Introduction, evaluation and implementation of health-associated technologies into municipalities

A situation analysis targeting municipalities, companies and end-users’ perspectives in Sweden

Ariadna Moreno Gay
Abstract

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Research questions:
I: What are the key steps to introduce, evaluate and implement health-associated technologies into different Swedish municipalities?
II: Which are the main challenges and opportunities to introduce, evaluate and implement health-associated technologies into different Swedish municipalities?

Purpose: The aim of the project has been to conduct a situation analysis on how different Swedish municipalities introduce, evaluate and implement existing health-associated technologies into their organization. To conduct this study, key steps and main challenges in these processes have been identified by interviewing different stakeholders involved from the public and private sector as well as end users.

Methodology: This master thesis is an abductive case study. Primary data has been collected through interviews and internal documents from organizations. Secondary data collection was collected through research papers and literature review.

Findings: The main findings of this study show that regarding the introduction procedure some municipalities are further in the process of developing formal procedures for organizations and end users to approach them with their products or needs. The evaluation as part of the procurement process has been considered a big obstacle for the three stakeholders groups interviewed since the criteria established doesn’t consider different aspect of the technology as its value to the municipality and end user. Implementation procedures do not exist and were not under development from any of the three municipalities interviewed.

Keywords: Innovation process, municipalities, healthcare, technology, public sector, private sector, end-users.

Academic supervisor: Lina Sors Emilsson/ Industrial supervisor: Per Matsson
Subject reader: Sofia Wagrell
Examiner: David Sköld
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It has been a challenging and enriching project where I had the opportunity to gain knowledge in an area which personally interests me by meeting many people who have been genuinely helping and providing me with very valuable perspectives. Having had the opportunity to meet people who are involved in developing a better society, outlining what needs to be improved and suggesting future directions, I realized how much we can do for each other and how much collaborations can help to construct better societies.

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Through this study I could also gain a better insight of Sweden. From Swedish organizations, to municipalities to end users, it has been a very good experience to learn more about the country and its current situation regarding the introduction of health technologies into municipalities and everything that surrounds it.

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Ariadna Moreno Gay
Popular scientific summary

In today’s complexity, mainly related to a growing population and rapid changes in our society due to tech development and digitalization, it is important to collaborate and build on others stakeholder’s expertise. Demographic changes will have many implications for our future society specially regarding health-care and long-term care, but many of these technological advancements have been developed to provide better care that wouldn’t and will not be possible without current and future health tech achievements.

Of these stakeholders, companies are providing innovative products and services that are developed to meet the needs of citizens and organisations working with healthcare both in the public and the private sector. By collaborating, each stakeholder can save resources by focusing on the core part of their businesses. However, a major challenge for private and public actors to collaborate is to find an equilibrium where the shared goal/s are achieved at the same time as the unique needs of all actors are met.

Thus, this study focuses on investigating how different municipalities in Sweden are introducing, evaluating and implementing existing health-associated technologies into their organization. The study aimed to include the perspectives, not only from municipalities but from other stakeholders involved in the public sector, the private sector and the end users.

The study was initiated by doing a literature review around the theory regarding fostering innovation in the public sector and the main barriers. Also understanding what the main barriers regarding the relationships between the public and the private sector are.

The results of the study show that regarding the introduction procedures some municipalities are further in the process of developing formal procedures for organizations and end users to contact the municipality and approach their products or needs. For this reason, nowadays private organizations and end users will have to rely on their extended network to try to introduce existing products into municipalities. Legislations and rules established by politicians in each municipality also become an obstacle when municipalities have not been assigned and provided resources to engage in innovative processes. Regarding the evaluation process, the evaluation procedure as part of the procurement has been considered the main obstacle since there is no space for evaluating a new solution considering different aspects of the technology including its
value to the municipality and the end-user. Also, implementation procedures do not exist and were not under development from any of the municipalities interviewed.
**Word list**

**PPP**-Public Private Partnership

**CE marked**-symbol that applies to products to ensure they follow EU legislations regarding safety, health and environmental protection

**SALAR**-Swedish Association of Local Authorities and Regions

**SDC**-Stockholm digital care

**Vinnova**-Innovation agency in Sweden
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1. Introduction

The following sections present the background of the study, the problem formulation and ends with the purpose of the study.

