to more interoperable systems. An example is the HL7 FHIR standard that facilitates interoperability between vendors. Although such standards have improved the situation, the problem is still severe due to the complexity of care-based settings. As a result, data standards are often incomplete or poorly defined. Data standards need to be agreed upon before data sharing; otherwise, the aggregated data will not be broadly applicable. The lack of interoperability between interface vendors complicates information sharing between and within organizations (Feeley et al., 2020).

2.3 Summary

The theoretical background identifies three main concepts that are essential for platform technologies in healthcare to exist: (1) system interoperability (e.g., modularity, data exchange via APIs), (2) connecting customers to the platform (e.g., critical mass creation), and (3) continuous improvement for the platform to survival and evolution.

First of all, as platforms connect different systems with the end-users, interoperability can be seen as a critical element for implementing MSPs in care-based settings (e.g., Tiwana, 2013; Pine, 2019; Huckman & Uppaluru, 2015; Feeley et al., 2020). The degree of openness needs to be balanced carefully to create a successful platform implementation (e.g., Parker & Van Alstyne, 2008; Cusumano & Gawer, 2002; West, 2003; Boudreau, 2010; Van Alstyne et al., 2016). Data control and ownership are difficult in healthcare (Furtenau & Auschra, 2016). Hence, balancing open and closed data on the platform is a complex mechanism that is poorly understood in care-based settings (e.g., Pine, 2019; Huckman & Uppaluru, 2015; Feeley et al., 2020). As healthcare needs a new generation of interoperable systems, MSP technologies might accelerate this area of IT innovation by establishing the ability to smoothly integrate and exchange data between the interface, platform, and end-users (Feeley et al., 2020). Nevertheless, data standards are often poorly defined in healthcare, creating a barrier to interoperability (Pine, 2019; Feeley et al., 2020). Therefore, the dynamic of open and closed data and the ability to share and integrate data impacting the interoperability of systems in care-based settings need a deeper understanding.

Second, creating a long-term user connection is essential to create compelling and unique value for its users, especially in the developing phase (Tiwana, 2013; Kuziemsky & Vimarlund, 2018). Connecting the end-user to the platform with value-based approaches is an essential process for implementing MSPs to create a critical mass that can be sustained (Evans & Schmalensee, 2016; Faggini et al., 2019; Feeley et al., 2020). Consequently, the process of understanding how customers are connected to the platform is essential to understand how the critical mass is created in healthcare.

Third, another main characteristic of socio-technical MSPs is the ability to evolve over time and meet the user's needs (Tiwana, 2013; Faggin et al., 2019). This phenomenon allows for the anticipation of new value opportunities for users that can be integrated into the platform technology. Within the public domain of healthcare, the process of continuous development of the platform to identify the needs and sustain the critical mass of users on the platform is a relatively unexplored phenomenon in literature. For this reason, it needs a deeper understanding of the public domain.

So, this study focuses on the implementation of platform technologies in care-based settings with a specific focus on combining the role of (1) system interoperability, (2) connecting the customer to the platform, and (3) the continuous development and evolution process of the MSP. This thesis aims to create an integral understanding of the implementation process of MSPs combining social and technological aspects. The following section provides the conceptual analysis of an adjusted implementation model based on these three core characteristics.

3. Conceptual analysis: Implementing MSPs in healthcare

This section provides a conceptual analysis of the implementation of MSPs in care-based settings. Section 3.1 discusses the similarities and differences between adoption and implementation models. Section 3.2 discusses the ITIM by Schoville & Titler (2015). Section 3.3 adjusts the generic ITIM for MSPs in healthcare based on (1) system interoperability, (2) customer connection, and (3) continuous improvement. The chapter includes an adjusted conceptual ITIM and a table with the clarifications of the concepts and their determinants.

3.1 The implementation and adoption of platform technologies

Implementing health information technologies such as multi-sided digital platforms is complicated because there are many interrelated organizational, social, and technological factors (Cresswell & Sheikh, 2013; Furstenau & Auschra, 2016). To adopt and implement health information technologies, Cresswell & Sheikh (2013) state that these three factors need to be analyzed to successfully implement organization-wide information technologies, including key stakeholders such as care recipients and caregivers. Due to the interrelation between the social, technical, and organizational dimensions proposed by Cresswell and Sheikh (2013), there is a need for strategic implementation models. These models should stimulate the decision-making process of the organization and individual.

In short, two main dimensions can be identified when looking at the broad technological usage, being adoption and implementation. The adoption of healthcare technology is determined by how users are adopting the technology. Extensive research within this domain has taken place (e.g., Rogers, 2003; Venkatesh, 1998). Technology Acceptance Models (TAM) predominantly focus on the individual decisions to adopt technologies. However, these models lack the consideration of processes and strategies to implement healthcare technologies as multiple individuals determine organizational behavior. Therefore, the technology might have positive or negative implications for different individuals. TAM models do not consider the organizational behavior leading to a lack of understanding of the organizational variables that influences implementation.

Implementation Science (IS) frameworks try to illustrate how innovations are diffused and sustained within organizations. There is a large diversity in implementation frameworks. Nevertheless, IS models share a dependent variable of adoption of the innovation. Moreover, IS models share the purpose of guiding and designing frameworks for implementation to translate research-based evidence into a practical application (Schoville & Titler, 2015; Krau, 2015). IS models can be used to identify potential users through problem identification, technology adoption evaluation, fitting implementation strategy definition, and the quality analysis and synthesis of evidence-based practices (EBPs). The field of IS focuses on the introduction of EBPs with organizations or individuals (Schoville & Titler, 2015). EBPs are, according to the IS literature, defined as innovations (Birken et al., 2018; Schoville & Titler, 2015). Research lacks IS models for the implementation of healthcare technologies (Schoville & Titler, 2015). Current studies distinguish between the users` needs during the implementation, while other studies apply knowledge in a practical setting using technology.

In summary, there is a distinction between technology adoption practices and implementation practices. TAM models focus on the individual acceptance of the technology, where individual characteristics, such as demographics and culture as well as the context and social influences of the technological innovation, influence adoption. More specifically, TAM models evaluate the individual's perception of the technology and the ease of use, usefulness, and actual usage of the technology. The IS models analyze implementation strategies predominantly at the organizational level of the care system. In addition, IS models take characteristics such as regulations, the economic environment, and policy into account (Schoville & Titler, 2015; Cresswell & Sheikh, 2013). Table 2 provides an overview of the differences and commonalities between TAM and IS models.

Table 2. *The commonalities and differences across TAM and IS based on Schoville & Titler (2015).*

	Technology Acceptance Model (TAM)	Implementation Sciences (IS)
Level of analysis	Individual	Organization
Dependent variable	Technology adoption	Adopting evidence-based practices
Implementation interventions	No	Yes
Context	Information technologies	Care settings
Barrier assessment	No	Yes
Patient experience	No	Yes
External factor consideration	No	Yes

3.2 The Integrated Technology Implementation Model

The previous sections elaborated on the major differences regarding technology adoption and implementation frameworks. Schoville & Titler (2015) propose the Integrated Technology Implementation Model (ITIM) to guide health information technology implementations. The framework combines 51 theories with key concepts in the field of TAM and IS. IS models guide technological innovations in their diffusion and sustainability. Therefore, it is essential to create a comprehensive understanding of why and how implementation strategies are applicable in specific contexts. The primary purpose of IS models is to achieve a successful translation of research into practice (Schoville & Titler, 2015; Krau, 2015)

The ITIM aligns organizational structures with the end-user adoption to successfully implement information technologies. The model distinguishes 11 determinants in two primary environments: the inner context and the outer context of the organization. Figure 2 provides an overview of the ITIM. The following section defines the determinants of the ITIM by Schoville & Titler (2015).

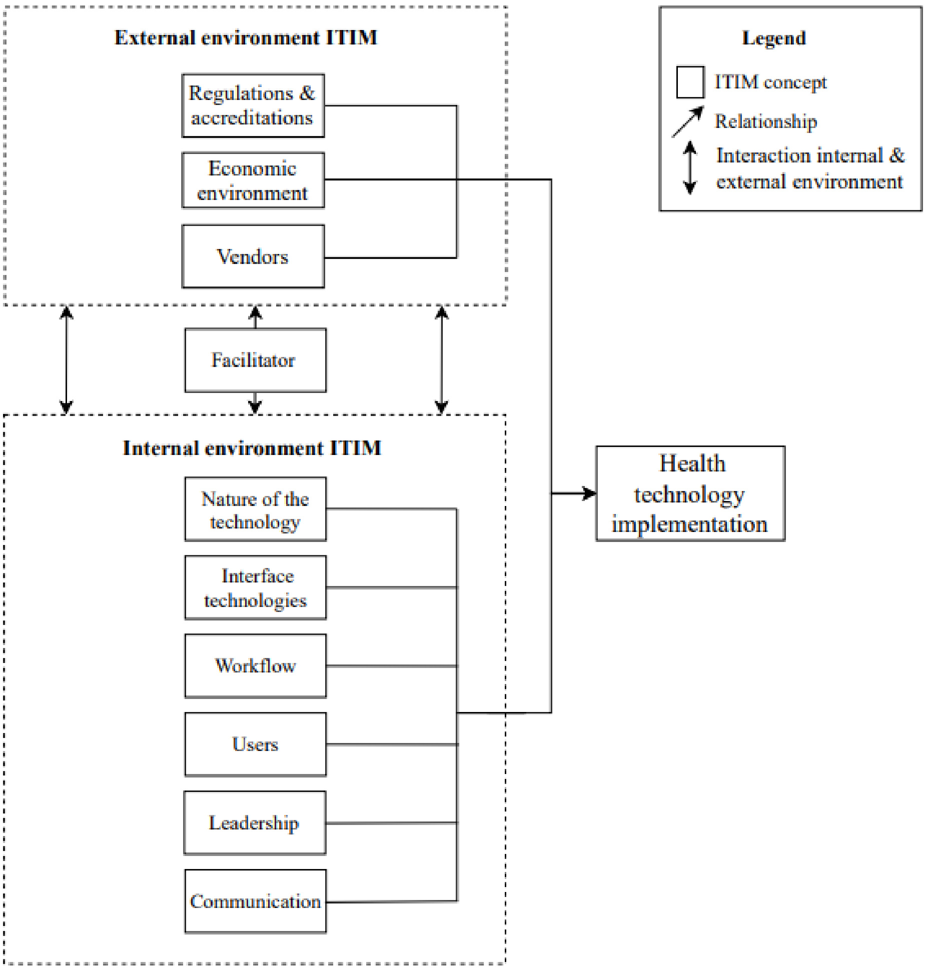

Figure 2: *The ITIM obtained from Schoville & Titler (2015).*

3.2.1 The Internal environment

The inner context of the ITIM contains the nature of the technology, interfacing systems, workflow, users, leadership, and communication. The internal context of the technology defines the factors and processes within the organization that need to be addressed to implement the technology successfully. Specifically, it describes the organizational context that influences the adoption, implementation, spread, and sustainability of the technology. The following sections define the key determinants and processes for successful technology implementation (Schoville & Titler, 2015).

3.2.1.1 The nature of the technology

The first element described by Schoville & Titler (2015) is the nature of the technology. The nature of the technology is defined as *"a new technological-based solution for use in accomplishing a specific task or care process to achieve defined outcomes"* (Schoville & Titler, 2015. p. 104). The nature of the technology is defined by five elements that are essential for technology adoption. The technology needs to be compatible with the current norms, values, beliefs, and needs of the organizations and the individual user. Moreover, the technology should have a relative advantage over existing technologies. Users should be able to try and explore technological innovation. In addition, the technology should reduce complexity and stimulate simplicity in understanding for its users, and it should be observably useful (Schoville & Titler, 2015; Rogers, 2003; Sahin, 2006).

3.2.1.2 Interfacing systems

The second internal factor provided by Schoville & Titler (2015) is interfacing systems. Interfacing systems should allow for better communication between healthcare providers and improve care. The ITIM stresses the importance of the independence of the technology. However, it should also have the possibility to communicate with other systems outside of the organizations, especially from multiple vendors. These technologies allow for excellent coordination between various stakeholders such as organizations and vendors. In addition, these systems bring together software applications outside the organization critical for patient care Schoville & Titler (2015).

3.2.1.3 Workflow

Schoville & Titler (2015) define the third internal ITIM element as the workflow of the employees. To effectively use, adopt and implement the technology, it is essential to understand the work process of the employees and the organization. The workflow can be defined as the orchestrated and repeatable activities of care professionals enabled by the organization that provides resources into the care process to transform these resources into services (Wohed et al., 2005). The technology should contribute to the improvement of the systematic steps that the healthcare provider is taking to fulfill their daily tasks. The analysis should therefore focus on identifying barriers in the workflow to provide compatible technologies within this process. So, the workflow defines the daily care process of employees. Therefore, frequent evaluation of the workflow process is required to successfully implement digital technologies to positively impact the caregiving process (Ash et al., 2007; Carayon et al., 2010; Zayas-Cabán & White, 2020).

3.2.1.4 Users

The term users originate from the theory of the diffusion of innovations (DOI) proposed by Rogers (2003). Rogers distinguishes several characteristics of the user. Characteristics are the ability to cope with change, knowledge on innovation, and education. However, other characteristics like the context of the environment and the experience with technology play an important role in working with the technology. In the context of the user's understanding of digital technologies, digital literacy is key. Digital literacy is defined as the competence and understanding to evaluate, find and compose clear information through digital platform technologies and is merely a matter of technical skill (Buckingham, 2010). In addition, a central component in technology acceptance literature and implementation literature that is largely emphasized to influence the implementation of complex health technologies is the involvement of the user in the innovation process (e.g., Wadell et al., 2010; Cresswell & Sheikh, 2013; Schoville & Titler, 2015; Røtnes & Dybvik Staalesen, 2010).

3.2.1.5 Leadership

The fifth factor influencing the internal organizational context is leadership (Schoville & Titler, 2015). In the context of implementation sciences, leadership is described as the ability to create an environment that actively embraces innovation. The organization should establish organizational strategies, structures, and systems that facilitate innovation. Leadership roles are taken mainly by nursing directors, frontline managers, but also executives. Leaders should be able to create a vision, set goals, make strategic plans, including policy, performance, and communication. Thus, leaders are responsible for clearly communicating change and building support systems during technology implementation (Schoville & titler, 2015; Cresswell & Sheikh, 2013). Therefore, the following section will dive into the factor of communication.

3.2.1.6 Communication

The sixth and last internal factor is described as communication. The ITIM defines communication as *"the process of sharing information in a targeted social system using a variety of strategies that include interactive education programs, written communication, communication roles, networks, audit, and feedback that affect adoption"* (Schoville & Titler, 2015, p. 105). Communication focuses specifically on addressing how the organization uses the technology and how user roles and responsibilities change. For this reason, the organization should frequently communicate with the technology users during the convincing and decision-making process (Rogers, 2003; Schoville & Titler, 2015). Rycoft-Malone and Bucknall (2010) have identified several strategies for communicating roles. They emphasize the role of the boundary spanner, who has connections outside of the organization and can link and filter knowledge early in the implementation. Moreover, the organization could actively support the opinion leaders that have a direct influence on their peers. Another essential form of communication is providing feedback and audit to users (Schoville & Titler, 2015). In addition, Hysong (2009) states that the provision of feedback positively affects the quality and outcomes of the usage of the technology by providing information regarding the current performance and areas of improvement. So, at its core, effective communication is described as the process of developing a shared understanding between actors that can be realized by establishing, testing, and maintaining relationships (Pirnejad et al., 2008).

3.2.2 The external environment

Besides the internal environment, the external environment of the ITIM might influence the adoption of the technology within the organization in part. Within the external environment, four key factors can be identified: regulation, economic environment, vendors, and facilitators.

3.2.2.1 Regulations and accreditation

The first element focuses on the accreditation and regulation of digital technologies within healthcare. In the healthcare industry, standards are set for digital technologies. The determinant of regulations defines how an official agency (external force) establishes standards that influence the selection of the technologies by organizations (Schoville & Titler, 2015).

3.2.2.2 Economic environment

The economic environment of the ITIM is described as the extra-organizational economic determinant that is changing the ability to innovate. Examples of such determinants are the changing political or economic environment, competition in the market, or government-subsidized programs (Schoville & Titler, 2015).

3.2.2.3 Vendors

The third external element that influences the implementation of technologies within the healthcare industry is the technology vendor. The technology vendor should be a reputable organization with a solid financial position. They should be able to meet the healthcare organizations' needs. Within the context of the ITIM, the vendor makes and sells the technology. However, it is also responsible for the interoperability between other technological systems. Cooperation between multiple vendors is therefore essential. There are several characteristics of how vendors can promote the implementation of the technology and simultaneously promote the sustainability of the technology. First of all, the vendor should have sufficient expertise to solve organizational problems. Second, there should be clear communication about software upgrades within the organization. Third, the vendor should have in-depth knowledge of current systems within the healthcare organization to provide accurate recommendations. Fourth, the company should possess the creative minds to meet customers' needs effectively. Fifth, the vendor should complete its work within the budget. Sixth, the knowledge of the company should be up to date to provide proper recommendations. Seventh, the vendor should be able to stress the urgency of malfunctioning technologies in the healthcare organization. Finally, the company should be able to identify problems and provide the right solution (Schoville & Titler, 2015).

3.2.2.4 Facilitator

The final factor in the ITIM is the facilitating role of actors that guide the implementation process (Schoville & Titler, 2015; Greenhalgh et al., 2017). The facilitator role is defined as the simplification of the implementation process by leading actors who are guiding change, endorsing innovation, and political and environmental factors. The facilitator supports the teams and individuals in implementing the innovations (Rycroft & Malo, 2004; Graham & Logan, 2004; Schoville & Titler, 2015; Tidd & Bessant, 2020). The facilitator role is a boundary spanner who facilitates interaction between the internal and external environment of the organization (Greenhalgh et al., 2017). Consultants, vendors, employees, and the technology department can adopt this role. Moreover, the facilitating actor is responsible for providing training, economic resources, and conflict resolution skills. The facilitator is characterized by the possession of skills and knowledge that directly or indirectly influences users to change their routines and apply the innovation into their daily practices. Skills examples focus on technique, project management, communication, clinical competencies, and the ability to meet the user's needs. Therefore, the credibility and support base of the facilitating role within the organization is essential to successfully guide the technology implementation process (Rycroft-Malone, 2004; Craddock, 1993).

3.3 The adjusted ITIM for MSPs in healthcare

The ITIM proposed by Schoville & Titler (2015) is a model for the implementation of general health information technologies in care-based settings. In general, generic health information technologies do not connect multiple complementing parties in one interface. For this reason, the determinants in the ITIM are clarified, adjusted, and supplemented with comprehensive characteristics of MSP technologies in the context of care-based settings. Therefore, this section aims to adjust the ITIM for (1) system interoperability, (2) customer connection, and (3) continuous improvement while maintaining the essential building blocks for implementation.

First of all, the "nature of the technology" in the ITIM is adjusted based on the MSP characteristic of interoperable systems in healthcare (e.g., Feeley et al., 2020). The new concept is positioned in the external environment of the ITIM as system interoperability is a technical precondition for implementation. Moreover, elements in the external environment of the ITIM are essential for implementation, such as "regulatory standards", the role of the platform complementors, "vendor", and the "economic environment". Second, the internal environment of the ITIM is transformed into the concept of customer connection by combining the determinants of the "facilitator", "communication", "workflow", "interfaces", "users", and "leadership". Third, the current model lacks the concept of continuous improvement over time. MSP technologies are socio-technical systems that continuously evolve to survive by incorporating, removing, and adjusting complementing technologies on the platform (Tiwana, 2013). Consequently, continuous improvement is added as a new concept in the adjusted ITIM. The following sections will elaborate and clarify the determinants in the adjusted ITIM for MSP technologies.

3.3.1 System interoperability

The nature or core of each platform technology is the interoperability of systems since the platform connects two sides of the market, the platform complementors on the one hand and users on the other hand (Tiwana, 2013). The nature of the technology is extensively discussed in the theoretical background in section 2. In the context of the ITIM, the construct of the "vendor" defined as complementors of the MSP, influences the interoperability of an MSP as it integrates separate systems to the platform in the context of care-based settings. Therefore, the context of interoperability in the external environment of the ITIM is defined as a variable concept in this study that replaces the nature of the technology in which the vendor plays a major role.

Nevertheless, interoperability impacts the internal infrastructure of care organizations and therefore influences implementation. As a result, a new determinant is defined as the institutional arrangements on data access and data exchange in care organizations. Institutional arrangements influence system interoperability due to the complex structures of care organizations (Pine, 2019; Birnholtz &, Bietz, 2003). Regulatory aspects such as privacy, ISO certifications, and standards for exchanging data are often predetermined elements. Nevertheless, standards for data exchange are often incomplete or poorly defined (Feeley et al., 2020), resulting in the fact that there is no real consensus to overcome barriers to interoperability in care settings leading to a failed implementation (e.g., Pine, 2019). Therefore, regulatory issues from the ITIM like data standards, certifications, and privacy concerns are considered in the adjusted ITIM as they significantly influence interoperability.

In addition, the nature of the MSP technologies is characterized by the concept of modularity. Modularity is defined by the integration of the complementing systems into the platform that is designed independently from each other (Tiwana, 2013; Feeley et al., 2020). Therefore, if one part of the system is changing, it should affect other elements in the ecosystem. This mechanism is defined as the decomposability of systems (Tiwana, 2013). Section 2 elaborates on this concept. To integrate data from external interfaces, the ITIM actors of the complementing "vendor" and the organization itself need to understand the technology to provide future recommendations, create cooperation between two interface parties and communicate on technical changes (Schoville & Titler, 2015). In line with the economic aspect of the ITIM, open access to external data to increase interoperability and upgrades of the interfaces requires funding (Holmgren et al., 2017; Stanford Medicine, 2018; Schoville & Titler, 2015). When specifically focusing on platform technologies, this can be explained as funding system interoperability and updates of the platform. Moreover, the integration, receival, and sending of complex care data can be blocked, limiting data extraction for the platform and reducing interoperability (Feeley et al., 2020). So, the technical preconditions of system interoperability in the external environment of the ITIM can be operationalized with six determinants. (1) "institutional arrangements", (2) "modular architectures", (3) "data standards", (4) "data integration", (5) "data receival and distribution", and (6) "data funding".