1.1. Background

In Europe, the population over 65 is expected to double within 50 years in relation to the working age population (aged 15-64) (Sobczak, 2014). Persons active in the labour force will face an increasing tax burden and higher social contributions to support their elders. Alternatively, older citizens will need to accept lower levels of support and services or a higher pension age (Wihlman, 2015). This situation will have several implications for our future society especially regarding old-age pensions, healthcare, and long-term care.

In addition to expected demographic changes, our society is also witnessing a rapid increase in technological advancement that includes innovations aiming to meet future healthcare challenges (Henriksson, 2017) as well as provide better care that wouldn’t and will not be possible without current and future health tech achievements.

To make new innovations in health technology valuable for organisations and citizens, actors at all levels—from structural to individual level—need to be involved to ensure co-developing of innovative and health supporting solutions (Henriksson, 2017).

The public sector, more concretely, plays an important role in this challenge. Having a well-developed innovation capability will facilitate the creation of attractive places to live and work guaranteeing good standards of living for all citizens including an aging population demanding more care (OECD, 2017). Therefore, implementing an innovative culture in the public sector is on the focus today to adapt to changing demands from residents, and especially to create new opportunities and meet the needs of the elderly and those with disabilities (Wihlman, 2015).

As stated by Albury & Mulgan (2005) “Innovation is essential to the improvement of public services; it is not an optional luxury but needs to be institutionalized as a deep value”. For this reason, governments need to reconsider the way they integrate innovations into organizational policies.
1.2. Problem Formulation

Introduce, evaluate and implement new solutions into public services is currently a challenge due to a situation where it is hard for municipalities to recruit appropriate employees, which leads to a situation where organisations are understaffed and existing personal overloaded. Furthermore, municipalities are restricted in their financial priorities due to a system of one and four years budgets (Henriksson, 2017).

However, there are also many factors that have been identified to help foster innovation in the public sector, including support from top managers, the involvement of end user’s, encourage staff to bring new ideas or have a high-quality risk management (Wihlman, et al., 2016). Some of these factors are included in the framework developed by Albury & Mulgan (2005) which is going to be used in this study to understand what helps to foster innovation within the public sector. The framework goes from defining how to generate opportunities, to analyse and learn from several barriers and challenges.

In the complexity of our world, mainly related to a growing population and rapid changes of our society due to tech development and digitalization, it is important to collaborate and build on all stakeholder’s expertise when introducing health-related changes to organisations, cities, regions and countries. Of these stakeholders, companies are providing innovative products and services that are developed to meet the needs of citizens and organisations working with healthcare both in public and private sector. They also bring to the partnership expertise in product and process development as well as adjustments (Widdus, 2001). By collaborating each stakeholder can save resources by focusing on the core part of their businesses (Reich, 2002). However, a major challenge for private and public actors to collaborate is to find an equilibrium where the shared goal/s are achieved at the same time as the unique needs of all actors are met.

The Public-Private Partnership (PPP) is a theory about above-mentioned challenge of collaboration and is defined as “a co-operation between public and private actors with a durable character in which actors develop mutual products and/or services and in which risk, costs and benefits are shared” (Klijn & R. Teisman, 2003). Furthermore, Trafford and co-workers state in a paper from 2006 that using the expertise of both public and private sector will help to reinforce opportunities for innovation by meeting specific
public needs through a cooperation based on individual competitive strengths ( Trafford & Proctor, 2006).

Majority of studies regarding PPP are focused on how to create a culture of innovation and establish good partnerships within the private and public sector. One example is the work by Wihlman (2015) where he addresses the difficulties when implementing innovation into Swedish municipal welfare services, including lack of structures and support, understanding of the innovation concept and lack of communication.

1.3. Purpose, aim and study restrictions

This study aims to address the difficulties to introduce new health-associated technologies to municipalities, incorporating collaborations between municipalities, corporations and end-users. The research is based on a situation analysis conducted in Sweden, incorporating different actors’ experiences of current processes at municipalities and how they suggest that an innovation process should function in a collaborative manner so that the right tech reaches the right organisation with the right information for improved life quality of Swedish citizens.

Specifically, the question addressed is “How can new innovative health-associated technologies be interdisciplinarity introduced, evaluated and implemented to improve the life quality of citizens in Sweden? Citizens that are in need of support by the Swedish public sector, more specifically Swedish municipalities”

The aim is to understand how an innovation process can be organised to introduce, evaluate and implement health-associated technologies to maintain and improve an individual’s functioning and independence through preventing both primary and secondary health conditions (WHO, 2016). For this, previous identified challenges and opportunities for introduction, evaluation and implementation will be identified and analysed, including key stakeholders and actions.