3.3.2 Customer connection

The internal organizational environment in the ITIM focuses on the process of connecting the organization and the user with the technology by adopting evidence-based practices in specific care settings (Schoville & Titler, 2015). Therefore, the internal environment of the ITIM is adjusted into the concept of customer connection. As the end-users and leadership are both determinants defining stakeholder interest in the implementation process, they can be combined into one construct of stakeholder connection. Within the internal environment of the adjusted ITIM, four variable determinants influence the user connection process over time. To meet the users' needs with evidence-based practices, the daily workflow should be defined to understand barriers for implementation within this daily process (Schoville & Titler, 2015). The workload in this study is defined as the reduction of the administrative burden or increased quality in the workflow of caregivers based on the orchestrated and repeatable tasks of care professionals (Wohed et al., 2005). As a result, constant evaluation of the care process influences platform implementations (e.g., Schoville & Titler, 2015; Ash et al., 2007; Carayon et al., 2010; Zayas-Cabán & White, 2020). In the context of an MSP technology, interface technologies play a significant role as a great variety of complementing interface technologies can be implemented in the platform. As MSPs in care-based settings focus on value delivery for caregivers and their patients, it is important to understand the end-user's needs in interface technologies to support their care process. Examples of such technologies are planning systems, staffing systems, notification systems, ordering systems, medications systems, and EHRs. So, MSPs can be seen as a marketplace for complementing interfaces. Complementing interface technologies determine the ability to deliver value on the MSP for its users (e.g., Tiwana, 2013) and are incorporated in the adjusted concept of customer connection.

Clear communication is required throughout the implementation process (Schoville & Titler, 2015; Creswell & Sheikh, 2013a; Creswell & Sheikh, 2013b). As the facilitator manages the project, this role must define clear streams of communication to create an implementation of the technology as it attempts to support the adoption of the MSPs over time. The facilitator guides the implementation process and should therefore connect the changes in technological platforms throughout the internal environment of the implementation process with the users. Moreover, the facilitator should be able to guide the process of the workflow identification, interface technology identification, and stakeholder identification through clear communication. For this reason, the facilitator's credibility, support base, and (technical and communication) skills are essential for the implementation of MSPs (Rycroft & Malo, 2004; Graham & Logan, 2004; Schoville & Titler, 2015; Greenhalgh et al., 2017; Craddock, 1993). Therefore, the determinants of the "facilitator" and "communication" are combined in the adjusted ITIM, as the facilitator is responsible for clear communication between multiple MSP stakeholders during the implementation trajectory. In addition, the facilitator can take different perspectives. The facilitator role can be adopted by the platform owner or "vendor", care organization project lead, external consultants, or a group of stakeholders including the vendor, organization, or a third party that facilitates the project. For this reason, the vendor is integrated with the facilitator role as it continuously communicates with external technology providers of the platform and the care organization. Finally, an essential factor that is lacking in the ITIM is the responsibility of the project lead for the project management roles, including proper planning and scheduling. This element has to be kept in mind in order to realize a successful implementation. So customer connection is operationalized based on four determinants: (1) "facilitator communication", (2) "workflow", (3) "stakeholder connection", and (4) "interface technologies".

3.3.3 Continuous improvement

The previously mentioned concepts of system interoperability and customer connection can be grounded in the ITIM model to guide the implementation process and increase adoption over time. However, this study considers the importance of continuous improvement to stimulate adoption through iterative feedback cycles. The concept of continuous improvement is currently not incorporated in the ITIM model. The provision of iterative feedback cycles stimulates interaction and a stronger relationship with the customer, increasing adoption (Cresswell & Sheikh, 2013; Cresswell et al., 2013).

This process of continuous value creation through feedback cycles is strongly interlinked with socio-technical platform technologies that continuously innovate and evolve themselves (Tiwana, 2013; Faggini et al., 2019; Tilson et al., 2010; Eaton et al., 2015). Therefore, besides iterative feedback cycles, the construct of innovating and evolving on the platform is added as a new determinant to define the concept of continuous MSP improvement more accurately. Ultimately platform technologies can contribute to a sustainable care industry. The sustainability of the healthcare system can benefit from actors that continuously adapt and align their strategies. In order to achieve this, actors should continuously adapt their behavior to the changing environmental context (Faggini et al., 2019).

As healthcare is a public domain, the value-adding process is defined as "public". A recent study by Faulkner and Kaufman (2018) identified four elements that define public value creation. First of all, Faulkner and Kaufman (2018) identify *outcome achievements* that define the publicly valued outcomes. Second, there is a focus on *trust and legitimacy* by key stakeholders and the public. Third, the service should be *delivered with quality* and meet the users' needs. Finally, to create public value, there should be an increase in efficiency to achieve maximal benefits with minimal resources (Faulkner & Kaufman, 2018). Private value is mainly focused on the individual, and it privileges the private sphere over the public sphere, whereas public value favors collaboration, social participation, and communal responsibility (Benington, 2011; Faulkner & Kaufman, 2018). So, the continuous improvement of value can be both public and private (Benington, 2011).

In care settings, platform technologies allow for public value creation by implementing iterative cycles of user involvement (Botti & Monda, 2020; Dugstad et al., 2019). To be more specific, MSPs nourish the value co-creation process between people, their characteristics, and their preferences which are essential for enduring improved personalized healthcare outcomes and offering more effective information management (Faggini et al., 2019). Hence, it is assumed that continuous improvement reinforces the process of connecting the customer. However, the MSP becomes more complex in nature (e.g., Chambers, 2004). This is depicted in Figure 3 with the R+/- indication. So, continuous improvement can be defined with the three determinants of "public value", "innovation and evolution", and "feedback cycles".

3.3.4 The adjusted ITIM

This section provides the final conceptual model based on three main concepts: (1) System interoperability, (2) customer connection, and (3) continuous improvement. The conceptual model clarified, adjusted, and supplemented the ITIM with comprehensive characteristics of MSP technologies in healthcare. This model supplemented and adjusted the nature of the technology with system interoperability by adding a set of determinants to the external environment. The internal environment of the ITIM is redefined into customer connection. The continuous improvement concept is added based on the characteristics of MSPs that continuously improve in order to survive. Figure 3 visualizes the conceptual model. The blue constructs are newly introduced in the adjusted ITIM. The purple elements are combined elements of the existing adjusted ITIM. The white elements are existing ITIM determinants redefined for MSPs. The characteristics of system interoperability and continuous improvement are predominantly new due to their in-depth explanation of the main concepts.

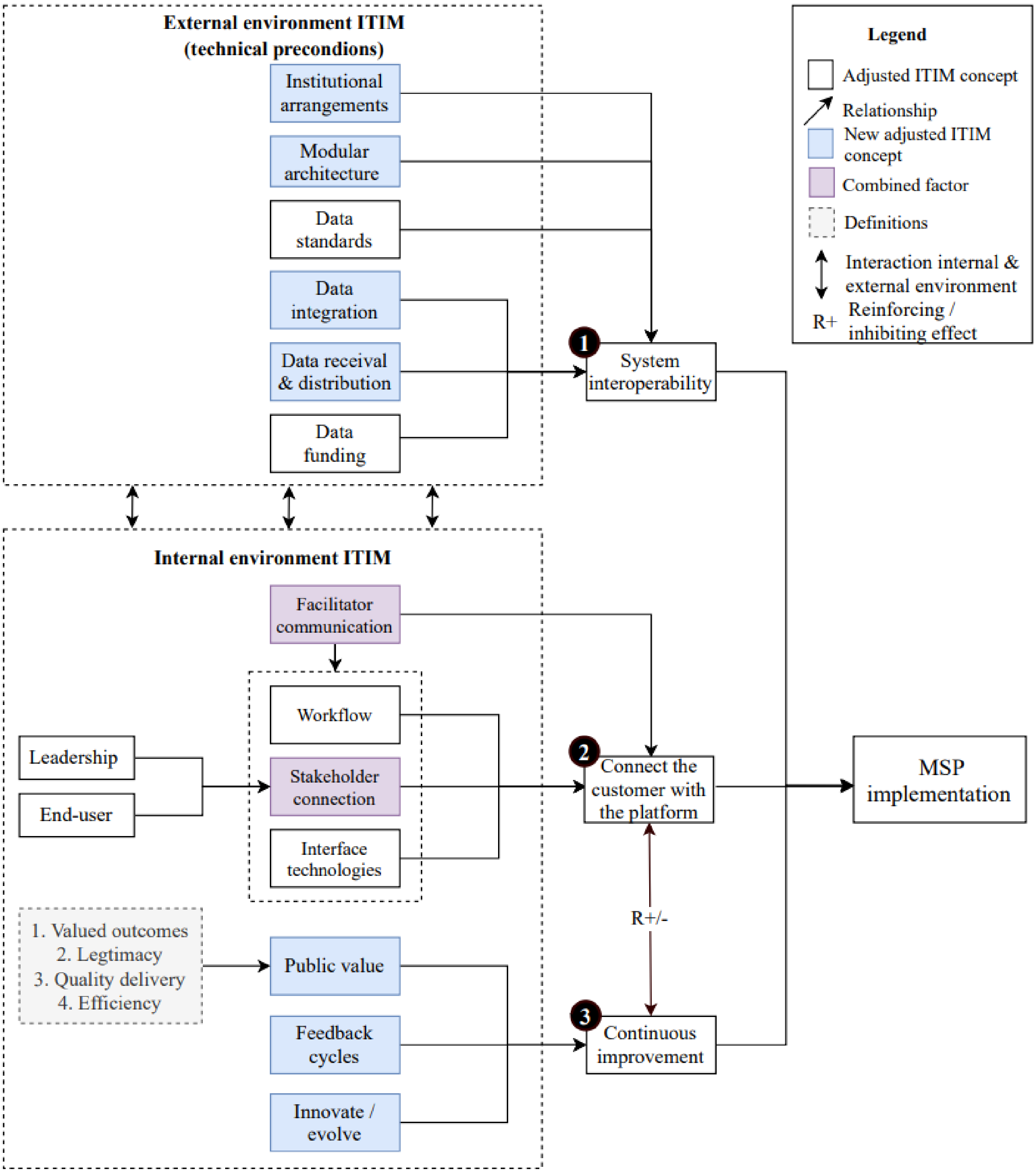

Figure 3: *The adjusted ITIM for the implementation of MSPs in healthcare.*

3.3.5 Clarifications of the concepts in the adjusted ITIM

This section provides a Table (3) with the clarification of the concepts and its determinants, extracted from the adjusted ITIM for MSP technologies in care settings.

Table 3. *Concept & determinant clarification of the adjusted ITIM.*

Concept	Factor	Determinant definition in the context of MSPs
System Interoperability	Institutional arrangements	The complexity of the organization's policy, systems, and processes to efficiently manage system interoperability for MSP implementation (Pine, 2019; Birnholtz & Bietz, 2003).
	System modularity	The degree to which platform components are designed to be independent of each other so that a change in one element does not change another component in the MSP. The degree of openness of APIs and their influence on interoperability of complementing interface technology systems focusing on the alignment of complementors with the MSP (Tiwana, 2013; Pine, 2019; Feeley, Landman & Porter).
	Data Standards	The role of badly or well-formulated regulations such as ISO certification, privacy through the General Data Protection Regulation (GDPR), and the definition of open standards for healthcare data for implementing MSPs (Pine, 2019). Moreover, data standards focus on data exchange agreements and data formats before sharing and integrating data (Feeley et al., 2020).
	Data Integration	The ability to understand and integrate external source systems into the MSP from external providers and the role of open or proprietary data sources. It reflects the technical expertise to provide future recommendations, create cooperation activities, and communicate on technological changes (Schoville & Titler, 2015; Holmgren et al., 2017; Stanford Medicine, 2018).
	Data receival and distribution	The ability to send and receive data from the MSP towards the user or complementor focusing on open or proprietary data sources. Data receival and distribution also reflect the ability to have the technical expertise to provide future recommendations, create cooperation activities, and communicate on technological changes (Schoville & Titler, 2015; Holmgren et al., 2017; Stanford Medicine, 2018).
	Data funding	The financial resources to create interoperability for MSPs and fund updates and innovation based on open or proprietary data sources (Holmgren et al., 2017; Stanford Medicine, 2018).
Customer connection	Workflow	The orchestrated and repeatable activities of care professionals focusing on transforming resources into valuable services (Wohed et al., 2005). This study has a specific focus on how MSPs can reduce the administrative burdens by frequent evaluation of the work process (Schoville & Titler, 2021; Ash et al., 2007; Carayon et al., 2010; Zayas-Cabán & White, 2020).
	Stakeholder connection	The connection of stakeholders to the MSP being the (1) end-users such as care professionals and (2) leaderships such as team leaders and senior managers (Schoville & Titler, 2015, Cresswell & Sheikh, 2013).
	Interface technologies	The platform interface and complementary technologies are integrated into the MSP (Schoville & Titler, 2015, Tiwana, 2013).
	The facilitator	The implementation guide is responsible for understanding the care professionals' workflow, individual needs, and technology usage. This role is also responsible for clear communication throughout the implementation process of the MSP, including tight scheduling skills. Moreover, the facilitator should possess the technical understanding, skill, and a credible reputation to create an organizational support base (Schoville & Titler, 2015; Rycroft & Malo, 2004; Graham & Logan, 2004; Greenhalgh et al., 2017; Craddock, 1993).

Continuous improvement	Public Value	The public value creation process on the MSP focuses on publicly valued outcomes, legitimacy among peers, and quality delivery by meeting the customers' needs. The last element of the MSP implementation focuses on the increased efficiency for the organization or end-user, meaning to reduce resources and simultaneously gain end-user or organizational advantages (Faulkner & Kaufman, 2018; Benington, 2011; Meynhardt, 2009; Schoville & Titler, 2015).
	Platform innovation and evolution	The innovation process of adding, removing, and updating features over time and the role of proprietary value creation or value co-creation on new technological concepts on the platform with a focus on aligning visions of participants in the innovation process (Tiwana, 2013; Faggini et al., 2019; Moore et al., 2017).
	Iterative feedback cycles	The inclusion and incorporation of feedback from users of the MSP to adapt the platform to the users` needs (Tiwana, 2013; Faggini et al., 2019; Moore et al., 2017).

4. Methodology: The SmartWork platform in long-term care facilities

This section provides the proposed methodology for this study. Section. 4.1 provides the case description, section 4.2 the research design, section 4.3 the sampling strategy, section 4.4 the operationalization table, section 4.5 the data collection and instruments. Finally, section 4.6 provides the data analysis approach.

4.1 Case description and context: SmartWork

This study draws upon an explorative in-depth case study on the implementation of a leading-edge MSP technology, SmartWork (Yin, 2018). The platform integrates fragmented technologies from the daily workflow of the care professionals into one user-friendly interface (Service Heroes, n.d.). Moreover, the platform has been in development for over two years in collaboration with the care organization. The platform is currently implemented for 200-400 caregivers and continues to grow during this study. Therefore, the case focused on the early implementation phase of SmartWork.

According to the researchers` knowledge, the implementation of similar MSP technologies integrating most of the technologies that care professionals use into their daily workflow, is currently unknown in Dutch long-term care facilities. The MSP exchanges data from multiple actors across the "Service Highway" depicted in Figure 4. This process allows for an in-depth analysis of the interoperability of various systems. Moreover, the MSP is implemented with a specific focus on optimizing the service provision of care professionals in long-term care facilities. The platform incorporates technologies that are used by care professionals in their daily work, such as EHR and planning systems. However, the platform structure offers the opportunity for technologies that are not yet envisioned to be implemented into the platform, such as Internet of Things (IoT) applications. The main focus of these technologies is reducing the administrative burden for care professionals, increasing their work quality, and stimulating a more patient-centered approach. The platform's focus on users opts for the possibility to study how the customers are connected to the platform technology. Moreover, as the platform evolves over time and new technologies can be incorporated into the platform, a process of continuous improvement and iterative feedback cycles can be researched. To be more specific, the roles of user-centric approaches to continuously innovate the platform can be studied. For this reason, the dynamics of the SmartWork platform and its leading-edge character make this in-depth case study on the large-scale implementation suitable for this thesis.

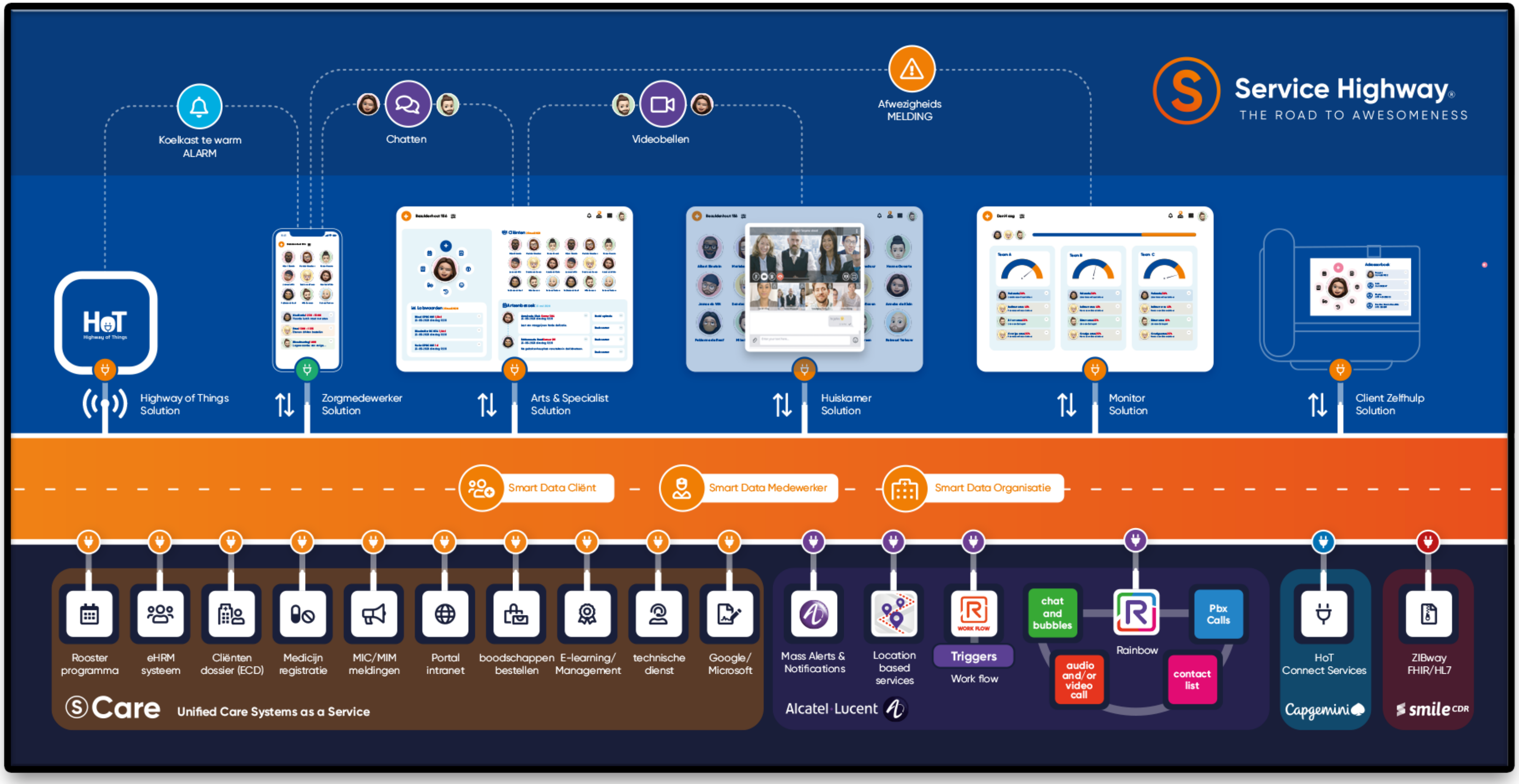

Figure 4: *The Service Highway and SmartWork interface (Service Heroes, n.d.; D1).*

Within the context of the SmartWork case, the customer is identified as the care organization that obtains the license for the MSP. Several stakeholder groups need to be connected to the platform within the care organization, such as healthcare professionals, leadership, management, and the IT department. Within the context of SmartWork, users are identified as healthcare professionals. Moreover, the facilitator role is fulfilled by the care organizations project lead, PwC consultants, and a business consultant from the platform vendor.

This study takes place in the context of a long-term closed care facility in the Netherlands. For privacy concerns, the organization is anonymous in this research. The organization can be characterized as innovative, as the organization is a frontrunner in experimenting with leading-edge platform technologies. The organization has over 400 locations with more than 5.000 workers. The long-term care organization provides both extramural and intramural care services. Extramural care is defined as clients who receive care in their own house. The care-providing organization is often located within the neighborhood. Intramural care means that clients live in facilities that the care organization provides. Simultaneously, clients receive care within this facility. The provision of care tasks exists out of physical supporting activities such as dressing, washing, eating, administering medication, and mental supporting activities such as supporting mentally disabled individuals.

4.2 Research design

This study is an exploratory case study into the implementation of the SmartWork platform technology in the context of long-term care facilities in the Netherlands (Yin, 2018). The research design of this study is a qualitative in-depth case study on the large-scale organizational implementation of SmartWork with a specific focus on validating and expanding the proposed adjusted ITIM with a focus on creating insight on system interoperability, customer connection, and continuous improvement during the implementation process. According to Yin (2018), a case study can be defined as an *"empirical method that investigates a contemporary phenomenon (the "case") in depth and within its real-world context, especially when boundaries between phenomenon and context may not be clearly evident*" (Yin, 2018 p. 45). According to Bryman (2016) and Rowley (2002), in-depth case studies fit the exploratory approach of this study. Case studies can generate new ideas and are central to understand how constructs are related to each other (Yin, 2018). The case can be an individual, action, organization, or event in a specific place or time. Within the context of this research, the case is defined as the SmartWork platform technology implementation in long-term care facilities. Moreover, case studies allow for a detailed investigation of the case in its contextual position. It is therefore defined as an empirical inquiry that examines a contemporary phenomenon within its context. So, a case study improves the understanding of complex phenomena such as implementing the SmartWork platform in long-term care facilities (Yin, 2018; Bryman, 2016; Rowley, 2002).

This study adopted a qualitative approach to understand and interpret the actions and statements made by the interviewees in the way they are supposed to mean. Qualitative studies are meant to study a specific phenomenon in a particular population (Leung, 2015). Phenomena are socially constructed and therefore provide a deeper and universal meaning of the phenomenon that is taking place (Saunders et al., 2007). As a result, the influence of "interpretation" of the raw data plays an essential role since this study is conducted among individuals. Interpretivism is explained as the degree to which social actors interpret and give meaning to the world from their individual point of view (Saunders et al., 2007). The researcher should understand the subjective meaning in their context.

4.3 Sample strategy

In this section, the sampling strategy is explained. Section 4.3.1 provides an overview of the sampling selection. Finally, section 4.3.2 describes how this study is handling sampling biases.

4.3.1 Sample selection

As this study is an explorative in-depth critical case study on the implementation of MSPs in a long-term care facility, specific key individuals are identified. These key individuals are involved in the implementation of SmartWork in the long-term care organization. This targeted sampling approach is a purposeful and systematic approach with a list of specific population members related to the phenomenon of interest, being the implementation of Smarwork. Purposeful sampling is a widely used qualitative method in the field of implementation sciences to select information-rich subjects (Palinkas et al., 2015; Bryman, 2016). The researcher selected experts on the implementation case of SmartWork in combination with leading implementation experts and external consultants.

The specific, purposeful sampling strategy adopted for this study is critical case sampling. Critical case sampling investigates a group of agencies that use a new evidence-based practice. The main goal of this approach is to identify reasons why this evidence-based practice is lacking (Palinkas et al., 2015), as is currently happening with the implementation of MSPs in care-based settings. Critical case sampling allows for a *"logical generalization and maximum application of information because if it is true in this one case, it's likely to be true of all other cases"* (Palinkas et al., 2015; p. 18). In total, 14 experts are identified based on their knowledge of the implementation of SmartWork and their role in one of the three main stakeholder groups. The first stakeholder group (A) is the group of PwC experts as they guide the implementation process. The second stakeholder group (B) is the key individuals from the care organization involved in the implementation process. The third stakeholder group (C) is the technology experts from the vendor, as the vendor is responsible for integrating external interfaces, which is essential for platform survival (e.g., Tiwana, 2013). The sample includes IT & implementation experts, consultants, project leads, care managers, IT experts, creative designers, and operations managers. An overview of the experts' functions profiles, including the referral number and date of the interviews, can be found in Table 4.

Table 4. *Sample selection.*

Function	Stakeholder group	Respondent	Date
Project lead	B	R1	May 14th, 2021
Creative director	C	R2	June 9th, 2021
IT & Implementation expert 1	C	R3	May 17th, 2021
IT & implementation expert 2	B	R4	May 25th, 2021
Business consultant	C	R5	June 11th, 2021
Business consultant	A	R6	May 31th 2021
External IT & implementation consultant 1	A	R7	May 18th, 2021
External IT & implementation consultant 2	A	R8	May 11th, 2021
External organizational transformation consultant 1	A	R9	May 6th, 2021
External organizational transformation consultant 2	A	R10	June 1st, 2021
Former Project lead	B	R11	May 28th, 2021
Senior manager	B	R12	June 8th, 2021
Team manager	B	R13	June 11th, 2021
Operations manager	C	R14	June 14th, 2021

4.3.2 Sample bias

Despite the wide usage of purposive sampling in case-based implementation studies, this approach has several challenges. Information-rich informants are selected assuming that participants possess knowledge of the predetermined variable themes (Palinkas et al., 2015; Taherdoost, 2016). First of all, purposive sampling might create a bias in the sample due to the researchers' individual perceptions of the sample. In order to tackle this bias, the researcher developed a sample in collaboration with implementation experts from the technology vendor, care organization, project lead, and external consultants.

Establishing the sample frame beforehand might create potential bias in selecting the sample as it does not allow for the control of the knowledge of potential unknown confounders. This bias reduces the generalizability of the study (Taherdoost, 2016; Palinkas et al., 2015). For this reason, the researcher adopted an approach of re-sampling to draw an appropriate sample to create theoretical saturation (Palinkas et al., 2015; Bryman, 2016). Theoretical saturation is based on the predetermined conceptual framework (Palinkas et al., 2015).

Finally, no significant number of studies show the limiting nature of positivistic and realistic systematic sampling approaches. To tackle this problem, rationales are included for selecting participants for this study (Palinkas et al., 2015). The participants are selected based on their relationship with the implementation of SmartWork within the specific long-term care organization. Moreover, participants are selected with a strong focus on technical, social, and organizational factors for implementation, which is discussed with implementation consultants to increase reliability.

4.4 Operationalization of the adjusted ITIM

Section 4.5 provides an overview in Table 5 on how the determinants from the adjusted ITIM are operationalized in this study on the implementation of SmartWork. The operational definition of relevant determinants for implementing MSPS increases the consistency of this study. Moreover, the operationalization reduces subjectivity and increases the reliability of the study (Bryman, 2016).

Table 5. *The operationalization of the adjusted ITIM for the SmartWork platform.*

Concept	Factor	Determinant definition in the context of SmartWork
System Interoperability	Institutional arrangements	To a degree of high and low, to what extent is the organization supporting or inhibiting the exchange of data for SmartWork (e.g., policies). In-depth questions were asked on the relationship between leadership, IT, the vendor, and the organization and how this influences the SmartWork implementation, access to data, and data exchange.
	System modularity	The degree to which systems have modular architectures, meaning that the focus lies on how independent or dependent modular systems are. Moreover, the focus lies on how modular systems positively or negatively impact the implementation of external interfaces on the SmartWork platform, focusing on the differences in external systems.
	Data Standards	Data standards cover three main aspects, being certifications (e.g., ISO, NEN), privacy (e.g., AVG), and the role of data exchange standards and formats (e.g., HL7). The latter is operationalized by zooming in on how bad or good formulated data standards for data exchange using APIs or source systems are stimulating or enhancing the implementation of SmartWork and the incorporation of external interfaces.

	Data Integration	The degree to which data is understood, and how data is incorporated within the platform. Data integration focuses on data understanding of the vendor and care organization. The determinant is operationalized by asking how external source systems are unlocked and how locked (closed) systems inhibit platform growth, implementation, and extension.
	Data receival and distribution	The determinant of data receival and distribution is operationalized by asking how data is sent and what data can and cannot be sent, including the preconditions for sending and receiving data. The determinant is further operationalized by asking the respondents how this process is currently shaped, how this process could improve, and what is going well. The availability of APIs (closed or open) is the primary determinant to receive and distribute data. In addition, respondents are asked how they work around poorly functioning APIs and why they function well or badly. Finally, the focus lies on how complementors are blocking information access to owners.
	Data funding	The determinant of data funding is on the one hand operationalized by asking how updates on the SmartWork platform are funded and how this is inhibiting or enhancing platform innovation and implementation. On the other hand, respondents are asked how the implementation of new features (innovation activities) is funded over time and how this inhibits or enhances the SmartWork implementation.
Customer connection	Workflow	The workflow is operationalized by asking how the SmartWork platform is reducing the administrative burden for its users. The workflow focuses on the amount and complexity of systems that clients use in their daily routine work schedule and to what extent the workflow improves by reducing the administrative burden.
	Stakeholder connection	The determinant of stakeholder connection is operationalized by asking how the stakeholders (leadership, management, and end-users) are connected to the platform. It is defined by how the organization and the caregiver are connected to the platform to create a critical mass. To be more specific, questions are asked on how stakeholders are given the time and training facilities to become 'part' of the platform. The focus lies on identifying how the SmartWork platform substitutes previous interfaces and how this impacts the users' willingness to join the platform. This can be a direct effect (e.g., perceived usefulness, quality) or an indirect effect (happiness/job satisfaction).
	Interface technologies	The determinant of interface technologies is operationalized by asking how external interfaces from complementing vendors are selected and prioritized for the implementation process of SmartWork (e.g., planning systems, EHR, reporting systems, financial systems, and sensors for telemonitoring). Respectively, it is defined by the powerful position of complementing interfaces and how barriers and drivers exist for the implementation of SmartWork are created by these interfaces.
	The facilitator communication	The facilitator determinant is operationalized by identifying the different facilitating roles in the SmartWork implementation. Respectively, their role in communication, technical skill, reputation, training, and creating support base is discussed with a specific focus on the adoption of SmartWork over time (implementation) by managers and users
Continuous improvement	Public Value	The determinant of public value creation is operationalized by asking how publicly valued outcomes are realized during the implementation of SmartWork and what barriers and facilitators occur during this process. Public value is operationalized by four elements: (1) publicly shared valued outcomes, (2) legitimacy among peers, (3) increased efficiency in the workflow, (4) a reduction in resources to establish advantages for the end-user and care organization.
	Platform innovation and evolution	The role of co-creation on the SmartWork platform is identified. The focus lay on what went right and what went wrong during this process and why. Specific questions are asked about the role of innovation and prioritizing innovation based on a large user group. This determinant is specified by asking how the innovation process is organized, facilitated, and monitored and how actors organize, change and align their visions in a changing environment.
	Iterative feedback cycles	The determinant of iterative feedback cycles is operationalized by mapping iterative feedback cycles and evaluation moments. The focus lies on the frequency of feedback sessions and how feedback is provided, handled, and returned to the users.

4.5 Data collection and research instruments

Yin (2003) defines six sources of evidence that are used in case-based research: "*documents, archival records, interviews, direct observation, participant observation, and physical artifacts*" (Yin, 2003; p. 85). The necessary input for this study is achieved by conducting semi-structured interviews with experts on the specific case of the implementation of SmartWork within a long-term care organization in the Netherlands. The previous section operationalized the determinants of the adjusted ITIM for SmartWork. A questionnaire is created based on the adjusted ITIM concepts to identify how system interoperability, customer connection, and continuous improvement influence the implementation of SmartWork. To ensure the validity of this study, the interview questions are validated with external implementation consultants, academics, and the project lead. The semi-structured approach of this study allows for in-depth and detailed data gathering and offers the opportunity to pick up on expert views in a structured way (Bryman, 2016).

Moreover, as a primary data source, the researcher analyzed project documents on the implementation strategy, customer engagement strategy, and continuous development strategy sent before, during, or after the interviews. These documents were discussed during the interviews and are used to triangulate data and back up quotes provided by respondents (Moon, 2019). In total, eight documents were used from the platform owner, consultants, and care organization. In order to create a contextual background for this study, the researcher analyzed secondary data sources on the implementation of the SmartWork platform. In order to create a more in-depth context for this study, the researcher organized a focus group with four technical experts from the vendor and an external implementation consultant from PwC. The generic themes discussed in the focus group can be found in Appendix 5. The focus group is used to create a direction for this study and adapt the ITIM. It allowed the researcher to adopt an iterative approach of searching literature on the topic. Moreover, the researcher joined weekly project meetings with three implementation consultants and a three-hour technical training with the vendor on how to build prototypes. Lastly, the researcher joined an implementation strategy session with a PwC implementation consultant to create a broader context for this study. In addition, a cross-sectional meeting is organized with six implementation consultants to discuss the broader perspective of SmartWork in other care organizations. This session is used as contextual information as other care organizations are out of scope for this study. Using multiple data sources ensures that a complete perspective is created during this study. This triangulation process increases the validity and reliability of this study (Moon, 2019; Riege, 2003). Table 6 provides the data description for this study.

Table 6. *Data description.*

Data types and dates	Amount	Referral code
Primary data		
Semi-structured interviews lasting between 60 and 90 minutes	**14**	**R (1-14)**
Project documentation	**8**	D (1-8)
Project documents vendor	4	D (1-4)
Project documents consultants	3	D (5-7)
Care organization	1	D8

Secondary data	
Contextual & technical meetings	**3**
Focus group (90 minutes)	1
Training: Technical platform understanding (3 hours)	1
Cross-sectional meeting	1
Project meetings	**25**
Weekly project meeting lasting 45 minutes, mailings and notes	24
Implementation strategy session	1

4.5 Data analysis

Thematic analysis is a frequently used method to analyze qualitative data (Bryman, 2016). In his seminal work, Kings (2004) developed a method for thematic analysis, called template analysis *"the essence of template analysis is that a researcher produces a list of codes ('template') representing themes identified in their textual data"* (King 2004, p. 256).

The interviews are analyzed using a set of predefined codes. *"[...] template analysis normally starts with at least a few predefined codes which help guide analysis"* (King, p. 259). This set of predefined theoretical determinants is presented and operationalized in section 4.4. An interview guide is used to develop the initial template for this study which can be found in Appendix 2. The interviews were transcribed using Word. Finally, the data is structured using NVivo software.

The next step included the coding process of the interviews. Hierarchical coding is applied to identify descriptive or interpretive text pieces in the interview. In the thematic form of template analysis, hierarchical coding is applied to organize the codes at different levels. Codes with a higher-order represent the generic themes, whereas lower-order codes are more specified. In the template analysis, each text piece was related to the research question and the conceptual themes that were defined prior to this study. If prior themes did not cover the textual contents, a new code was created, or an existing code was modified (King 2004). So, template analysis focuses on analyzing text in a flexible manner to adapt the code to the study's specific needs (King, 2004).

Accordingly, King states that *"once an initial template is constructed, the researcher must work systematically through the full set of transcripts, identifying sections of text which are relevant to the project's aims, and marking them with one or more appropriate code(s) from the initial template."* (King, p. 261). After the coding process of the initial template, several inadequacies were identified, resulting in an alteration of the template by deleting, integrating, and changing the scope of concepts and determinants. The final version included all text that was relevant to answer the research question.

However, King (2004) states that the template is not the final product of the analysis. This study used the template as a tool to structure and interpret the data. A template analysis combines both inductive and deductive elements. Saunders et al. (2007) state: *" [...] a template analysis combines a deductive and an inductive approach to qualitative analysis in the sense that codes will be predetermined and then amended or added to as data are collected and analyzed"* (Saunders et al., 2007 p. 496). Deductive research approaches test and confirm the existing theory. In contrast, inductive research approaches develop a theory based on observations. Figure 5 provides an overview of the analytical template analysis process developed by King (2004). Appendix 6 provides the template created for this study. The results will be presented in the following chapter.

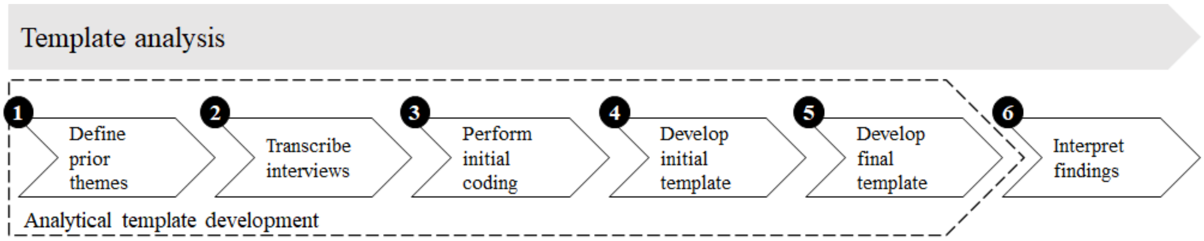

Figure 5: *Template analysis structure based on King (2004).*

5. Results

The following chapter presents this study's results based on the application of the adjusted ITIM. The results are presented based on the three core elements of the adjusted ITIM. Section 5.1 describes the insights on system interoperability. Section 5.2 describes the insights on customer connection, and section 5.3 describes the insights on continuous innovation. The three concepts are analyzed through semi-structured interviews and project documentation. Table 7 quantifies the adjusted ITIM-concepts and its determinants mentioned by respondents.

Table 7. *Quantification of respondents elaborating on adjusted ITIM concepts and determinants.*

Concepts & determinants adjusted ITIM	Respondent count
System interoperability	13
● Institutional arrangements	6
● Modular architectures	12
● Data integration & exchange	11
● Data standards	13
● Data funding	10
Customer connection	14
● Facilitator role	14
● Stakeholder connection via Workflow	14
● Interface technologies	7
Continuous improvement	14
● Feedback cycles	14
● Continuous innovation	14
● Public value	10

5.1 System interoperability

This section dives into system interoperability and how it influences the implementation of SmartWork in long-term care. 13 of the 14 respondents elaborated on at least one of the determinants defining system interoperability. Especially respondents focusing on the technical implementation emphasized that a lack of system interoperability is a major barrier for implementation.

> *"A lot of factors are inhibiting innovation, but the interoperability of data is a major one" (R6)*

Section 5.1.1 provides the role of institutional arrangements on system interoperability. Section 5.1.2 dives into the modular architecture of the SmartWork platform and how it influences the implementation process of SmartWork. Section 5.1.3 integrates the elements of data integration, receival, and sending into data integration and exchange. Section 5.1.4 dives into the role of data standards for the implementation of SmartWork. Finally, section 5.1.5 covers how the exchange of data and interoperability of systems is funded.

5.1.1 Institutional arrangements

The first element of the adjusted ITIM for the implementation of SmartWork that influences system interoperability is the organization's institutional arrangements. Respondents acknowledged that institutional arrangements predominantly focus on leadership and project management skills. Only two respondents acknowledged that institutional arrangements in the long-term care organization might be barriers to exchanging and accessing data. R7 emphasized this by the *"fear of losing the value of jobs by automation"* (R7) that might result in slowing down organizational processes such as implementing SmartWork. Another element focuses on the organizational structures of exchanging data by outsourcing the IT services to third parties. This outsourcing slows down the access to data "*some tasks should take 2-3 hours, but instead, it took 3-4 weeks due to resistance from the external IT provider"* (R11). Other institutional arrangements stimulating system interoperability are defined as preconditions for implementation, such as Wi-Fi availability, server capacity, and properly working devices. These elements are mentioned by respondents but did not have a significant impact on SmartWork within the organization. Respondents did not emphasize that internal institutional arrangements complicated the access to data and the ability to exchange data.

5.1.2 Modular architectures

The second element influencing system interoperability is the modular architecture of the SmartWork platform. *"SmartWork is a plaster that provides the time needed to clean up the back-end of interfacing systems" (R6)*. SmartWork is a "*shell" (R1, R2, R3, R6)* that is placed over existing systems. This shell is explained as "*we create one world where we combine several data sources into one interface"* (R2). Simultaneously, the data sources can operate independently from each other, creating a proper modular architecture. "*When removing SmartWork from the organization, we have separated the underwater pillars to leave the data in the original source systems"* (R2). Therefore, SmartWork stimulates companies to "*innovate*" and "*quickly develop*" (R2, R5, R14) as *"it provides the flexibility to drag and drop interfaces using real-time data"* (R2). So, respondents acknowledged that the implementation of SmartWork creates a flexible modular structure for care organizations.

"The highway is the asphalt through your organizations by building standards and giving back control to your organization. It provides the flexibility to drag and drop interfaces using real-time data creating the road for new and innovative concepts" (R2)

As the SmartWork platform has a modular structure, it is essential to collaborate with complementors of the integrated systems on the platform to speed up data access. Besides the complexity in communicating with complementing vendors, the respondents emphasize a great variety and complexity in systems. Stakeholders use different complementing interfaces that might increase complexity and complicate the interoperability of systems. Nevertheless, modular architectures are service-oriented. *"Caregivers visiting clients in their own home or in the internal care facility, require different information. However, the data needs to be retrieved from the same source system. For this reason, modular service-oriented data integration is a great advantage"* (R4). However, complementing suppliers might complicate changes in the modular architecture. *"I need a bit more of this and a little bit more of that because my IT process has changed, the supplier says to come back in 2 years because by then their new release will be launched"* (R8). Therefore, platform dependencies should be properly managed. "*If the SmartWork platform increases the number of dependencies with other components in the systems, it is essential that the platform elements connect neatly to each other"* (R4). Respondents show that it is essential to understand that the determinant of modularity is primarily determined by "*the difference in the maturity of systems"* (R6).

So, to establish a modular architecture, respondents acknowledge that it is essential to reduce the number of dependencies between complementing systems. Subsequently, clear communication with complementing suppliers is critical. Finally, one should consider the significant difference in the maturity of systems of suppliers, especially in healthcare.

5.1.3 Data integration and exchange

This section dives into the integration and exchange of data. Data integration and data receival and distribution are identified as two separate elements in the conceptual model. Respondents combined both determinants as they are strongly interlinked and at the core of interoperability. The ability to access, exchange, and integrate data is often emphasized as one of the essential elements to implement the SmartWork platform (R1, R2, R3, R4, R5). This chapter is organized into two subsections, being 5.1.3.1 Connection heterogeneous source systems and 5.1.3.2 Communication and central positions on data.

5.1.3.1 Connecting heterogeneous source systems

Complementors play a major role in creating value on the SmartWork platform. The care organization licenses systems from these complementors, which can respectively be integrated into the SmartWork platform. The data created by interfaces provided by complementing platform suppliers are "*owned by the care organization*" (R1, R2, R3, R4, R6, R8, R11, R14). Remarkably, R2, R6, and R8 acknowledged that: "*A lot of care organizations are not fully aware that they own the data"* (R2, R6). Respondent acknowledged that the platform focuses on internal systems using highly sensitive information. The data is often stored on-premise at the care facility, off-site in the cloud, or at the complementors` facility. The care organization needs to grant access to the SmartWork platform to retrieve and send the *"real-time"* (R2, R4, R7) data. The data is often locked up into the source systems of the complementor, meaning that retrieving and integrating data into the SmartWork platform is complex. Multiple respondents have acknowledged that accessing the data is one of the main barriers to implementation and slows down the implementation process.

"The biggest challenge is the ability to connect the underlying systems with the SmartWork platform, so how can you access the data and how accessible is the source system from which you retrieve the data. I think that's the most important question" (R3).

"*It is difficult for care organizations to exchange data within the organization and outside the organization"* (R6).

To retrieve data from external source systems, APIs are essential *"the entire SmartWork platform runs on the fact that they are a shell over other applications, so APIs are vital to them"* (R4). APIs for SmartWork are not freely accessible APIs as all systems are licensed from complementors of the SmartWork platform. Therefore, APIs are provided by the complementors to access the data of the care organizations. However, APIs in care-based settings are often very poorly formulated. *"There are a lot of bad APIs in healthcare"* (R8). Multiple respondents have acknowledged that APIs can be too narrow or too broadly formulated, resulting in an inaccurate way of retrieving, sending, and integrating data *"All the data is retrieved at once, the API drains the whole system at once"* (R8). *"Some APIs are really specific, ... some systems have 1.300 APIs. That is ridiculous of course"* (R8). *"Some systems use 1 or 2 APIs where other systems use 12-20 APIs for the same information"* (R1). *"That you don't need 20 APIs, but just 3 or 4"* (R3). Clear documentation and quality APIs are crucial to properly integrate external data sources in the platform. Hence, the API layer of the complementor needs to be *"A well-documented API layer"* (R1). Respondents acknowledged three vital elements for API quality: Data access, data availability, and the ability to manage and control the API with accurate roles and rights (R1, R4, R5, R8).

If APIs are not available or lack quality, a microservice can be built. Most systems have local databases that have little to no API connection options. Respondents acknowledge: *"We build our own kind of APIs on the platform. We call them microservices that act as an interface"* (R3). However, *"we rather not do that"* (R5) as it is more costly and time inefficient. In short, there are three main ways to access data (R2, R3). First, one can use APIs for accessing data. Second, one can directly access the database using an *"open database connection"* (R2). However, "*this is not possible with cloud storage"* (R5). As a last resource, one can use *"screen scraping in which we emulate everything from the front-end, and then we can extract the data as well. However, this is not ideal"* (R2). As the maturity of complementing suppliers differs, they sometimes deliberately create proprietary systems to create individual gains. *"They can see SmartWork as a threat because they will slowly take over our business"* (R6). Respondents acknowledged that this attitude of complementing suppliers delays the implementation of new services on the platform. If there is a lack of data quality and access, clear communication, alignment, and *"cooperation"* (R2) are necessary between the implementation consultants, care organization, the platform owner, and complementing suppliers. Respondents acknowledged that some complementing suppliers show a positive attitude towards the innovative character of SmartWork. *"Some vendors say: This is an interesting development; how can we connect and tell me what you need!"* (R8). Currently, there is a shift in the environment in which SmartWork becomes an "*enabler instead of a competitor*" (R2). However, this still seems to be difficult in practice.