The current study includes interviews with three municipalities, five corporations working with municipalities and three end users with self-experienced interactions with Swedish municipalities.
With limited amounts of conducted interviews, the current study is a cross-section of a situation in Sweden based on following research questions:

i. What are the key steps to introduce, evaluate and implement health-associated technologies into different Swedish municipalities?

ii. Which are the main challenges and opportunities to introduce, evaluate and implement health-associated technologies into different Swedish municipalities?
2. Theory

The following section presents theories regarding hinders and drivers behind innovation processes within the public sector and is divided into three sections, i.e. PPP, barriers to innovation in the public sector and end-user driven innovation concepts.

2.1. The Public-Private Partnerships

Service processes within the public sector are in constant need of development to meet different needs of the society related to economic pressures, a deficit in social services, fast ageing populations and new technological developments (Sinisammal, et al., 2016). As pointed out by Trafford and Proctor, the public sector has difficulties to deliver the number of services needed by the citizens and thus needs of collaborations with different organizations to compensate for the lack of knowledge in improving their capacity and the provision of goods and services (Trafford & Proctor, 2006). To make the best possible for citizens and handle financial and demographic challenges of the public sector, several actors from the private and public sector have joined forces to achieve added value in collaboration, i.e. PPP.

Public Private Partnerships can be defined as a “co-operation between public and private actors with a durable character in which actors develop mutual products and/or services and in which risk, costs, and benefits are shared” (Klijn & R. Teisman, 2003). Privat actors include all non-government agencies such as the corporate sector, self-help groups or individual and community-based organizations (Khushbu, 2014). Using the expertise of both public and private sector, PPP reinforces opportunities to introduce new solutions into healthcare and elderly care, while meeting specific public needs through a cooperation based on individual competitive strengths (Trafford & Proctor, 2006).

Sometimes, the main purpose of the partnership is financial, and this implies the increase of resources and reduction of costs, but it can also introduce new knowledge or increase the image of the actors (Trafford & Proctor, 2006).

As an example of PPPs between academia, business and public actors, in June 2016, the Swedish Government launched five innovative partnership projects with the aim to meet a range of societal challenges in Sweden including creating better transport solutions, develop smart cities, develop better strategies for food supply and energy issues and increase collaborations to solve societal challenges concerning health (Government, 2016).
2.1.1. Types of Public-Private partnerships

Public-private partnership can take different forms depending on the involvement of each actor and the risks that are taken. Geddes (2005) considers that a useful way to classify Public-private partnerships is understanding the reason for their creation, falling under three different categories: i) partnerships emerging as a result of a government decision or legislation (statutory partnership); ii) partnerships that are created from different organizations on a voluntary basis to meet a common objective (voluntary partnership) and iii) partnerships where a private organization is contracted to deliver a particular outcome (commercially partnership). Thus, the different nature of partnership will demand different approaches to its management.

2.1.2. The lifecycle of Public-Private partnerships

According to Geddes (2005) all partnerships follow a partnership lifecycle. It will start by establishing an initial concept that can emerge from a variety of resources; from government legislation, organizations and individuals or by identifying a concrete need. In some cases, and depending on the type of partnership, it will be necessary to redefine the concept, so it can be transformed into a specific need or objective, understood as the second step of this cycle. After identifying the need it is important to assign a person (a partnership champion), with the support of a steering committee, to be responsible for leading the partnership development process known as the partnership champion. The partnership champion in cooperation with the steering committee will develop a strategy to define the goals, tasks, structures and resources needed. Once an agreement has been recognised; business plans, targets and reporting systems must be established, defining then the implementation process. To ensure that objectives are met and that the PPP is prepared to respond to unexpected circumstances the progress of the partnership must be monitored. This last stage, the delivery stage, acts as the monitoring phase that can lead to new partnerships and objectives (Figure 1.) (Geddes, 2005).
2.1.3. Challenges and successful factors in Public-Private partnerships

One of the main identified challenges for PPP is a lack of transparency and mistrust of the different actors’ goal of the partnership (Sharma & Bindal, 2014). For this reason, it’s important to boost and define a communication process with trust, openness and common understanding between different levels of management. Furthermore, Trafford & Proctor (2006) propose that the different management levels must be connected across organizations to ensure an effective communication.