"In an ideal world, we would receive the data in the right way with the right authentication. However, that's just not yet facilitated by software suppliers" (R2).

Although systems are heterogeneous, complex, and sometimes costly to retrieve data, respondents with a technical orientation stressed that there is no barrier to understand or retrieve data as the platform owners have created the skills to understand external source systems.

> *"Currently, we have succeeded in making a connection with all systems that we need" (R6)*

5.1.3.2 Communication and central positions on data

Clear communication between the implementation consultant, care organization, platform owner, and complementing vendor is essential to integrate data sources on the SmartWork platform successfully. The facilitator takes a central position in this communication and relationship building which will be discussed in section 6.2.1. If elements are changing in an already existing API or new API, clear communication on the adaptations is required, which is validated with D8 provided by R4. *"If something changes in the API or application, we should have a collaborative discussion on that"* (R6). Clear communication on API documentation is facilitated via *"release notes of new updates"* (R3). For the implementation of SmartWork, it is essential to understand that SmartWork based its infrastructures on the existing "*connectors*" (R1, R3) of the complementing suppliers. Therefore, respondents stressed the essence of communicating and discussing changes in the source systems and connection points between the vendor, care organization, and complementors. As the complementor is responsible for providing the API, they place themself in a central position. As stressed earlier, there is a clear difference between complementors who are "*eager to participate*" (R8) or "*afraid of losing business"* (R3) and are *"not benevolent"* (R2). However, *"the complementor is not always able to take an opposing attitude towards sharing data. Otherwise, the suppliers will lose their customers"* (R6). As a result, some complementing suppliers actively collaborate with the platform owner, care organization, and external consultants by establishing a partnership strategy to increase openness and transparency in data and enhance communication. *"So, we decided to sit around the table with [supplier] to create and communicate access to the data"* (R6). Currently, there is a shift in attitude towards SmartWork of complementing vendors to become "*a more enabling technology instead of a large substituting competitor"* (R2). Nevertheless, it is important to understand that complementing vendors *"have different attitudes towards the SmartWork platform"* (R1). Sometimes complementing vendors are unaware that they are taken *"hostage source systems"* (R2) of care organizations. Accordingly, *"it is not always the intention to deny access to the data. However, the suppliers are not always able to provide proper access"* (R2). Therefore, respondents state that an estimation of the ability to connect source systems must be made using data standards. This estimation is elaborated in the following section.

5.1.4 Data standards

Data standards are in the conceptual model defined as certifications, privacy, and the ability to exchange data in a standardized way within and between care organizations. Respondents have emphasized that care data is highly sensitive. Therefore, it is vital to treat the data carefully. The SmartWork platform exchanges data via the service highway, meaning that the data is not integrated into the MSP. *"SmartWork starts from the principle that no privacy-sensitive information is integrated into the platform itself. SmartWork is only a shell on the data, so nothing is stored within SmartWork, no client information, no employee information.*" (R1). The lack of data integration reduces the privacy risk for the platform owner.

To be more specific, if the organization buys a license, it is possible to store the SmartWork software on the servers of the care organization. Therefore *"if databases are internally at the client, you can install SmartWork and the Service Highway there. You are within the domain of the client, meaning that their certifications support the platform"* (R3). However, current policies around the Dutch privacy regulations (AVG) complicate the implementation of SmartWork as the law is open for interpretation. *"The AVG can be a barrier for implementation depending on how one interprets this law"* (R8). Moreover, the external implementation consultants supporting the implementation of SmartWork are therefore partly responsible if a data breach occurs.

The latter two elements focus on certification and privacy-sensitive information. However, respondents acknowledged that establishing a standard for open data provided by platform complementors is essential for system interoperability as this is currently a severe problem in healthcare.

"A challenge in healthcare are standards for data exchange. This is currently lacking in healthcare, reducing interoperability" (R6).

Therefore, *"it is tough to exchange data in care organizations. Intern as well as extern, because a clear standard is lacking for data exchange"* (R6). For this reason, the platform owner established a standard for the whole care organization by applying a three-star rating on the openness of external data sources. A *"three-star rating is applied on the ability to connect with external source systems"* (R2). D4, R2, R5, and R14 explained that zero, one, two, or three stars are provided based on nine characteristics, being: (1) Documentation, (2) logical data output, (3) business logic in the API, (4) user-level roles and rights, (5) system-level roles and rights, (6) data access via API or database, (7) data access via APIs database or front-end, (8) the supplier shares knowledge, and (9) the supplier cooperates. Through this standardization process, the platform owner creates an indication of the complexity to access external data sources and provides the complementary vendor's insights into their potential improvements of source systems. *"By building standards and giving back control to your organization"* (R2). This standard on the openness of source systems should stimulate *"direct access to the data owned by the care organization"* (R14), as some complimenting supplier`s state:

"System suppliers say that they are very open and would like to collaborate, but then it turns out that they are just not open or willing to collaborate" (R14).

Respondents state that this rating system positively influences interoperability by creating a standard for estimating complexity and costs to integrate external source systems into SmartWork and stimulate flexibility within the organization. Table 8 provides an anonymized real-life example of a 2-star rated system on their openness explained by R5 with D4.

Table 8. *Rating system example on the openness of systems provided by R5 in D4.*

	System [example]	★☆☆	★★☆	★★★
Documentation	×			Optional
Logical data output	×			Required
Business logic in API	×			Required
User-level roles and rights	×			Required
System-level roles and rights	✔		Required	Required
Data access via API or Database	✔		Required	Required
Data access via API, database, or front-end	✔	Required	Required	Required
The supplier shares knowledge	✔		Required	Required
The supplier cooperates	✔	Required	Required	Required

5.1.5 Data funding

Respondents state that funding is a precondition for the SmartWork platform to be implemented. Two distinct ways of funding are identified. On the one hand, updates of the SmartWork platform and the underlying data exchange platform, the Service Highway, are funded through a license-based model. On the other hand, further developments of innovative features on the SmartWork platform, such as an *"absence administration"* (R9), are funded by establishing new contracts on development trajectories. The healthcare organization funds this trajectory. R1 and R9 emphasized the importance of making clear upfront agreements on the two elements of the license agreement and the creation of innovative features. Nevertheless, making financial calculations on building new features can be difficult as there are dependencies on external actors (e.g. suppliers). So, the platform, data exchange, and updates are all privately funded through a license-based structure. Respondents acknowledged that public funding is currently not available for these kinds of pioneering innovations. Therefore, R9 emphasized that the care organizations should possess an innovative character and strong financial position in the early development phase of the platform.

5.2 Customer connection

This section discusses the concept of connecting the customer to the SmartWork platform. First, section 5.2.1 describes the role of the facilitator on the SmartWork platform. Next, section 5.2.2 describes the stakeholder connection process that distinguishes between a focus on user connection to the MSP via the improved workflow of the caregiver and the organizational connection process to the SmartWork platform. Finally, section 5.2.3 discusses the role of interface technologies.

5.2.1 Facilitator communication role

All respondents acknowledged that the facilitator role is essential for the platform implementation. It bridges the gap between the internal and external organizational environment. Respondents show that the facilitator role moves beyond merely the project lead. Therefore, this chapter identifies the different facilitating roles to provide insights into the facilitating function profile. During the implementation of SmartWork, three key actors are identified by respondents with their own facilitating roles. First of all, the organizational project lead takes a central role during the implementation of SmartWork within the organization's internal environment. All respondents acknowledged that the project lead is responsible for clear communication through planning and creating realistic expectations among stakeholders. Second, the external PwC consultants facilitate this process and *"bridges the gap between the platform owner and care organization*" (R10). Third, the technology vendor is responsible for clear communication with external suppliers on data exchange. This process is facilitated by external PwC implementation consultants and the care organization's project lead. The ultimate goal for the platform owner is to create open partnerships, as discussed in section 5.1.3. A barrier for implementation regarding the project lead is the current lack of internal support functions. Respondents acknowledged that losing the project lead due to illness has profound negative implications for the implementation trajectory. Nevertheless, the project lead has support from PwC consultants who facilitate the identification of the customers' needs, which are prioritized in collaboration with the project lead and management team.

Communication is an essential element for the successful implementation of SmartWork. In the early phase of the implementation, the facilitators show users *"clickable prototypes"* (R3) that can be used to experience the product. All respondents acknowledged the importance of testable prototypes. The technology starts with customers' needs providing a prototype that does not necessarily include all elements in the final version of the product at once. Therefore, clear upfront communication is essential to create realistic expectations for users:

"In the initial phase, we have clearly explained that it could take some time to realize the source system connections in the back-end" (R6).

"If a source system is difficult to connect, you should communicate that in advance" (R2).

Lacking this communication is a significant barrier to the successful implementation of SmartWork among users as it would result in disappointments and resistance among users to adopt the platform.

"So what you see is if one makes a promise to realize a new build with an easy delivery and then it turns out that there is no API available, then you think like well … that one cannot deliver..." (R4).

As a result, it is essential to create a shared understanding and communicate upcoming changes to avoid unexpected outcomes through a clear planning and communications strategy which can be achieved by establishing stakeholder meetings, a shared vision, and a roadmap where *"you are going to funnel what you want to deliver in each period"* (R12) by setting clear *"milestones"* (R3). However, the complexity of accessing external source systems influences the development of the roadmap *"You should actually show where the data should come from. This influences your whole roadmap"* (R2). The care organization facilitates this by building a new feature each quarter of the year to limit the newness for care professionals and create a *"gradual"* (R1, R3, R9) adoption and implementation throughout the organization. So, implementation and development are two processes that both need a planned project structure facilitated by the project lead and external implementation consultants (D6). Therefore, a shared understanding is required:

"The organization should embrace the vision set by the management board to become a data-driven healthcare organization" (R7).

The project lead is responsible for creating a support base and awareness of the platform among users through an *"internal marketing campaign"* (R1). In line with this argumentation, the project lead takes a central role in identifying key users or "*change ambassadors"* (R8). For example, the project lead states: "*If a user has 3 or 4 good ideas, this indicates the involvement of the user [...] we sit with them around the table to collaboratively retrieve new ideas"* (R1). Key users is a newly identified role that is, according to all respondents, essential for the implementation of SmartWork. Key users can contribute to feedback provision, co-innovation, and connecting other users to the SmartWork platform. The provision of feedback by key users is monitored, evaluated, and managed by the facilitating project lead and external PwC consultants. How key users are actively participating in the customer connection process of the SmartWork platform is discussed in the following section. The process of providing feedback in a continuous loop is further discussed in section 5.3.

5.2.2 Stakeholder connection

This section dives into the process of how stakeholders are connected to the SmartWork platform. Section 5.2.2.1 focuses on the user adopting SmartWork via the improved workflow, while section 5.2.2.2 focuses on connecting organizational actors such as the management board and the IT department with the MSP.

5.2.2.1 User adoption via improved workflow

All respondents acknowledged that the daily work process of the care professionals takes a central role in defining the platform interface. All respondents acknowledged that the improved workflow by reducing time spent on administrative tasks through a standardized interface is the main driver for users to adopt the platform. Administrative tasks are often perceived as "*negative*" (R4) by caregivers. Accordingly, the platform focuses on user needs:

"We really look at the wishes, needs, and actors from the field where you operate, and from there we determine what you need and how we can organize that for you" (R2)

"SmartWork does not replace current systems. It simplifies existing systems in a user-friendly way" (R4)

"Users are happy when using SmartWork because the technology really meets their needs in their daily tasks" (R1)

So, the platform implementation starts with defining the daily work process of the caregivers. This process is identified in collaboration with caregivers, project lead, and consultants.

"We went to a residential side with a team lead and supervisor and sat around the kitchen table, asking the caregiver what he does during his daily tasks, what irritates him and how it could be better. We then used the whiteboard and showed the caregiver, what if we do it like this, and what if we move this button on the screen. We always look at the pitfalls of the caregiver in their daily workflow. The care process is always leading" (R1)

"So, we collaboratively drew a step-by-step process flow including all the daily tasks of the caregiver. Respectively, we identified challenges within this process" (R6)

"*SmartWork is a technological platform that should be made and shaped by care professionals"* (R1).

Therefore, respondents state that the improved workflow is the starting point of the technical implementation and development process. When specifically focusing on the workflow definition, the SmartWork technology has the following function:

"The tool is an enabler for change. It determines how we want to work; with which tools we want to work and at what moment we are willing to do this" (R2).

Besides the "*intuitive*" (R6, R9, R11) approach of the platform interface, respondents recognized four roads to connect the users to the SmartWork platform, being (1) experimentation and prototyping, (2) using key users, (3) support and training, and (4) internal marketing campaigns. First of all, user connection can be achieved through experimenting and prototyping. *"First, we show the SmartWork demo to caregivers"* (R8).

"You should include the end-user via prototyping. Moreover, we can use drag and drop functionalities in a design sprint to test the functionalities with the end-user" (R2).

Second, key users or *"SmartWork ambassadors*" (R8, R9) can convince other users by establishing a "*support base*" (R9) or *"shared value*" (R6, R8). *"Users should tell the positive story of the technology to their colleagues*" (R7). As a result, key users connect with other users through "*snowballing*" (R1), creating an "*oil slick effect*" (R3, R4, R9). Therefore, the platform owner demands that *"the end-user is involved in the development process"* (R2). As a result, negative attitudes of key users could complicate the implementation of SmartWork due to this oil slick effect.

Third, users are connected to the platform through training. However, respondents show that the platform is intuitive and does not need training. *"In essence, no training is necessary as the platform is quite intuitive"* (R11). However, "*you should carefully explain the technology and its added value for caregivers"* (R4). Other respondents are more inclined to say that training should be focused on an intuitive approach with *"user cases*" (R6). In addition, some platform participants still *"need personal attention"* (R6) due to their age and aversion to technology. Therefore, the facilitator role, discussed in section 5.2.1, should "*facilitate users and train them if necessary"* (R9).

Fourthly, in the early phase, an internal branding campaign will be started by the project lead to create awareness for the platform. If users deny adopting the SmartWork technology, the facilitator begins a second internal branding campaign to convince users to adopt SmartWork in the workflow. "*We try to target this specific group of non-users with a second campaign and ask them why they are not using the SmartWork platform. The positive effects on the caregivers' workflow are shown respectively"'* (R1). Steps one and two in Figure 6 depict how the future workflow of the caregivers is envisioned and how a prototype is realized to incentivize users to adopt the technology. After several feedback cycles, the technology is built, which is visualized in steps three and four. Section 5.3.1 elaborates on these feedback cycles.

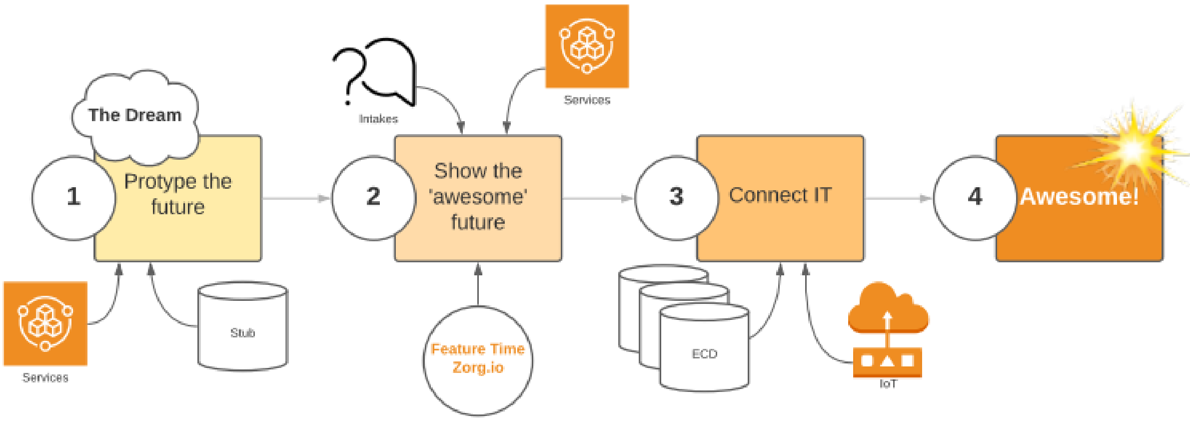

Figure 6: *Envisioning the future of SmartWork provided by R3 in D2.*

5.2.2.2 Organizational stakeholder connection with the MSP

The management board adopted the vision of SmartWork to establish a "*data-driven care organization*" (R7) and has a clear "*ambition to make this work*" (R1). SmartWork is *"initiated by the board of directors"* (R11). Respondents acknowledged that the complete "*support base*" (R1) of the management board is crucial for successful organization-wide adoption of SmartWork. Respondents acknowledged that the leadership is driven by the improved *"quality of care"* (R8), *"improved job satisfaction"* (R8), and *"positive financial benefits"* (R6). Therefore, the management board should propagate the technology via short communication lines, *"the management board has short lines with the team managers and is closely involved"* (R10), and general meetings with stakeholders. "*Conferences with all team leaders are organized. 400 participants are informed in a 2-day session, and the board is very busy guiding these groups"* (R13).

An actor who is not explicitly stressed in the adjusted ITIM is the IT department. According to the respondents, the IT department has a significant role in the implementation. IT departments in care organizations are often *"lacking funding"* (R6, R12, R14) and have *"tight schedules and planning"* (R6, R7, R8). R12 states that *"normally there is always a shortage of IT funding and now there suddenly is capital"* (R12), creating tensions within the department. Hence, it is difficult to position a new MSP on the care organization`s *"IT agenda"* (R7, R8). It is essential to create the understanding at the IT department that the SmartWork platform stimulates "*innovation and puts IT high on the organizational agenda"* (R6). However, creating legitimacy within the IT department can be difficult as they are "*the commanders in chief of the underwater IT infrastructure"* (R2). Accordingly, implementation experts recognize that the influence of external implementation consultants might result in "*tensions*" (R6) within the organizational IT departments as they are often not used to customer-centric approaches.

> *"There is some tension with the IT department as they are not used to customer-focused working [...] this technology is suggested by the field [...] IT departments find it difficult because they didn't come up with it themselves"* (R12).

5.2.3 Interface technologies

All respondents acknowledged that complementing technologies are at the core of the SmartWork platform as the platform is a "*shell over the existing complementing systems"* (R4). Therefore, complementing technologies play a dominant role in SmartWork. However, R1, R3, R4, and R5 mentioned that since the SmartWork platform is a shell over the existing complementing systems, users would not notice that a system alteration occurs in the backend of SmartWork. To illustrate this phenomenon: If the care organization chooses to license a different scheduling or EHR system, then the user would not notice the difference since SmartWork provides the whole interface for its users in a standardized form. All respondents stated that the standardized interface creates significant value for users. Nevertheless, respondents acknowledged that complementing systems are crucial for the platform's existence. In total, 17 complementing systems are identified for the implementation of SmartWork. Accordingly, SmartWork stimulates an agile way of working.

> *"You can develop a piece of software, and in three years, the legislation has changed, then you can throw it in the garbage can. This problem can be tackled with the SmartWork interface and Service Highway. You can work agile, and the user always has the same interface"* (R2).

So, complementing interfaces create the input for SmartWork. However, they can be substituted with other systems without the user noticing.

5.3 Continuous improvement

This section dives into the concept of continuous development. Two elements were in line with the conceptual model. First, the determinant of public value is repositioned in the customer connection process as respondents state that public value is created through the improved workflow of caregivers. Second, this chapter dives into the process of feedback cycles and continuous innovation and evolution.

5.3.1 Feedback cycles

According to all respondents, feedback cycles are essential to gather information for new developments. Respondents acknowledged that feedback cycles could be split up into three elements. First, they noted that feedback could be provided on mapping the workflow. Second, feedback is provided on the implementation process of developed features (e.g., improvements and bugs). Third, feedback can be provided on new features for further development. The third element is discussed in the continuous innovation and evolution section.

The previous section mentioned the importance of the facilitator, being the project lead, external implementation consultant, or platform owner to "*monitor and evaluate*" (R10) the process of feedback provision. To connect stakeholders, feedback needs to be retrieved from key users to map the hurdles in the daily administrative process of the care professional. Figure 7 provides a process flow that is established during an iterative feedback session. Within the process flow, each individual system is identified. Respectively, the process flow is discussed with key users. Challenges in each technology are identified in collaboration with users. Respectively, the technology is built as a clickable prototype.

During the implementation process, users can provide feedback on the features that are implemented, including bugs. There is a *"functionality that allows for reporting bugs or improvements"* (R3). Accordingly, adaptation can be made to the user's needs, as discussed in the customer connection chapter. Nevertheless, R2, R3, and R10 mentioned the major importance of returning feedback to the users.

"It is essential to return the feedback to the people. Show that you have really done something with the feedback" (R3).

To be more specific, respondents acknowledged that value is created by returning feedback to the users. Respondents acknowledged that users feel "*heard*" (R10) as IT is often seen as inhibiting instead of enabling in the primary care process. This process of providing feedback is strongly interlinked with the process of innovation as development and implementation simultaneously occur. The following chapter dives into the continuous innovation process on the SmartWork platform.

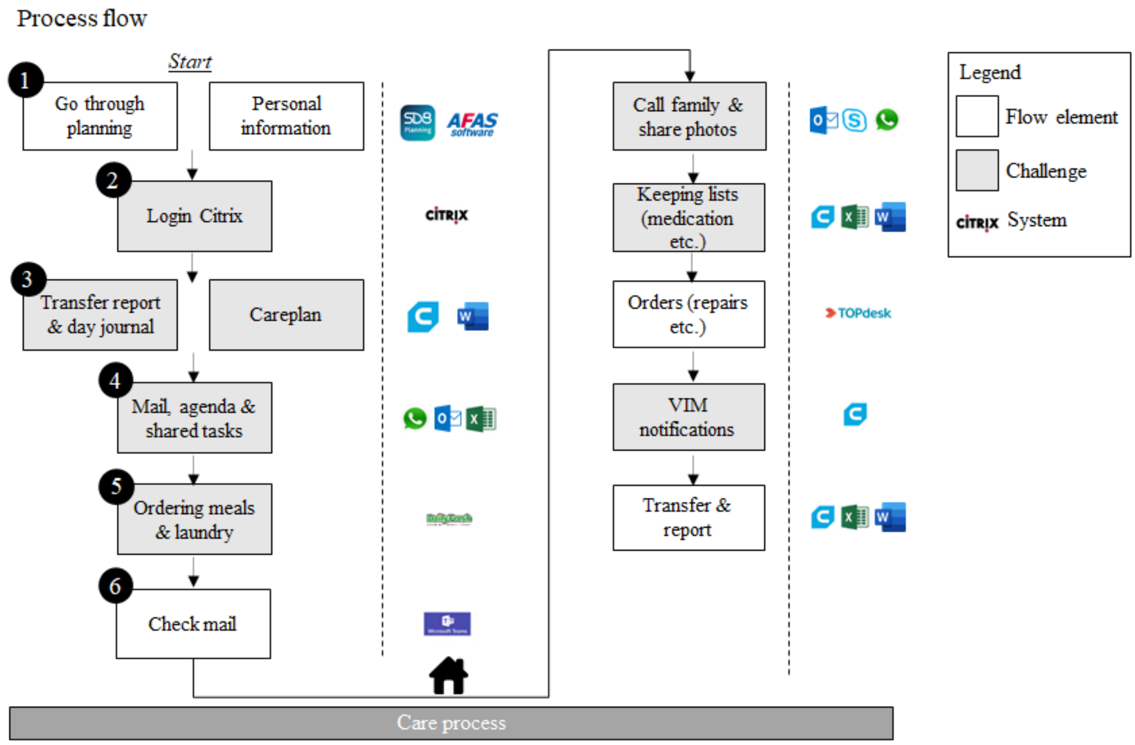

Figure 7: *Process flow example provided by R6 in D7.*

5.3.2 Continuous innovation & evolution

The third element of providing feedback focuses on continuously retrieving customer needs with caregivers to build new features on the platform collaboratively. The platform owner adopted a strategy of *"simultaneously implementing and developing the technology"* (R10). Key users play a major role in the continuous innovation and evolution process of new features. Key users *"co-create to improve their own workflow"* (R9), and "*There needs to be a continuous dialogue with users where reflection and direction are most important*" (R12). However, the role of key users reaches further:

"Users are the driving force behind the implementation process and the oil slick effect. In the meantime, the most critical users should provide continuous feedback on what features we want to implement in terms of content around the SmartWork platform, they should provide feedback on the

process of collaboration in terms of developing and expanding, and they should facilitate mutual communication" (R12)

In line with this argumentation, the retrieved needs for new features on the SmartWork platform are prioritized in collaboration with key users through *"co-creation"* (R5). Respondents acknowledged that this process of co-creation stimulates shared public value and support base among users of the platform over top-down approaches: *"If you can identify a person in the same function and you see that he is really enthusiastic. That works even better than a top-down approach"* (R10), *"the board decides, but the input for new developments comes from key users" (*R11). Inspiration for new features is created through an "*idea box*" (R1, R2) or a repeating iterative service identification session named *"feature time"* (R5, R14). All respondents acknowledged that key users play a major role in this process of *"co-development"* (R5). The project lead facilitates this process supported by external implementation consultants as the technology should be embraced by the internal organization instead of being pushed by the external environment. The process of prioritizing features is facilitated by the external PwC implementation consultant or project leads on a matrix including "quick wins", "showcases", "low hanging fruit", and "later priority" (D5).

"On the one hand, we use a matrix that indicates how much impact you make with a certain idea. On the other hand, it indicates the effort that needs to be made to develop the new features" (R10).

"*Ideas that have a high impact and require a relatively low effort are logically the first new features to be developed"* (R10).

Moreover, R4, R8, R10, R11 show that the prioritization of innovations allows for a process of *"blocked innovation*" (R9), meaning that implementation and development strategies are executed simultaneously. New features are developed in four innovation blocks per year. In line with this argumentation, respondents acknowledged that this blocked innovation process does not necessarily reduce the innovation capacity due to a planned strategy (D3, D5, D6). Within each block, there is the flexibility to decide upon new features. This planned innovation strategy creates clear expectations among stakeholders such as the platform owner that develops the new features, the IT department of the care organizations, and the platform users. The facilitators play a major role in steering this process of "interactions". R2, R5, R10, and R12 stressed that the innovation strategy is not *"cast in concrete"* (R2) and stimulates an *"agile"* (R2, R12) approach with a customer-centric focus.

"*Because you remain flexible within the platform, you are able to grow with the platform and adapt very ad hoc to changes in the field such as IoT. This facilitates agile working"* (R2).

In order to stimulate agility within the organization and continuously meet the user's needs, it is essential to regularly check if the platform still reflects your vision on innovation.

"You should regularly check whether the reality still reflects your vision of the previous year" (R12).

Finally, respondents show that the developed features are openly available for other care organizations that license the platform. Respondents acknowledged that this *"sharing is caring"* (R2, R5, R7, R8) principle creates a partly closed and open platform. The technologies are internally developed by innovation leaders and publicly accessible via a license-based structure. So, each individual feature is "*configurable*" (R3, R5) with the internal platforms of other care organizations, which have implications for implementing new features within the care organization. So, other care organizations can *"actively participate in new developments"* (R1) that benefit their own and public goals. Care organizations can also implement *"the features that are already ther*e" (R7). However, the platform technology is in the early phase of development and implementation. Therefore, this concept is underdeveloped yet and reaches beyond the scope of this study as this study focuses on MSP implementation within care organizations and not between care organizations.

5.3.3 Public value creation

Respondents acknowledged that the value creation for improving the caregiving process and reducing the administrative burden lies in improving the routine daily workflow of the healthcare professionals, stimulating an increased quality of service provision for patients. So, respondents predominantly emphasized public value creation in terms of the improved quality of the workflow. *"It really makes the administrative work easier for the employees"* (R4). *"When looking at the user, we focus on user-friendliness, time-saving, efficiency, and ease of use"* (R6). In order to create value, quality equipment is required:

"So, if you have quality equipment, like SmartWork, the adoption of the technology goes really fast" (R7)

5.4 Summary & final adjusted model

This study has validated the three main concepts identified in the adjusted ITIM for MSP technologies in long-term care facilities. The participants validate each main concept. However, the dynamics within each of the three concepts showed some similarities, differences, and mergers within the determinants of the adjusted ITIM.

"SmartWork is more than just a technical implementation" (R2), *"It's a vision"* (R14)

5.4.1 System interoperability

The respondents with a technical focus stressed the importance of interoperable systems in order to quickly access the right data at the right time. Respondents predominantly emphasized the role of data integration and data exchange as a major element and possible barrier for the implementation of SmartWork. These two elements are combined in the final model as respondents mentioned them together. Within the concept of data exchange and integration, there are different power relations between care organizations, complementing suppliers, platform owners, and external parties on data ownership, data access, and data quality. As the platform is internally focused on a licensing structure, the data is not openly available. The data is owned by the care organization and is made available to the platform owner to incorporate the data that is often stored in external source systems of suppliers. However, this process is complex. Complementors establish a central position on data reducing interoperability if platform complementors are not willing or able to cooperate while care organizations own the data. Regarding institutional arrangements concerning system interoperability, respondents predominantly discussed preconditions for implementation that do not pose a major barrier to implementation (e.g., Wi-Fi). Data standards predominantly focus on the lack of standardized formats for exchanging data that negatively impact the integration, access, and exchange of data, influencing system interoperability and data ownership. Respondents stressed the importance of establishing data standards for platforms. The main focus of the SmartWork platform is to solve this problem by creating one standard for data exchange throughout the organization, increasing system interoperability. The company aims to communicate this standard with complementing suppliers to stimulate interoperability. Moreover, the responsibility in case of data breaches turned out to be an important precondition for implementation. All respondents discuss data funding as a precondition for implementation. Finally, all respondents acknowledged that system interoperability is a necessary technical precondition for the implementation and the further development of SmartWork. As one starts with the innovation process of adding new features, one should at the same time check the system interoperability to integrate data. This process is defined by the outer arrow in Figure 8 of the final model and the small arrow between facilitator communication and technical preconditions as interoperability is essential for implementing and developing the platform.

5.4.2 Customer connection

The second main element of the adjusted ITIM is the customer connection concept. The customer connection concept focuses on improving the workflow by reducing the caregivers` administrative burden, which all respondents emphasized. All respondents emphasized that the improvement of the daily workflow by reducing the administrative burden of caregivers is the main incentive to connect the organization and caregivers to the SmartWork platform. This is done through one standardized interface for the whole organization. Public value is created through this process (e.g., legitimacy, efficiency, quality delivery, valued outcomes). Therefore, public value is repositioned in the adjusted ITIM. A newly defined element is the importance of connecting the internal IT department as resistance can occur due to different attitudes towards customer-oriented working. Moreover, interface technologies are repositioned in the model as the new interface of SmartWork creates an improved workflow for users. SmartWork standardizes the underlying system creating less influence on complementing interfaces. In addition, it is essential to create value for the IT department as they are responsible for facilitating the transition. Moreover, the IT department should understand the added value for the organization's users. Respectively, users and leadership are separated in the final ITIM as respondents acknowledged both roles of leadership and users separately. All respondents show that the management board has a significant role in communicating the vision of the SmartWork platform with a specific focus on creating public value through the reduction in administrative burdens. In addition, all respondents with a consultancy role acknowledged the role of key users in connecting with other stakeholders. The facilitator of the MSP implementation identifies these key stakeholders. All respondents acknowledged that the facilitator has a major role during the implementation of SmartWork to connect all stakeholders and provide clear communication. Moreover, all respondents agreed that the key stakeholder is a newly identified role as key stakeholders play a central role in connecting other customers and identifying new innovative features, which is part of the third concept of the adjusted ITIM. Moreover, key stakeholders act as representatives for other caregivers.

5.4.3 Continuous improvement

Within the third concept of continuous improvement, respondents acknowledged the importance of feedback cycles for the sustained implementation of SmartWork. The continuous innovation process focuses on key user feedback in a continuous loop. This continuous loop results in the continuous evolution of the SmartWork platform by retrieving innovative features with key users. The facilitator closely monitors this process with key stakeholders. This link is not yet made in the earlier defined adjusted ITIM. SmartWork is simultaneously implemented and developed in the care organization. Therefore, it is essential to continuously look at innovation and respectively check the interoperability of systems as this influences the implementation of new features. Accordingly, stakeholders (e.g., platform owner, care organization, users, and complementors) should align their visions on the implementation of these new features as the innovation process of MSPs are not cast in concrete. In addition, this study has validated the assumption that continuous improvement stimulates customers' connection and vice versa. An overview of the final adjusted ITIM for system interoperability, customer connection, and continuous improvement for MSPs is provided in Figure 8.

5.4.4 Final adjusted model

Based on the results, the three concepts of the adjusted ITIM are validated, and determinants are adjusted. The purple elements show combined existing determinants. The yellow elements show repositioned determinants, and the blue determinants are newly identified constructs. Moreover, the R+ shows that key users stimulate the innovation process by co-creation. This co-creation process results in the (3) continuous improvement of the platform, which stimulates the (1) customer connection process to scale the platform and stimulate MSP implementation in the early phase. Simultaneously, the (1) interoperability of systems is evaluated to successfully (3) develop, (2) implement and scale new features on the platform. The central starting position of the implementation process of SmartWork is the improved workflow through a standardized interface. Figure 8 provides the final adjusted ITIM.

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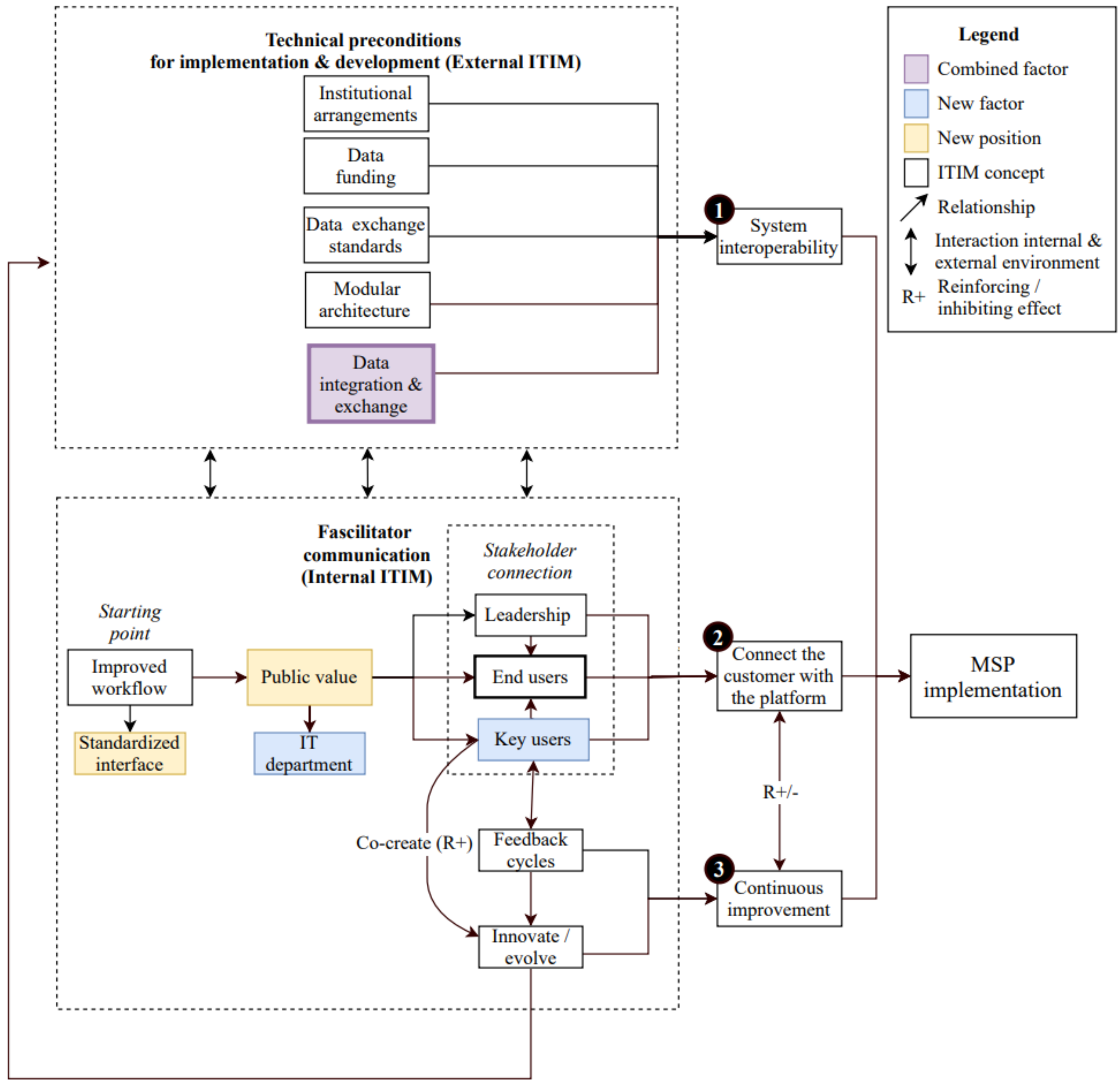

Figure 8: *Final adjusted ITIM.*

6. Discussion & Conclusions

This thesis focuses on the implementation of MSPs in long-term care facilities. The researcher has developed an implementation model based on an adjusted ITIM with a focus on three main MSP characteristics of (1) system interoperability, (2) customer connection, and (3) continuous improvement of the MSP. This study used an in-depth qualitative approach to create insights and validate the model for the leading-edge SmartWork MSP. A focus group is organized to create a context for adjusting the ITIM model. As a primary data source, semi-structured interviews and project documentation are used. This final section presents the conclusions and reflections based on the research question. Section 6.1 provides the effects of the SmartWork implementation based on three main MSP characteristics. Section 6.2 provides the theoretical contributions, practical contributions, and policy implications of this study. Section 6.3 provides the limitations of this study. Finally, section 6.4 provides suggestions for further research.

6.1 Answering the research question

To answer the research question, *"Why and how can MSPs be implemented in long-term care facilities in the Netherlands based on the ITIM?"* the conclusion is structured based on the three formulated research questions. First, the applicability of the ITIM for the implementation of MSPs is discussed. Second, the adjustment of the ITIM into the three concepts of system interoperability, customer connection, and continuous improvement for MSPs is discussed. Third, the model is applied to the SmartWork case in long-term care facilities in the Netherlands to create insights on system interoperability, customer connection, and continuous improvement. Finally, the conclusions are reflected.

6.1.1 The applicability of the ITIM for MSPs

In order to validate the applicability of the ITIM for MSPs in long-term care facilities, three research approaches were conducted. First, the current state of the long-term care industry in OECD countries and the Netherlands are analyzed with a focus on the increasing demand for care and rising pressure on care professionals. This analysis stresses the importance of user-centric technologies that support caregivers in their daily tasks. See section 2.1. Second, a theoretical analysis of MSPs in healthcare was conducted. The discussion covered several MSP elements, such as the role of APIs, closed and open platform strategies, platform evolution, and user-centric value-based healthcare. Another aspect focuses on the lack of interoperability of healthcare systems, poorly defined exchange standards, and the modular architectures of MSPs that increase the complexity of the platform (Feeley et al., 2020). Moreover, there is a shift in focus toward a user-centric approach to create value-based outcomes for users (Pine, 2019; Huckman & Uppaluru, 2015; Feeley et al., 2020). See section 2.2. Finally, this study provides an overview of different adoption and implementation models. The main focus lies on the distinction between IS models and TAM. TAM models focus on the individual adoption of the technology, whereas IS models focus on the organizational adoption of technologies. The ITIM by Schoville & Titler (2015) combines 51 theories from both adoption and implementation sciences with a specific focus on healthcare technologies. Therefore, the ITIM appeared to be a suitable model for the implementation of user-centric MSPs. However, the ITIM is limited by a lack of focus on continuous improvement processes, an essential element for MSPs to exist (Tiwana, 2013). For this reason, the ITIM appears to be appropriate for MSPs but has to be adjusted. See section 3.1-3.2.

6.1.2 Creating a usable model for the implementation of MSPs in healthcare

MSPs have specific characteristics, as described in section 2. To apply the ITIM by Schoville & Titler (2015) on the implementation of MSPs in long-term care facilities, determinants needed adjustments. Section 3.3 describes how the constructs are adjusted towards the implementation of MSPs in healthcare. The determinants of the inner environment of the ITIM are combined into a new concept of "customer connection". Customer connection combined the elements of the workflow, interfacing technologies, and users. The concept of users relates to the individual users and organizational users. Therefore, the determinant of leadership and users are combined into stakeholder connections. The facilitator role guides the implementation and is responsible for identifying the workflow and training people with using the technology. Moreover, the facilitator takes a central role in the communication process. Consequently, the facilitator role and the communication determinants are combined. In addition, the nature of the technology is adjusted with elements from the external environment. The nature of MSP technologies focuses on creating compatibility through interoperable systems of complementing technologies. The focus group provided insight on platform characteristics and allowed for a further literature search into MSP characteristics. The literature shows that interoperability is determined by institutional arrangements, data standards, the ability to integrate data, exchange data, and fund data exchange. These elements are preconditions for implementation but need continuous evaluation as platforms evolve continuously. In addition, the ITIM did not include continuous feedback cycles. For this reason, the ITIM is adjusted for continuous improvement as this is an essential characteristic of MSPs and their survival. Finally, the element of continuous improvement is defined by continuous feedback cycles, the continuous innovation process, and creating public value through shared valued outcomes, legitimacy, quality delivery, and efficiency.

6.1.3 Validating and adapting the adjusted ITIM

The adjusted ITIM is validated through a case study with experts on the leading edge multi-sided SmartWork platform technology. The SmartWork technology is implemented in the context of long-term care. Two approaches were used to validate and map the relationships between concepts and its determinants in the adjusted ITIM and create insights on the implementation of SmartWork. First, semi-structured interviews were held on the topics of system interoperability, customer connection, and continuous improvement of the MSP. Second, in order to triangulate the data, eight project documentations were analyzed and validated the results. See section 4.5. All three main concepts are validated, and insights are created on the MSP implementation. The relations in the determinants of the conceptual model are adapted, specified, and clarified based on the case to improve the model.

6.1.3.1 System interoperability

One of the main findings of this study on system interoperability is the current diffusion and establishment of a healthcare industry standard that potentially stimulates interoperability and expectations about complementing source systems. It is essential to communicate with these complementors to create access to the care organization's data to overcome the problem of being "taken hostage" by their own systems, as care organizations are often not aware that they own the data. APIs play a major role in modular architectures and accessing data from external source systems. However, results show that accessing real-time data through APIs can sometimes be difficult as they lack quality. Hence, the platform is highly dependent on complementors. The formulation of clear standards that are communicated to suppliers stimulates the creation of mutual expectations and alignment on data ownership and access, which is currently insufficient in the industry. The platform's modular architecture allows complementing technologies to be removed or added on request of the users, establishing flexibility and creating incentives for complementors to collaborate. Nevertheless, not all complementors welcome the platform technology with open arms and prefer to keep their systems proprietary. Technologies can be replaced on the platform without the users noticing. The platform is a shell over existing systems that allow systems in the backend to be substituted or improved over time, creating a new view on system interoperability by building an industry-standard on open data access, stimulating successful MSP implementation in long-term care facilities.

6.1.3.2 Customer connection

One of the main findings within the concept of customer connection is that stakeholders do not seem to be familiar with customer-centric products and incentives to actively participate and co-create on the SmartWork platform. The incentives are based on the improvement of the daily workflow of caregivers by reducing their administrative burden, creating an intuitive standardized interface. Therefore, SmartWork is an enabling technology instead of a technology-driven implementation. In addition, full support from the management board is crucial to realize the implementation. The board is incentivized by the improved quality and reduced costs of care services. Hence, the improved workflow is the incentive and starting point of the implementation framework. Key users are a newly identified role besides mainstream users. These key users facilitate the connection of other users and participate in the process of identifying the workflow and creating new features. Moreover, it is essential that key users and generic users can experiment with the technology to stimulate organizational-wide adoption. The facilitator of the care organization identifies key users. The results show that it is essential to identify the facilitator as they occur in different settings with different tasks (e.g., PwC consultants, project lead, platform owner). The facilitator has a dominant role in communicating with the organization's internal and external environment, creating realistic expectations for users by stimulating adoption and facilitating the continuous co-creation process.

6.1.3.3 Continuous improvement

The previously mentioned co-creation activity with key stakeholders is essential to continuously develop and implement new features on the SmartWork platform. The vendor has chosen a strategy to simultaneously develop and implement the SmartWork platform in collaboration with key users. Therefore, iterative feedback cycles on the platform in combination with continuous co-creation activities are crucial elements as the platform continuously evolves over time. The incorporation of feedback should be actively shown to users to incentivize participation. Accordingly, it is essential to continuously look at innovation and respectively check the interoperability of systems as this influences the implementation of new features. This process of continuous improvements is new within long-term care organizations and it requires the continuous alignment of multiple actors to adapt to the changing environment (e.g., complementors, platform suppliers, consultants, and care organizations). Other long-term care organizations might experience the same innovative approach of MSP technologies, changing their vision on the technology that changes from a technology-driven approach towards a customer-driven approach in the upcoming years. Within this continuous improvement loop, it is essential to prioritize the retrieved features during iterative feedback sessions that map the workflow using process flows. This prioritization is facilitated by the external PwC consultants in collaboration with users and the organizational project lead. This prioritization process is essential to create a proper project management structure with transparent time management. Finally, it is concluded that customer connection and continuous improvement simultaneously occur and show reinforcing characteristics during the early implementation phase of SmartWork.

6.1.4 Reflection

This thesis has analyzed how MSPs can be implemented based on an adjusted ITIM for MSPs using a case study on SmartWork. An adjusted ITIM by Schoville & Titler (2015) is used to explore, analyze and test (1) system interoperability, (2) customer connection, and (3) continuous improvement with an easy-to-use framework for implementation. The results show that clear and continuous communication throughout the implementation process is essential to align stakeholders and sustain the implementation process. The case showed the complexity in aligning multiple stakeholders, slowing down implementation. The implementation of MSP technologies can be realized if all stakeholders are adequately managed. Users take a central role in providing feedback and determining the development agenda, as their workflow is the central starting point of the implementation framework. Therefore, this study states that customer-centric approaches are essential for MSPs in healthcare to survive. This study identified how users could be successfully incentivized to adopt, implement and co-create MSPs which is a new phenomenon within the context of this study. Hence, this assumption needs further testing. Moreover, the adjusted ITIM guide provides insights into how data integration takes place and how the SmartWork platform creates its own standard stimulating system interoperability throughout the organization with complementing platform actors. The model has identified a strategy that is twofold. On the one hand, the implementation process takes place by connecting customers to the platform over time. On the other hand, a process of continuous improvement takes place. These approaches occur simultaneously, providing an understanding of the implementation of SmartWork, and stimulate the establishment of a modern agile care organization.

This agile innovation approach in healthcare for complex problems such as MSPs is discussed in a recent paper by Holden et al. (2021) that supported the assumption that care organizations should adopt a disciplined customer-centered approach to innovate and transform healthcare delivery systems. Within healthcare, agile approaches are often applied in software development because ineffective lean approaches cannot meet the continuously changing customer demands. Care organizations often lack training, infrastructure, and experience caregiver resistance due to a lack of customer focus (Sindhwani et al., 2019). Accordingly, technology-driven approaches might occur as user-driven approaches often fail in healthcare (e.g., Sindhwani et al., 2019). This might result in a misfit with the adjusted ITIM as users take a central position within the conceptual framework. This study suggests that intuitive MSP approaches with a focus on customers could provide a solution to this problem by incentivizing user participation. Although the Dutch care industry is at the start of this transformation, further research is essential to understand the complex dynamics and cultural shifts of care organizations to become agile in their innovative approach using MSPs. The SmartWork case showed that this cultural shift is currently underdeveloped and could take a significant amount of time to establish throughout organizations.

In line with this organizational cultural shift, it is essential to create interoperable systems based on high-quality APIs. Although this was expected from the theory (e.g., Feeley et al., 2020; Desai, 2016), results show that API quality could be created, and even guaranteed, by establishing a standard for accessing data that reaches beyond merely the API towards active participation, alignment, and communication of all stakeholders on open data access and exchange. Therefore, it seems to be essential that organizations predetermine and score new systems within the organization based on the standard guidelines set by the platform owner and care organization, increasing the alignment of actors in a continuously changing environment. Although a change towards more open systems is occurring, it still seems difficult for the care organization to create one interoperable standard for accessing data owned by the care organizations. A possible explanation for this phenomenon is the ability to balance the continuum between open and closed elements for complementing interfaces of platform technologies in healthcare (e.g., Tiwana, 2013). Moreover, open data sources in healthcare know some challenges because the data owners should directly connect with re-users of the data to understand their needs. In addition, when using open data sources, persistence, reliability, and accuracy must be guaranteed (Vathana & Audsin, 2013).

A challenge for creating long-term sustainability of the healthcare system by implementing MSPs is the ability to continuously align strategies and adapt the behavior of the actors involved in the MSP (Faggini et al., 2019). This study has predominantly focused on the early phase of implementing MSPs in healthcare. Therefore, the long-term sustainability of the platform within the organization cannot be determined yet. Nevertheless, the adjusted ITIM model predicts a potential increase in complexity and hardship in implementing MSPs as more complementing technologies join the MSP in the long-term. Hence, to establish long-term sustainability, minimal levels of complexity for users and care organizations are necessary to adopt a new MSP. Moreover, based on the adjusted ITIM, managing this complexity and adapting behavior among stakeholders is complicated, but it is assumed to be essential to enhance the healthcare system quality in the long-term. In addition, this study has already shown the importance of the alignment of actors and their adjusting and adapting behavior towards the continuously changing environment of the MSP in the early phase of the implementation. This predominantly focused on two elements: (1) continuous technology advancement (innovation) and (2) the continuous dialogue and alignment with external source systems and their suppliers. Accordingly, to achieve large-scale sustainability in the long-term, it is argued that the alignment of multiple stakeholders (e.g., the care organization, platform owner, key users, and platform complementors) could be expanded in the MSP network by establishing a mutual innovation strategy with a user-centric focus. Accordingly, findings showed that this alignment between the platform and the IT department was rather difficult in the early phase of the implementation and slowed down the process. As a result, this alignment process should be carefully guided by facilitators. However, these assumptions need further testing in the later stages of the implementation.

Accordingly, results show that the continuous improvement of the platform stimulates adoption and vice versa, which is in line with the conceptual model. The early MSP implementation is studied using SmartWork, resulting in a lack of focus on the continuous improvement of the MSP over a longer period of time. Subsequently, it is essential to understand that the technological advancement of the platform could potentially reach an optimum. Findings show that too little innovation reduces adoption. However, too much innovation could increase the complexity of the MSP (e.g., Chambers, 2004), reducing the user experience. Hence, innovation activities should be carefully balanced. Facilitators in the SmartWork implementation successfully achieved this through prioritizing innovations strategically. Although the SmartWork case did not yet show the implications of MSP complexity, this assumption needs further research over a longer period. .

The adjusted ITIM combines technical aspects such as system interoperability and social characteristics such as connecting the customer to the platform and continuously improving the MSP. From a social perspective, this study identified the role of internal organizational actors such as the IT department, and organizational leadership, while the external organizational environment focused on actors such as the platform owner, complementing vendors, and external implementation consultants. To stimulate the adoption and implementation of the MSP technologies with users, clear project management and communication are crucial on the social and technical aspects of the implementation that can be guided by the facilitator through using the adjusted ITIM, aligning internal and external stakeholders. Project management was clearly defined during the SmartWork implementation, although making financial calculations on new developments are difficult due to the large dependency on external organizational stakeholders.

The identified role of key users stipulates the importance of specific user groups with extensive knowledge and the ability to identify problems on the project or workflow of healthcare professionals. This phenomenon is acknowledged in the literature as a stratification of the user community, meaning the distinction between different user groups and their personal views (El Enany et al., 2013; Kujala, 2003). This study has shown that the facilitator takes a central position in selecting the users. Literature shows that unrepresentative involvement of users might occur due to this user selection process. Subsequently, it is important to acknowledge that a power relationship between the facilitating role and the key users exists, creating a possible bias in the selection process of user involvement (El Enany et al., 2013). Nevertheless, the study has shown that key users selected during the implementation of SmartWork provided accurate feedback to improve and identify the workflow of the healthcare professionals. The user experience had a central role during the implementation.

Although the previous aspects show generalizable elements for MSPs in healthcare, some factors need to be considered carefully. Although the conceptual adjusted ITIM can be applied in different care settings for different MSPs, the results show specific outcomes for the case. The case has a dominant focus on caregivers within the organization, indicating that the improved workflow of the caregiver and the ability to continuously adapt the technology to the workflow is the primary driver to adopt and implement the user-centric technology. Platforms with a patient-centered approach shift away from the workflow focus. Therefore, it is essential to understand that the results provide in-depth insight into the case based on a generalizable conceptual model for MSP implementations. The researcher suggests further study into the development of the adjusted ITIM for (1) system interoperability, (2) customer connection, and (3) continuous improvement for MSPs. This can be done in other industries or for newly developed platforms in long-term care facilities to review the implementation process over time. In addition, it is specifically interesting to further study the adjusted model in other long-term care facilities, other economic or regulatory environments, different care specialties (e.g., hospital care, mental healthcare), and different countries.

6.2 Contributions & policy implications

This section discusses the theoretical contributions of this study in section 6.2.1. Next, the practical contributions are discussed in section 6.2.2. Finally, the policy implications are discussed in section 6.2.3.

6.2.1 Theoretical contributions

According to the researchers' knowledge, this study indicates that no previous studies are conducted on MSP implementations in healthcare with a user-centric focus while using an adjusted ITIM for MSPs. First, the study provides a theoretical analysis on long-term care in OECD countries and the Netherlands as the study took place within this context. Second, the study has provided an analysis of the characteristics of MSP technologies in the care industry which can be built upon by future research. Moreover, the study provides the theoretical background on the characteristics of platform technologies healthcare from a socio-technical perspective, such as system interoperability, establishing a critical mass of customers, and continuous MSP improvement, creating an understanding for MSP implementation.

Accordingly, the researcher developed a conceptual model to implement MSPs based on an adjusted ITIM model. The ITIM combines both elements from TAM and IS and has not yet been tested or specified for MSP technologies. The original ITIM is the basis for this study. Each element of the ITIM is clarified and adjusted for three main MSP characteristics in healthcare. The development of the model can support future studies in further developing the adjusted ITIM for MSP technologies. Currently, such research focusing on adjusting the ITIM for MSP technologies has not yet been conducted in healthcare. Hence, the conceptual model helps to understand and improve MSP implementations in healthcare with a focus on improving system interoperability to exchange, use and interpret information on the platform, customer connection to connect users to the platform and sustain this connection, and finally, the continuously changing character of the platform to adapt to the continuously changing environment and user needs and preferences.

6.2.2 Practical contributions

The findings of this study provide key insights for practitioners, which aim to implement MSPs in long-term care facilities. MSP implementations in healhtcare are underdeveloped and underexplored (e.g., Kuziemsky & Vimarlund, 2018; Furstenau et al., 2020 & Furstenau & Auschra, 2016). Therefore, it is important to understand the immutable determinants of the implementation instead of merely measuring the putative implementation mechanisms (e.g., Lewis et al., 2020). Insights on these determinants for implementing MSPs, such as establishing system interoperability, is valuable information for practitioners. The first main insight focuses on creating an industry standard to enhance system interoperability. Building industry standards could align multiple stakeholders involved in the implementation process and solve implementation barriers like the lack of awareness on data ownership of care organizations and the ability of suppliers to aggregate and share data. Consequently, care organizations are often taken hostage by external suppliers providing immature systems. Hence, the communication on industry standards throughout the healthcare system is essential and could be facilitated by the Dutch trade association for healthcare organizations, Actiz, or independent knowledge organizations committed to digital information exchange in healthcare, such as Nictiz. The findings of this study provide a practical guide for practitioners to monitor and evaluate the openness of source systems to stimulate interoperability based on establishing industry standards. Consequently, implementation experts, such as external consultants, can support the search and adoption of care organizations on more open external source systems. So, from a practical perspective, this study has shown that industry managers play a dominant role in facilitating and expanding the knowledge field on system interoperability, stimulating the implementation of MSPs in healthcare, and reducing the fear of care organizations for external technology providers.

Second, to connect healthcare professionals to the platform, it can be beneficial for the implementation trajectory to ensure that users are incentivized to actively shape MSPs and build customer experiences to increase value for all participants and increase flexibility for the organization based on the customer's needs. Managers in leading care organizations should facilitate this change by emphasizing that technology should be an enabler with a customer-centric focus instead of a technological push. Improving the healthcare professionals` workflow is the starting point of the MSP implementation and development strategy. Managers can play a central role in propagating this vision as this is currently underdeveloped in healthcare (e.g., Sindhwani et al., 2019). However, managers should understand that the co-creation process of users for MSP technologies in healthcare should be carefully managed and planned.

Finally, it is key to facilitate continuous improvement of the platform by establishing agile structures within the organization. Therefore, practitioners play a dominant role in building this approach reaching beyond IT innovations towards user-centric approaches. Implementation experts could facilitate this process by adopting a strategy of simultaneously developing and implementing the MSP in collaboration with the care organization. However, managers should be aware that this process is complex and requires intensive change management trajectories that require a shared vision with the platform owner and stakeholders from the care organization (e.g., IT department, management, healthcare professionals).

6.2.3 Policy implications

The Dutch government has shown its ambitions in the technological advancement of the healthcare industry by popularizing digital health solutions and providing a wide array of subsidies (Nederlandse zorgautoriteit, 2020). During the Covid-19 outbreak, the effort to speed up digitalization in healthcare has progressed (Kronenfeld & Penedo, 2021). Although the Covid-19 outbreak has stimulated the implementation of digital solutions like remote care, digital health solutions are currently still progressing very slowly among care professionals in the Netherlands. The Dutch National Institute for Public Health and the Environment (RIVM) provides several reasons for this to happen, such as the failure of implementation trajectories of digital technologies, digital technologies are used by a small group of people or disappear after a while, reducing the success of digital technologies (Schnoor et al., 2020).

This study on the implementation of MSP technologies has shown the importance of communication, alignment, and awareness among multiple actors participating in the Dutch healthcare industry. Interoperability turned out to be of major importance for the care organization to implement digital (platform) technologies. However, the implementation problem reaches even further than interoperability alone. To implement and adopt digital (platform) technologies, it is essential to create awareness and share knowledge to establish enabling digital (platform) technologies for care organizations and care professionals by creating a user-centric focus. Although this study into the implementation of MSPs in long-term care facilities does not cover all emerging technologies, it shows a replicable approach for using and applying the adjusted ITIM within long-term care facilities. In total, three policy recommendations are formulated based on this study.

I. In order to create a broader understanding and awareness around system interoperability, data ownership, data access, and data exchange within the healthcare industry, policymakers should study industry developments. This study has shown that clear and well-formulated data standards are essential for system interoperability in a broad network of stakeholders such as technology vendors, care organizations, and platform owners. Therefore, policies should focus on initiatives that stimulate the creation of industry standards supporting the advancement of system interoperability by providing specific guidelines for technology vendors to build interoperable systems. Accordingly, there is still a lack of high-quality APIs from technology vendors. Subsequently, policymakers should focus on creating more awareness among organizations on data ownership and how data can be accessed “real-time” through quality APIs instead of pdf or zip files. This recommendation is in line with a recent letter to the parliament by the Dutch Ministry of Health, Welfare and Sport (VWS) who have emphasized that within the Dutch healthcare environment, there is a lack of system interoperability, open standards, and willingness to openly share information between organizations (Ministerie van Volksgezondheid Welzijn en Sport, 2020)

II. Second, healthcare organizations aspire to an organization-wide digital transformation. However, this is often far away from reality (Schnoor et al., 2020). This study has pointed out the role of internal marketing campaigns and the usage of key users to stimulate adoption and awareness of the SmartWork technology. However, care organizations often lack the time, knowledge, and resources to train staff and encourage experimentation to increase learning about emerging technologies and how they can be incorporated into the workflow of caregivers (Bremmer, 2019; Cresswell & Sheikh, 2013; Cresswell et al., 2013). The implementation of SmartWork has shown that a possible solution for this could be the informal information sessions provided by leading individuals such as the management board. Moreover, the intuitive platform structure allowed for learning opportunities during routine job tasks that could have broader applications for emerging technologies in healthcare to effectively and efficiently adopt these digital technologies. Therefore, policymakers should focus on developing and stimulating training programs for caregivers on the potential role of digital technologies in their daily workflow. Respectively, policymakers should further study the implications of digital technologies on the quality of healthcare and job satisfaction for caregivers.

III. Finally, each year, more financial resources go to the healthcare industry. However, deploying these financial resources is often complex. Care organizations are incentivized to innovate as they do not have standardized budgets. Hence, healthcare organizations must be economical with real estate and financial resources (Zorgwijzer, 2021). Currently, the innovative character of the care organization itself is leading in the implementation of digital (platform) technologies (e.g., SmartWork), meaning that the care organization is funding the platform itself. However, especially in long-term care facilities, not all organizations possess the capabilities and resources to innovate. Insurers play a central role in incentivizing and stimulating care organizations to innovate (Rutten et al., 2020). Therefore, policies could focus on insurers who should reward digital innovations in care organizations and penalize the lack of digital care in order to establish a minimum level of technology within care organizations. Moreover, policymakers could focus on encouraging insurers and care organizations to collaboratively invest in digital technology to stimulate mutual trust. In addition, insurers can support and guide care organizations with their investments in digital technologies that should pay for themselves in the long run. So, insurers have a major role in the underdeveloped potential to accelerate the digital transformation in healthcare.

6.3 Limitations

This section provides the limitations of this study. The limitations of this study create a contextual background for the choices made in this study, reflecting the results and conclusions.

This study into the implementation of SmartWork is a single case study. Because of the single case study, there is a focus on a specific group of stakeholders, which might change in other cases. The scope of the model on healthcare professionals could limit the generalizability of the created model. However, this study still provides in-depth insights on MSP implementations, but some determinants might have to be interpreted broadly for each case.

Accordingly, when using the adjusted ITIM for MSPs in healthcare, researchers require a flexible attitude when using the model. Some determinants, such as the workflow, know context-specific definitions for various stakeholders. For example, with MSPs focusing on healthcare professionals, the workflow is defined as a reduction in the administrative burden. At the same time, patient-focused platforms could experience the workflow from a care receiver perspective. Similar trends occur in the construct of users, as users can be defined as multiple stakeholders, such as healthcare professionals, patients, or internal departments like HR or IT, depending on the focus of the implementation.

This case study is exploratory in nature with a specific focus on long-term care facilities. Therefore, there are no parallel cases that support or falsify the data regarding the topic of implementing MSPs in long-term care facilities. The lack of prior research on the topic limits the study. For this reason, caution should be applied when performing case studies in specific contexts such as long-term care (Bryman, 2016). Moreover, the study is conducted in one care organization with a leading-edge case study, limiting the findings and experiences of the implementation professionals to other organizations in the Netherlands.

Finally, the research sample is established in collaboration with implementation experts from the vendor, PwC, and the long-term care organization. Some individuals were involved in specific aspects of the adjusted ITIM and specifically focused on these elements (e.g., technical or social aspects). The researcher has aimed to minimize these effects by following the interview guide, creating a complete data sample of the case. Respectively, data is triangulated with eight strategy and company documents. However, this study predominantly focuses on the managers` perspective of the implementation trajectory. Hence, the study is limited from the perspective of users. On the contrary, managers from the care organization work alongside care professionals, representing the vision of healthcare professionals. As a result, there is a limited focus on the direct healthcare professional perspective. Future research could solve this by incorporating more key user perspectives into the sample.

6.4 Further research

This section provides recommendations for further research for the implementation of MSP technologies in the long-term care industry.

First of all, the sample size of this study focuses on creating a complete case sample with key individuals involved in the implementation process of SmartWork. This study focuses on the implementation of SmartWork within the context of the internal environment of the care organization. The role of external actors is partly taken into account, including external implementation experts and the platform owner in the sample. These actors played a key role during the internal implementation of SmartWork. From an ecosystem perspective, the researcher recommends further research into the adjusted ITIM and the role of platform complementors to establish a broader perspective that reaches beyond merely the internal organizational implementation of MSP technologies towards an ecosystem approach of collaborating care organizations and suppliers.

Second, this study found that the platform owner established an industry data standard for care organizations based on a three-star ranking. According to the researcher's knowledge, this process is new due to a lack of data industry standards on accessing data by owners (e.g., care organizations or individuals). Therefore, the researcher challenges other researchers to study how standards are shaped by private parties in the industry and shared among other care organizations and complementing technology suppliers. This is currently lacking in the field of implementation sciences focusing on healthcare and could have serious implications on the implementation and development of MSP technologies in healthcare.

Third, this study takes place in a long-term care facility in the Netherlands. As the SmartWork technology is currently expanding towards other healthcare domains, the researcher would suggest creating a bigger sample and triangulate multiple cases. Moreover, this study suggests applying the model for newly developed MSPs in healthcare with a customer-centric focus to validate and adapt the conceptual ITIM.

Fourth, during this study, the role and tasks of managers are identified within the construct of the facilitator. The facilitator role takes a central position during the implementation. However, this study is limited by incorporating different management styles (e.g., Merchant & Merchant, 2004). As a result, the researcher suggests studying the influence of different management styles during the implementation of MSPs in healthcare.

Fifth, this study has adopted an in-depth qualitative approach creating a deeper understanding of the implementation trajectory of SmartWork. In order to validate the results, a quantitative approach can be adopted by testing the results found in this study (Papachristos & van de Kaa, 2018; Papachristos, 2020). The researcher suggests studying the interaction and involvement of different roles (e.g., users) in MSPs during the implementation and development phase using big data. Big data provides a broader and more generalizable perspective on different network effects between stakeholders.

Finally, the results and conclusions show a new approach to co-creation on platform technologies in healthcare. This MSP approach has changed where users are incentivized to actively participate and collaboratively build the SmartWork platform to increase the caregivers' workflow. This phenomenon shows new opportunities for value-based healthcare. Therefore, the researcher challenges future researchers to study the phenomenon of co-created MSPs in healthcare by providing incentives for caregivers and patients to innovate and collaboratively build the platform. Respectively, cultural elements and demographics come into play as various individual perspectives are involved in the innovation process. Furthermore, the incentives for users to actively participate in MSPs might have broad industry implications by increasing the adoption of MSP technologies in healthcare. Finally, the extension towards different social-cultural environments could raise the awareness of the positive impact of MSPs in healthcare.

References

Abdelkafi, N., Raasch, C., Roth, A., & Srinivasan, R. (2019). Multi-sided platforms.

Ahli, S. (2019). Zorgkantoren missen kennis van technologische innovaties. *Skipr*. Retrieved on May 20th, 2021 from: https://www.skipr.nl/nieuws/zorgkantoren-missen-kennis-van-technologische-innovaties/

Van Alstyne, M. W., Parker, G. G., & Choudary, S. P. (2016). Pipelines, platforms, and the new rules of strategy. *Harvard business review*, *94*(4), 54-62.

Anderson Jr, E. G., Parker, G. G., & Tan, B. (2014). Platform performance investment in the presence of network externalities. *Information Systems Research,* 25(1), 152-172.

Ash, J. S., Sittig, D. F., Poon, E. G., Guappone, K., Campbell, E., & Dykstra, R. H. (2007). The extent and importance of unintended consequences related to computerized provider order entry. *Journal of the American Medical Informatics Association*, *14*(4), 415-423.

Azarm-Daigle, M., Kuziemsky, C., & Peyton, L. (2015). A review of cross organizational healthcare data sharing. *Procedia Computer Science*, *63*, 425-432.

Baldwin, C. Y., Clark, K. B., & Clark, K. B. (2000). *Design rules: The power of modularity* (Vol. 1). MIT press.

Baldwin, C. Y., & Clark, K. B. (2006). The architecture of participation: Does code architecture mitigate free riding in the open source development model?. *Management science,* 52(7), 1116-1127.

Begoyan, A. (2007). An overview of interoperability standards for electronic health records. *USA: society for design and process science*.

Bemelmans, R., Gelderblom, G. J., Jonker, P., & De Witte, L. (2012). Socially assistive robots in elderly care: a systematic review into effects and effectiveness. *Journal of the American Medical Directors Association*, *13*(2), 114-120.

Benington, J. (2011). From private choice to public value. *Public value: Theory and practice*, 31-51.

Birken, S., Clary, A., Tabriz, A. A., Turner, K., Meza, R., Zizzi, A., ... & Charns, M. (2018). Middle managers' role in implementing evidence-based practices in healthcare: a systematic review. *Implementation Science, 13*(1), 1-14.

Birnholtz, J. P., & Bietz, M. J. (2003, November). Data at work: supporting sharing in science and engineering. In *Proceedings of the 2003 international ACM SIGGROUP conference on Supporting group work* (pp. 339-348).

Botti, A., & Monda, A. (2020). Sustainable value co-creation and digital health: The case of trentino eHealth ecosystem. *Sustainability*, *12*(13), 5263.

Boudreau, K. (2010). Open platform strategies and innovation: Granting access vs. devolving control. *Management science, 56*(10), 1849-1872.

Bremmers, S. (2019). 'Zorgtechnologie staat te vaak in de kast'. Retrieved on June 5th, 2021 from: https://www.zorgvisie.nl/zorgtechnologie-staat-te-vaak-in-de-kast/

Bryman, A. (2016). *Social research methods*. Oxford university press.

Buckingham, D. (2010). Defining digital literacy. *In Medienbildung in neuen Kulturräumen* (pp. 59-71). VS Verlag für Sozialwissenschaften.

Busse, R., Klazinga, N., Panteli, D., Quentin, W., & World Health Organization. (2019). *Improving healthcare quality in Europe: characteristics, effectiveness and implementation of different strategies.* World Health Organization. Regional Office for Europe.

Carayon, P., Karsh, B. T., Cartmill, R., Hoonakker, P., Hundt, A. S., Krueger, D., ... & Ollila, M. (2010). Incorporating health IT into workflow redesign: Request for information summary report. *AHRQ publication*, (10-0074), 105.

CBS (n.d.). Arbeidsmarkt zorg en welzijn. *Centraal Bureau voor de Statistiek.* Retrieved on March 10th, 2021 from: https://www.cbs.nl/nl-nl/dossier/arbeidsmarkt-zorg-en-welzijn

Chambers, C. (2004). Technological advancement, learning, and the adoption of new technology. *European Journal of Operational Research, 152*(1), 226-247.

Craddock, E. (1993). Developing the facilitator role in the clinical area. *Nurse Education Today, 13*(3), 217-224.

Cresswell, K., & Sheikh, A. (2013). Organizational issues in the implementation and adoption of health information technology innovations: an interpretative review. *International journal of medical informatics*, *82*(5), e73-e86.

Cresswell, K. M., Bates, D. W., & Sheikh, A. (2013). Ten key considerations for the successful implementation and adoption of large-scale health information technology. *Journal of the American Medical Informatics Association*, *20*(e1), e9-e13.

Cusumano, M. A., & Gawer, A. (2002). The elements of platform leadership. *MIT Sloan management review*, *43*(3), 51.

Dacin, P. A., Dacin, M. T., & Matear, M. (2010). Social entrepreneurship: Why we don't need a new theory and how we move forward from here. *Academy of management perspectives*, *24*(3), 37-57.

Desai, S. (2016). *The role of interoperability in hospital digitization: network effects and information blocking*. Working paper, Harvard Medical School, 2016, http://scholar. harvard. edu/files/desai/files/InteroperabilityWP_Desai. pdf Google Scholar.

Dhagarra, D., Goswami, M., & Kumar, G. (2020). Impact of trust and privacy concerns on technology acceptance in healthcare: an Indian perspective. *International journal of medical informatics*, *141*, 104164.

Diamond, C. C., & Shirky, C. (2008). Health Information Technology: A Few Years Of Magical Thinking? Technology and standards alone will not lead to health IT adoption, let alone transform health care. *Health Affairs*, *27*(Suppl1), w383-w390.

Dugstad, J., Eide, T., Nilsen, E. R., & Eide, H. (2019). Towards successful digital transformation through co-creation: a longitudinal study of a four-year implementation of digital monitoring technology in residential care for persons with dementia. *BMC health services research*, *19*(1), 1-17.

Eaton, B., Elaluf-Calderwood, S., Sørensen, C., & Yoo, Y. (2015). Distributed tuning of boundary resources. *MIS quarterly*, 39(1), 217-244.

Economides, N., & Katsamakas, E. (2006). Two-sided competition of proprietary vs. open source technology platforms and the implications for the software industry. *Management science,* 52(7), 1057-1071.

Eisenmann, T. R., Parker, G., & Van Alstyne, M. (2009). Opening platforms: how, when and why?. *Platforms, markets and innovation,* 6, 131-162.

El Enany, N., Currie, G., & Lockett, A. (2013). A paradox in healthcare service development: professionalization of service users. *Social science & medicine,* 80, 24-30.

European Commission (2018).The Right to Data Portability in the GDPR: Toward User-centric Interoperability of Digital Services. Retrieved on March 18th, 2021 from: https://ec.europa.eu/jrc/en/publication/right-data-portability-gdpr-toward-user-centric-interoperability-digital-services

Evans, D. S., & Schmalensee, R. (2016). *Matchmakers: The new economics of multisided platforms.* Harvard Business Review Press.

EY. (2020). Barometer Nederlandse Gezondheidszorg 2020. Retrieved on June 1st, 2021 from: https://assets.ey.com/content/dam/ey-sites/ey-com/nl_nl/topics/health/barometer-zorg/2020/ey-barometer-nederlandse-gezondheidszorg-2020.pdf

Faggini, M., Cosimato, S., Nota, F. D., & Nota, G. (2019). Pursuing Sustainability for Healthcare through Digital Platforms. *Sustainability*, *11*(1), 165.

Feeley, T. W., Landman, Z., & Porter, M. E. (2020). The Agenda for the Next Generation of HealthCare Information Technology. *NEJM Catalyst,1*(3), 1–26. doi: 10.1056/cat.20.0132

Faulkner, N., & Kaufman, S. (2018). Avoiding theoretical stagnation: A systematic review and framework for measuring public value. *Australian Journal of Public Administration*, *77*(1), 69-86.

Furstenau, D., & Auschra, C. (2016). Open digital platforms in health care: Implementation and scaling strategies.

Fürstenau, D., Auschra, C., & Klein, S. (2020). A Configuration Approach to Multi-Sided Platforms in Healthcare: An ALS Platform Case. In *ICIS*.

Fürstenau, D., Klein, S., Vogel, A., & Auschra, C. (2021). Multi-sided platform and data-driven care research. *Electronic Markets,* 1-18.

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.

Gawer, A., & Cusumano, M. A. (2014). Industry platforms and ecosystem innovation. *Journal of product innovation management*, *31*(3), 417-433.

Gawer, A., & Cusumano, M. A. (2015). Platform leaders. *MIT Sloan management review,* 68-75.

Graham, I. D., & Logan, J. (2004). Translating research-innovations in knowledge transfer and continuity of care. *Canadian Journal of Nursing Research Archive*, 89-104.

Greenhalgh, T., Wherton, J., Papoutsi, C., Lynch, J., Hughes, G., Hinder, S., ... & Shaw, S. (2017). Beyond adoption: a new framework for theorizing and evaluating nonadoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. *Journal of medical Internet research*, *19*(11), e367.

Hagiu, A., & Wright, J. (2015). Multi-sided platforms. *International Journal of Industrial Organization,* 43, 162-174.

Haseltine, W. (201). Aging Populations Will Challenge Healthcare Systems All Over The World. *Forbes.* Retrieved on February 12th, 2021 from: https://www.forbes.com/sites/williamhaseltine/2018/04/02/aging-populations-will-challenge-healthcare-systems-all-over-the-world/

Herman, H., Grobbelaar, S. S., & Pistorius, C. (2020). The design and development of technology platforms in a developing country healthcare context from an ecosystem perspective. *BMC medical informatics and decision making, 20*(1), 1-24.

Holden, R. J., Boustani, M. A., & Azar, J. (2021). Agile innovation to transform healthcare: Innovating in complex adaptive systems is an everyday process, not a light bulb event. B*MJ Innovations, 7*(2).

Holmgren, A. J., Patel, V., & Adler-Milstein, J. (2017). Progress in interoperability: measuring US hospitals' engagement in sharing patient data. *Health Affairs, 36*(10), 1820-1827.

Huckman, R., and Uppaluru, M. (2015). "The Untapped Potential of Health Care APIs," *Harvard Business Review* (93:12), pp. 1–7.

Hysong, S. J. (2009). Meta-analysis: audit & feedback features impact effectiveness on care quality. *Medical care, 47*(3), 356.

Jacobs, F. (2016). Is toekomst ict-toekomst in de zorg regionaal. Smarthealth. Retrieved on May 23rd, 2021 from: https://smarthealth.live/2016/02/04/vitalhealth-de-ict-toekomst-is-aan-de-regio/

Kim, J., & Yoo, J. (2019). Platform growth model: The four stages of growth model. *Sustainability, 11*(20), 5562.

King, N. (2004). Using templates in the thematic analysis of text. In: *Casell, C., & Symog, G. (Eds.) Essential Guide to Qualitative Methods in Organizational Research.* Sage, pp. 256-270.

Krau, S. D. (2015). Technology in nursing: the mandate for new implementation and adoption approaches. *Nursing Clinics,* 50(2), xi-xii.

Kraus, S., Schiavone, F., Pluzhnikova, A., & Invernizzi, A. C. (2021). Digital transformation in healthcare: Analyzing the current state-of-research. *Journal of Business Research, 123*, 557-567.

Kujala, S. (2003). User involvement: a review of the benefits and challenges. *Behaviour & information technology,* 22(1), 1-16.

Kuziemsky, C. E., & Vimarlund, V. (2018). Multi-Sided Markets for Transforming Healthcare Service Delivery. In *MIE* (pp. 626-630).

Kowalczuk, K., Krajewska-Kułak, E., & Sobolewski, M. (2020). Working excessively and burnout among nurses in the context of sick leaves. *Frontiers in psychology, 11*, 285.

Kronenfeld, J. P., & Penedo, F. J. (2021). Novel Coronavirus (COVID-19): telemedicine and remote care delivery in a time of medical crisis, implementation, and challenges. T*ranslational behavioral medicine, 11*(2), 659-663.

Lewis, C. C., Boyd, M. R., Walsh-Bailey, C., Lyon, A. R., Beidas, R., Mittman, B., ... & Chambers, D. A. (2020). A systematic review of empirical studies examining mechanisms of implementation in health. *Implementation Science, 15*, 1-25.

Leung, L. (2015). Validity, reliability, and generalizability in qualitative research. Journal of family medicine and primary care, 4(3), 324.

Logue, D., & Grimes, M. (2019). Platforms for the people: Enabling civic crowdfunding through the cultivation of institutional infrastructure. *Strategic Management Journal*.

Meynhardt, T. (2009). Public Value Inside: What is Public Value Creation? *International Journal of Public Administration, 32* (3-4), 192-219.

Merchant, J. E., & Merchant, S. (2004). Management Styles And Cultural Differences: Bridging The Productivity Gap In The Implementation Of Information Technology. Int*ernational Business & Economics Research Journal (IBER), 3(2).*

Ministerie van Volksgezondheid Welzijn en Sport (2020). Open standaarden en ICT-markt in de zorg. *Rijksoverheid*. Retrieved on June 5th, 2021 from: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/kamerstukken/2020/12/15/kamerbrief-over-open-standaarden-en-ict-markt-in-de-zorg/Kamerbrief+over+open+standaarden+en+ICT-markt+in+de+zorg.pdf

Ministerie van Volksgezondheid Welzijn en Sport (2018). Actieprogramma werken in de zorg. *Rijksoverheid*. Retrieved on March 14th, 2021 from: https://www.rijksoverheid.nl/binaries/rijksoverheid/documenten/jaarplannen/2018/03/14/actieprogramma-werken-in-de-zorg/Actieprogramma-Werken-in-de-Zorg.pdf

Moon, M. D. (2019). Triangulation: A method to increase validity, reliability, and legitimation in clinical research. *Journal of Emergency Nursing*, *45*(1), 103-105.

Moore, J. E., Mascarenhas, A., Bain, J., & Straus, S. E. (2017). Developing a comprehensive definition of sustainability. *Implementation Science*, *12*(1), 1-8.

Navidi, Z., Nagel, K., & Winter, S. (2020). Toward identifying the critical mass in spatial two-sided markets. *Environment and Planning B: Urban Analytics and City Science, 47*(9), 1704-1724.

Nederlandse zorgautoriteit (2020). Wegwijzer bekostiging digitale zorg. Retrieved on May 22nd, 2021 from: https://puc.overheid.nl/nza/doc/PUC_316224_22/1/

OECD (2019). Ageing and long-term care. Retrieved on February 10th, 2021 from: https://www.oecd.org/els/health-systems/long-term-care.htm

OECD (2017) Health at a glance: Long-term care expenditure. Retrieved on February 10th, 2021 from: https://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2017/long-term-care-expenditure_health_glance-2017-81-en;jsessionid=ABUD9XE2pyIkK64RvXghseIh.ip-10-240-5-51

OECD (2020a). Public funding of healthcare. Retrieved on March 8th, 2021 from: https://www.oecd.org/health/Public-funding-of-health-care-Brief-2020.pdf

OECD (2020b). Spending on long-term care. Retrieved on March 8th, 2021 from: https://www.oecd.org/health/health-systems/Spending-on-long-term-care-Brief-November-2020.pdf

Palumbo, R. (2017). *The bright side and the dark side of patient empowerment: Co-creation and co-destruction of value in the healthcare environment*. Springer.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and policy in mental health and mental health services research, 42*(5), 533-544.

Papachristos, G. (2020). Platform competition: A research outline for modelling and simulation research. *Journal of Engineering and Technology Management, 56,* 101567.

Papachristos, G., & Van de Kaa, G. (2018). Understanding platform competition through simulation: a research outline. *Technology Analysis & Strategic Management, 30*(12), 1409-1421.

Parker, G., & Alstyne, M. V. (2008). Managing platform ecosystems. *ICIS 2008 Proceedings*, 53.

Parker, G., & Van Alstyne, M. (2012). A digital postal platform: Definitions and a roadmap. *MIT Center for Digital Business, Working Paper*.

Parker, G., Van Alstyne, M. W., & Jiang, X. (2016). Platform ecosystems: How developers invert the firm. *Boston University Questrom School of Business Research Paper*, (2861574).

Pine, K. H. (2019). The qualculative dimension of healthcare data interoperability. *Health informatics journal*, *25*(3), 536-548.

Pirnejad, H., Niazkhani, Z., van der Sijs, H., Berg, M., & Bal, R. (2008). Impact of a computerized physician order entry system on nurse–physician collaboration in the medication process. *International journal of medical informatics, 77*(11), 735-744.

PwC (2018). De toekomst van werk 2030. PricewaterhouseCoopers. Retrieved on January 22nd from: https://www.pwc.nl/nl/dienstverlening/people-and-organisation/documents/pwc-future-of-work-2030.pdf

Raivio, Y., & Luukkainen, S. (2011). Mobile networks as a two-sided platform-case. Open Telco. *Journal of theoretical and applied electronic commerce research*, *6*(2), 77-89.

Riege, A. M. (2003). Validity and reliability tests in case study research: a literature review with “hands‐on” applications for each research phase. *Qualitative market research: An international journal.*

Rogers, E. M. (2003). *Diffusion of innovations.* New York: Free Press.

Rogers, L., De Brún, A., & McAuliffe, E. (2020). Developm*ent of an integrative coding framework for evaluating context within implementation science. BMC Medical Research Methodology, 20*(1), 1-14.

Røtnes, R., & Dybvik Staalesen, P. (2010). New methods for user driven innovation in the health care sector.

Rowley, J. (2002). Using case studies in research. *Management research news.*

Rutten, P., Pruim, J., van Zijl, N., & Merckelbach, S. (2020). Digitale zorg in Nederland. *McKinsey*. Retrieved on June 15th, 2021 from: https://www.mckinsey.com/nl/our-insights/digitale-zorg-in-nederland

Rycroft-Malone, J. (2004). The PARIHS framework—a framework for guiding the implementation of evidence-based practice. *Journal of nursing care quality, 19*(4), 297-304

Saebi, T., Foss, N. J., & Linder, S. (2019). Social entrepreneurship research: Past achievements and future promises. *Journal of Management*, *45*(1), 70-95.

Sahin, I. (2006). Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory. *Turkish Online Journal of Educational Technology-TOJET*, *5*(2), 14-23

Saviano, M., Barile, S., Spohrer, J. C., & Caputo, F. (2017). A service research contribution to the global challenge of sustainability. *Journal of Service Theory and Practice*.

Saunders, M., Lewis, P., & Thornhill, A.. (2007). Research methods. *Business Students 4th edition Pearson Education Limited, England.*

Scheffler, R. M., & Arnold, D. R. (2019). Projecting shortages and surpluses of doctors and nurses in the OECD: what looms ahead. *Health Economics, Policy and Law, 14*(2), 274-290.

Schoville, R. R., & Titler, M. G. (2015). Guiding healthcare technology implementation: a new integrated technology implementation model. *CIN: Computers, Informatics, Nursing*, *33*(3), 99-107.

Schnoor, K., Wouters, M. J. M., Ossendorp, B. C., Hoogerhuis, P. M., & Suijkerbuijk, A. W. M. (2020). Verkenning e-healthmonitor: de digitale transitie in de zorg in beeld.

Service Heroes (n.d.). De Service Highway faciliteert SmartWork voor medewerkers binnen uw organisatie. Retrieved on February 20th, 2021 from: https://www.serviceheroes.com/#page2

Simon, H. A. (2002). Near decomposability and the speed of evolution. I*ndustrial and corporate change, 11*(3), 587-599.

Sindhwani, R., Singh, P. L., Prajapati, D. K., Iqbal, A., Phanden, R. K., & Malhotra, V. (2019). Agile system in health care: Literature review. *Advances in industrial and production engineering*, 643-652.

Sociaal Economische Raad (2020). SER-verkenning Zorg voor de toekomst. *SER* Retrieved on February 2nd, 2021 from: https://www.ser.nl/nl/Publicaties/zorg-voor-de-toekomst

Stanford Medicine (2018). The Democratization of Health Care. *Stanford Medicine.* Retrieved on March 22nd, 2021 from: https://med.stanford.edu/content/dam/sm/school/documents/Health-Trends-Report/Stanford_Medicine_Health_Trends_Report_2018_FINAL.pdf

Tåg, J. (2008). Open versus closed platforms.

Taherdoost, H. (2016). Sampling methods in research methodology; how to choose a sampling technique for research. *How to Choose a Sampling Technique for Research (April 10, 2016).*

Tidd, J., & Bessant, J. R. (2020). *Managing innovation: integrating technological, market and organizational change.* John Wiley & Sons.

Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Research commentary—Digital infrastructures: The missing IS research agenda. *Information systems research, 21*(4), 748-759.

Tiwana, A., Konsynski, B., & Bush, A. A. (2010). Research commentary—Platform evolution: Coevolution of platform architecture, governance, and environmental dynamics. I*nformation systems research, 21*(4), 675-687.

Tiwana, A. (2013). *Platform ecosystems: Aligning architecture, governance, and strategy.* Newnes.

United Nations (2017). World population ageing. Retrieved on February 14th, 2021 from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WPA2017_Highlights.pdf

UWV (2020) Zorg: Factsheet Arbeidsmarkt. Retrieved on February 3rd, 2021 from: https://www.uwv.nl/overuwv/Images/factsheet-arbeidsmarkt-zorg-maart2020.pdf

Vathana, A., & Audsin, D. P. (2013). An Open Analysis on Open Data. *World Wide Web Consortium.*

Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management science, 46*(2), 186-204.

Vilans (2018). Inspiratiebox technologie in de langdurige zorg. Retrieved on May 20th 2021 from: https://www.vilans.nl/vilans/media/documents/producten/inspiratiebox-technologie-in-de-langdurende-zorg.pdf

Wadell, C. J., Ölundh Sandström, G., Janhager, J., & Norell Bergendahl, M. (2010). EARLY STAGES USER INVOLVEMENT AS A PRODUCT INNOVATION CAPABILITY IN THE MEDICAL TECHNOLOGY INDUSTRY-A LITERATURE STUDY. In *DS 60: Proceedings of DESIGN 2010, the 11th International Design Conference, Dubrovnik, Croatia.*

West, J. (2003). How open is open enough?: Melding proprietary and open source platform strategies. *Research policy*, *32*(7), 1259-1285.

WHO (2018). Ageing and Health. *WHO* Retrieved on February 11th, 2021 from: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health

WHO (2015). Older people and Primary Health Care. *WHO*. Retrieved on February 10th, 2021 from: https://www.who.int/ageing/primary_health_care/e

Wohed, P., van der Aalst, W. M., Dumas, M., ter Hofstede, A. H., & Russell, N. (2005). Pattern-based Analysis of BPMN.

Yin, R. K. (2018). *Case study research and applications: Design and methods.* Sage.

Yin, R. K. (2003). Designing case studies. *Qualitative Research Methods, 5,* 359-386.

Zayas-Cabán, T., & White, P. J. (2020). The national health information technology human factors and ergonomics agenda. *Applied ergonomics, 86*, 103109.

Zenooz, A.M. Fox, J (2019). How New Health Care Platforms Will Improve Patient Care. *Harvard Business Review10*(1), 1–8. Retrieved on March 20th, 2021: https://hbr.org/2019/10/how-new-health-care-platforms-will-improve-patient-care

Zorginstituut Nederland (n.d.). Wlz-algemeen: Hoe werkt de Wet langdurige zorg? Retrieved on January 30th, 2021 from: https://www.zorginstituutnederland.nl/Verzekerde+zorg/wlz-algemeen-hoe-werkt-de-wet-langdurige-zorg

Zorgwijzer (2021). 7 misvattingen over ons zorgstelsel. Retrieved on June 10th, 2021 from: https://www.zorgwijzer.nl/zorgverzekering-2021/7-misvattingen-over-ons-zorgstelsel

Zorgwijzer (n.d.). Wet langdurige zorg (Wlz). Retrieved on May 20th, 2021 from: https://www.zorgwijzer.nl/faq/wlz

Appendices

The following section provides the appendices for this study.

Appendix 1: Informed consent form

This section provides the informed consent form for this study. The informed consent form is in Dutch as the interviews took place in the context of the Netherlands.

Informed consent form:

Dit onderzoek focust zich op de grootschalige implementatie van multi-sided platforms in de context van de langdurige zorg in Nederland. Om inzichten te krijgen in de implementatie van multi-sided platforms wordt middels een case study onderzoek gedaan naar de baanbrekende SmartWork technologie. Om inzicht te krijgen over de grootschalige implementatie van multi-sided platforms worden er vragen gesteld over de implementatie van SmartWork binnen [Organisatie X] over drie thema`s:

- De uitwisseling van data, modulaire systemen en de rol van open data en APIs
- Het connecten van de klant en gebruiker met het SmartWork platform
- Het continu ontwikkelen en innoveren op het SmartWork platform

Vragen over deze thema`s worden geformuleerd in een semigestructureerd interview. De interviews zullen worden opgenomen en getranscribeerd in tekst. Alle data wordt geanonimiseerd om uw privacy te waarborgen in het onderzoeksverslag. Persoonlijke data wordt niet beschikbaar gesteld op de persoonlijke informatie van de onderzoeker na. Na afronding van dit onderzoek wordt de master thesis gepubliceerd in de TU/e database. Het verslag geeft geen toegang tot de ruwe interview data die u beschikbaar stelt voor dit onderzoek. Na afronding van het onderzoek zal het verslag met u worden gedeeld.

Voor meer informatie of opmerkingen kunt u contact opnemen via m.v.mes@student.tue.nl of via LinkedIn

Appendix 2: Questionnaire adjusted ITIM

This section provides the interview guide based on the adjusted ITIM for the implementation of MSPs in long-term care facilities. The questionnaire is provided in Dutch as the interviews took place in the Netherlands.

Introduction

Mijn naam is Martijn Mes en ik loop momenteel stage bij PwC. Bij PwC doe ik een onderzoek naar de implementatie van multi-sided platforms in de zorg voor mijn studie technische innovatiewetenschappen aan de TU Eindhoven. Multi-sided platforms in de zorg hebben de eigenschap om verschillende groepen stakeholders en technologieën bij elkaar te brengen. Om deze reden doe ik een onderzoek naar de grootschalige implementatie van SmartWork binnen [Organisatie X] om medewerkers te ondersteunen in hun dagelijkse bezigheden als case voor een multi sided platform in de zorg. Ik ga u een aantal vragen stellen rondom drie thema`s. Ik zou dit interview graag willen opnemen. Uw data wordt zorgvuldig geanonimiseerd en na dit onderzoek verwijderd. De volgende thema's zullen besproken worden

1. De uitwisseling van data, modulaire systemen en de rol van open data en api`s
2. Het connecten van de klant met het SmartWork platform
3. Het continu ontwikkelen en innoveren op het SmartWork platform

Personal information:

1. Leeftijd,
2. Functie,
3. Rol binnen de SmartWork implementatie,
4. Ervaring in de zorg,
5. Ervaring met platformen en digitale zorg

Het interview kent een semi-gestructureerde vorm. Voorafgaand aan het stellen van de vragen en tijdens het stellen van de vragen zullen de concepten worden uitgelegd aan de respondenten. De vragen en concepten zijn naar het Nederlands vertaald. Bij de start van het interview wordt een korte introductie geven over het onderzoek en de achtergrond van de onderzoeker. Daarna worden gevraagd naar de achtergrond van de respondent en zijn/haar ervaring met het SmartWork platform. De persoonlijke informatie wordt niet opgenomen in het transcript. De eerste reeks vragen heeft betrekking op technische concepten en zullen niet aan de managers, teamleiders en begeleiders worden voorgelegd.

Topic 1: Platform interoperability

Openingsvraag: Wat is uw ervaring op het gebied van datatoegang en data uitwisseling voor de implementatie van SmartWork binnen [Organisatie X]. Wat zijn de grootste barrières en drijfveren voor het uitwisselen van data op het platform?

1. *Organisatiestructuren*: Wat is de rol van organisatorische structuren op het uitwisselen van data?
    a. Welke prikkels zijn er voor samenwerking binnen de organisatie?
    b. Hoe werk je samen aan datatoegang en beschikbaarheid? (Informatie blocking?)
    c. Hoe beïnvloedt dit de interoperabiliteit van systemen?
2. *Modulaire architecturen*: In hoeverre zijn interfaces op het platform onafhankelijk en hoe beïnvloedt dit de implementatie van het platform?
    a. Wat is de rol van externe interfaces op het platform en wat is hun machtspositie?
    b. Welke interfaces moeten interacteren?
        i. Hoe ontsluit je de bronnen en waar loop je tegenaan?
    c. Hoe ga je om het verschil in vraag naar gegevenstoegang vanuit de zorgaanbieder en het SmartWork-platform?
        i. Wie is er verantwoordelijk?
        ii. Hoe organiseren jullie dit?
    d. Wat is de rol van open data in het SmartWork-platform?
        i. Hoe zou u open data definiëren?
    e. Hoe gebruiken jullie API`s?
        i. Hoe beinvloeden API`s het implementatieprocess?
        ii. Moeten jullie vaak om API`s heen werken, omdat informatie geblokkeerd wordt?
        iii. In hoeverre gebruiken jullie open API`s?
        iv. Hoe beïnvloeden gesloten API`s de interoperability en implementatie van SmartWork?
        v. Hoe open zijn deze API`s en hoe beïnvloeden ze de de interoperability en implementatie van SmartWork?
3. *Data standaarden*: Wat is de rol van data standaarden op de implementatie van SmartWork?
    a. Wat is de rol van data standaarden op de implementatie van SmartWork?
    b. Hoe anticiperen jullie op veranderingen in externe systemen, zoals gesloten zorgsystemen (e.g., plancare)?
    c. Wat is de rol van privacy voor het gebruik van data en het uitwisselen van data?
        i. Hoe beïnvloedt dit de implementatie van SmartWork
4. *Externe data ontvangen en verzenden:* Hoe gaan jullie om met het verzenden en ontvangen van data en hoe beïnvloedt dit de implementatie van SmartWork?
    a. Hoe gaan jullie om met vijandige IT-systemen?
    b. Kunnen jullie altijd alle externe data gebruiken? (Wanneer wel en wanneer niet?)
    c. Wat is de rol van gesloten en open systemen op de integratie van externe bronnen?
5. *Data integration:* Hoe integreren jullie externe data en waar lopen jullie tegenaan?
    a. Welke data hebben jullie nodig?
        i. Lukt het altijd om dit te krijgen binnen de juiste termijn?
    b. Welke data hebben jullie?
    c. Welke data begrijpen jullie niet en waarom?
    d. Van wie is de data

    e. Wie moet de data verstrekken?
    f. Hoe wordt de data voor het SmartWork platform geleverd?
6. *Financiering:* hoe wordt de uitwisseling van gegevens gefinancierd?
    a. Wie financiert de volgende update van het platform?

Topic 2: Connecting the customer

Opening: Wat ervaren jullie als de eindgebruiker wordt aangesloten op het SmartWork platform?

1. *Stakeholder connectie:* Hoe wordt de gebruiker op het platform aangesloten?
    a. Wat gaat er momenteel goed in dit proces en wat kan beter?
        i. Hoe kunnen we dit verbeteren?
        ii. Waarom beïnvloeden x, y, z het connecten van de eindgebruiker?
    b. Hoe beïnvloedt dit de zorgorganisatie?
    c. Zijn er verschillende benaderingen in de organisatie om de eindgebruiker op het platform aan te sluiten?
    d. Wat is de rol van de eindgebruiker in het implementatieprocess?
        i. Hoe beïnvloeden de persoonlijke eigenschappen van de eindgebruiker de implementatie?
        ii. Hoe ga je hiermee om?
    e. Hoe beïnvloedt de eindgebruiker het platform?
2. *Werkprocess*: Hoe sluit de technologie aan bij het werkprocess van de eindgebruiker?
    a. Wat gaat hierin goed en wat gaat hierin slecht?
    b. Wat is de rol van het werkprocess in de implementatie van SmartWork?
    c. Hoe verandert het werkprocess en hoe gaan gebruikers hier mee om?
    d. Hoe wordt deze verandering gemanaged?
3. *Interfaces*: Wat is de rol van externe interfaces op het platform voor de gebruiker?
4. *Faciliterende rol/projectleider:* Wat is de rol van de projectleider tijdens het implementatieprocess van SmartWork?
    a. Wie is de projectleider en waarom?
    b. Hoe moet deze rol eruit komen te zien?
    c. Wat is de rol van de projectleider in het definiëren van de gebruikersbehoeftes?
    d. Wat is de rol van het management en de projectleider tijdens de implementatie?
    e. Zijn de juiste stakeholders betrokken door de projectleider?
    f. *Communicatie:* Hoe wordt er gecommuniceerd met de eindgebruiker tijdens voor en na de implementatie van SmartWork?
        i. Wat gaat hierin goed en wat gaat hierin slecht?
        ii. Wat is de rol van de projectleider in de communicatie?
        iii. Hoe communiceren jullie over vernieuwingen op het platform?
        iv. Welke vormen van communicatie werken wel en wat werkt niet?
        v. Over welke onderwerpen moet het meest duidelijk worden gecommuniceerd?

Topic 3. Continuous improvement

Opening: Hoe zie jij het SmartWork platform voor je in de toekomst?

1. *Evolueren en innoveren:* Hoe wordt het platform continu geïnnoveerd?
    a. Hoe ziet dit innovatieprocess eruit in de toekomst?
    b. Welke barrieres en drivers ervaar je tijdens dit innovatieprocess?
    c. Stopt de innovatie als het project binnen de [Organisatie] over is?
    d. Wie innoveert het platform en hoe wordt dit gefinancierd?
    e. Waar komt de kennis voor innovatie vandaan? (Gebruiker, consultant?)
    f. Hoe zorg je dat het SmartWork platform dynamisch blijft?
    g. Waar komt de kennis voor het implementeren van nieuwe features vandaan?
    h. Hoe worden deze features geprioriteerd?
2. *Feedback cyclus:* Wat is de rol van de eindgebruiker op het SmartWork platform kijkend naar innovatie?
    a. Hoe worden gebruikers betrokken bij de implementatie?
    b. Wat is de rol van feedback tijdens, voor en na het implementatietraject?
    c. Hoe wordt feedback geprioriteerd en verwerkt in het platform?
3. *Publieke waardecreatie:* Hoe zorg je dat er continu waarde toegevoegd voor de eindgebruikers van het platform?
    a. *Gemeenschappelijk gewaardeerde uitkomsten*: Hoe wordt er gezamenlijk gedefinieerd wat waarde toevoegt voor eindgebruikers?
        i. Hoe zien gebruikers deze uitkomsten en wat is de rol van gebruikers in "uitkomsten" van het platform?
        ii. Hoe ziet dit process eruit?
    b. *Legitimiteit:* Hoe wordt er draagvlak gecreëerd voor de implementatie van SmartWork
    c. *Kwaliteit:* Hoe wordt er continu goede kwaliteit geleverd en hoe wordt dit georganiseerd in de toekomst?

Appendix 3: Strategic documents

Appendix 3 includes strategic confidential company documents that are not publicly available.

Appendix 4: Interview transcripts

Appendix 4 includes a word file with the transcripts of the interview data. The transcripts can be retrieved upon request.

Appendix 5: Focus group structure

At the beginning of this study, a focus group is organized to explore the SmartWork platform and its implementation process. This information is used as a contextual understanding for the researcher. Table 9 provides an overview of the three themes, including a description. The data can be requested with the researcher.

Table 9: S*ample overview.*

Theme	**Description**
Technology	The central questions to this theme were: How does the SmartWork platform technology work? What do you understand, and what do you technologically not yet understand?
Implementation	The central question of this theme was: What are your general experiences with implementing SmartWork in [care organization], and what is enhancing and disturbing factors during the implementation of SmartWork
The future vision for SmartWork	The central question of this theme was: What should the future look like for the SmartWork platform, and what do you still need to do to get there?

Appendix 6: Template study

Appendix 6 provides the templates that are developed based on the adjusted ITIM for MSP technologies for system interoperability, customer connection, and continuous improvement. Respectively, the templates for system interoperability, customer connection, and continuous improvement are depicted in Figures 9, 10 & 11.

Appendix 6.1: System interoperability

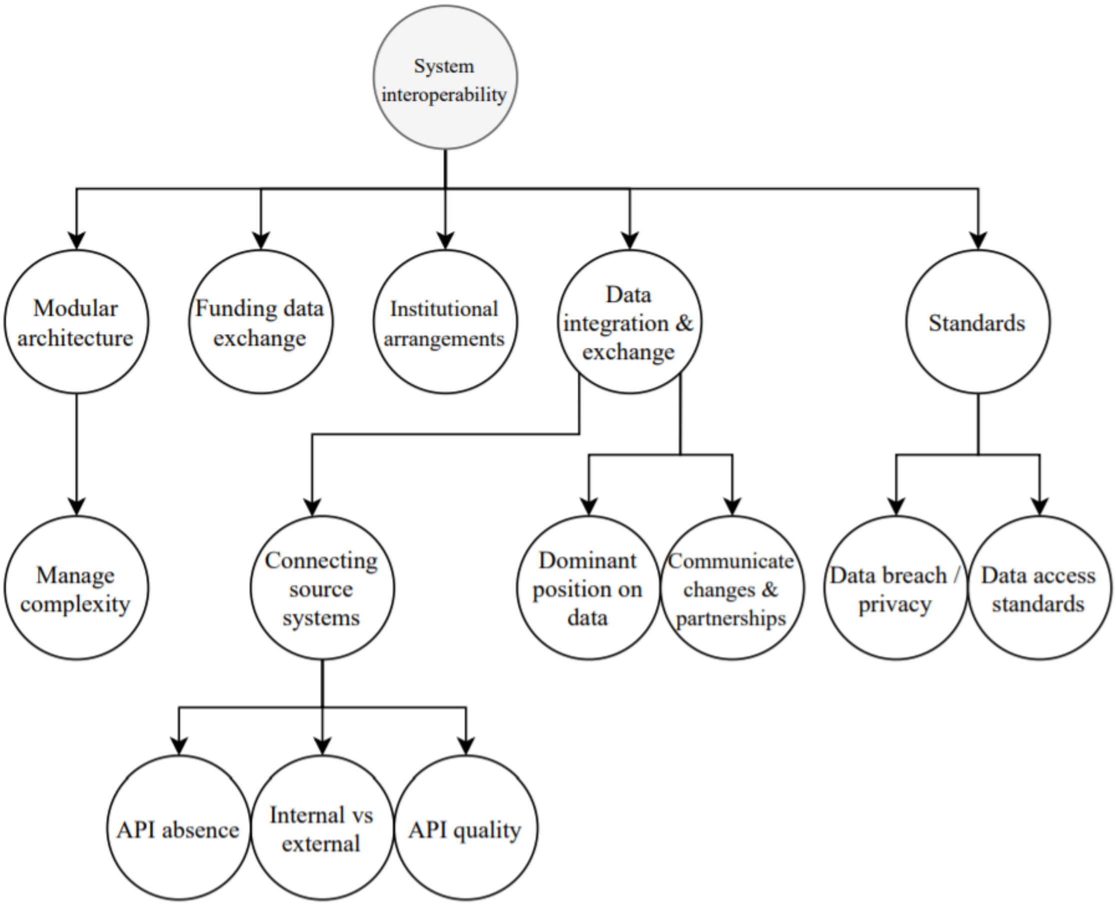

Figure 9: *Template system interoperability*

Appendix 6.2: Customer connection

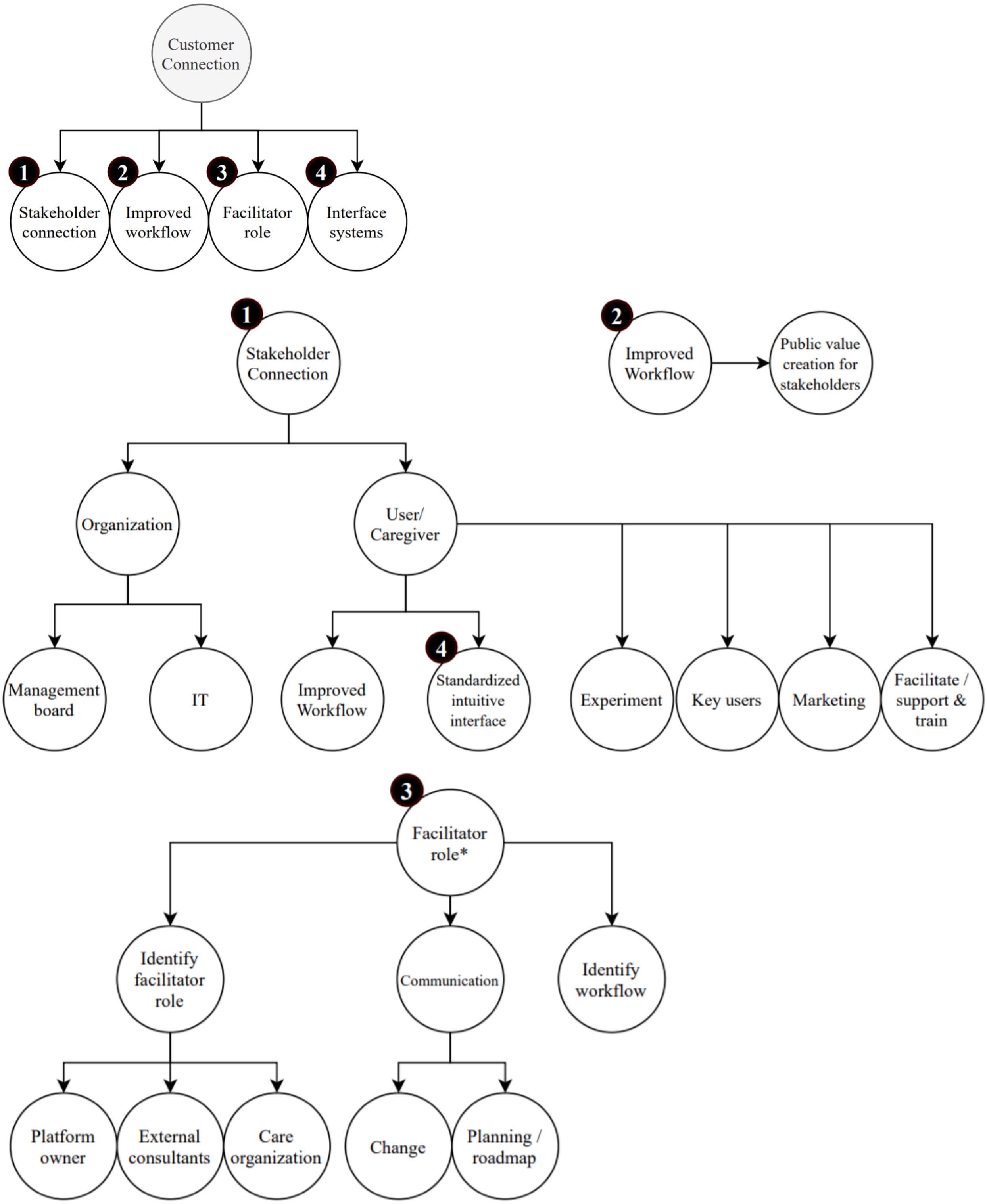

Figure 10: *Template customer connection*

Appendix 6.3: Continuous improvement

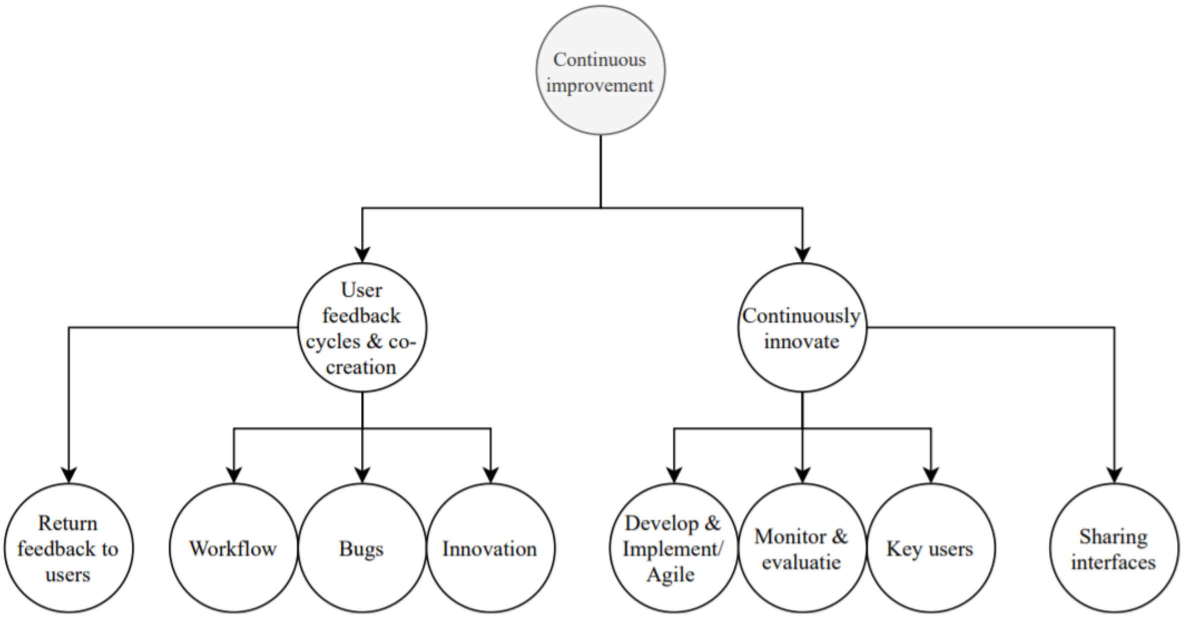

Figure 11: *Template continuous improvement*