This management levels and responsibilities are divided into:

1. Top management for monitoring progress and develop broad objectives.
2. Middle managers to develop common plans
3. Operational staffs who are responsible to perform the everyday tasks

Trafford & Proctor (2006) also found in their research that some of the barriers to communication are related to power differences, gender differences, physical surroundings, language and cultural diversity. Other challenges were related to the loss of control, understood as the inability to act due to a shared decision-making process, and, not sharing a common vision in the partnership can make actors just focus on achieving their individual goals and become a problem. These challenges have been mentioned as common findings in numerous research such as the one performed by Sharma & Bindal.
(2014) were the authors suggest that some of the challenges that have PPP have to face are: mistrust between public and private sector, create a management capability in the public sector to deal with the private sector and adjust the type of contracts done considering the heterogeneity of the private sector.

On the other hand, Mitchell (2008) revised the factors to successfully implement a PPP from a workshop held by The Asian Development Bank Institute on Public-Private Partnerships in The Social Sector in Japan in July 1999 and the results were:

- Establish legal and regulatory frameworks
- Ensure transparency and accountability
- Develop suitable public policies
- Have a commitment to Public Good
- Find a common understanding
- Share resources
- Focus on consumers and communities

Another contribution on the topic is done by Sharma & Bindal (2014) where involving a third party to monitoring the process will help to minimize the control of the government over the project and better define roles and responsibilities.

2.2. **Innovation Management in the public sector**

The need for implementing a culture of innovation and innovations (e.g. new services or technologies) in the public sectors, is on demand due to the demographic changes, individualisation of services and shortage of economic resources arising nowadays (Wihlman, et al., 2016).

Innovation can happen “top-down”-were the managers set the pace, the goals and provide funds-or “bottom down”-were the innovation comes from any member of the company that is willing to make suggestions for improvement or contribute with new perspectives. (Bækkelié, 2015).
2.2.1. Framework to foster innovation in the public sector

Extensive research has been done regarding innovations in the public sector although there is a lack of empirical research. Albury & Mulgan (2005) suggest a non-linear framework to foster innovation in the public sector (Figure 2). A Framework where the four different elements (generating possibilities (1), Incubating and prototyping (2), Replication and scaling up (3) and Analysis and learning (4)) are interconnected and described as follows:

1) Generating possibilities

This first step of the process helps to redefine how innovative ideas can be encouraged and supported within the public sector.

According to Albury & Mulgan (2005) more than half of all innovations are not originated by the top of the organisation, for this reason, it is important to have defined procedures to listen to the suggestion from the end users, staff and middle managers. Encouraging staff to generate new ideas will reduce the resistant to change that some staff can have and help to find needs and opportunities.

The authors also suggest that having an organization where the staff has a wide variety of backgrounds and mindsets, with different viewpoints, is more likely to be innovative. Observing how others behave can also help to consider new ways of doing while incorporating good practices and creating new opportunities for innovation.

Using creativity techniques has been an effective tool to generate innovations, especially in the private sector (Martins & Terblanche, 2003 ). In the public sector there are some governments that use these techniques effectively even if some countries are faced with barriers, such as rigid and traditional organizational structures, that need to be addressed before they can implement these creativity techniques in to their innovation processes (e.g. Denmark, Singapore) (Albury & Mulgan, 2005).

Another aspect of innovation is that an organisation is more likely to generate new ideas from a blank sheet than trying to generate them from existing procedures. That means that if one tries to be innovative having the existing ways of doing things in mind it will be harder to bring new options on the table. In fact, for new ideas to arise it is important to create both the space and time necessary to let ideas flow, e.g. by supporting team
work, encourage competition between teams or within an organization and/or including specific hours a week for idea generation (Albury & Mulgan, 2005).

The authors also suggest that for being innovative sometimes it is necessary to break the rules and that organisational rule-breaking should be accepted and sometimes encouraged.

2) **Incubating and prototyping in the public sector**

Innovation generated in the public health-sector deal with the challenges of requiring high-quality risk management spaces to pilot test, evaluate and assess new innovations (Albury & Mulgan, 2005). For that it is important to have defined models, enough funds and a realistic connection between actions and results. However, it is not possible to eliminate risk completely when testing innovations and therefore there must be a tolerance for failure.

If the process is complex including many variables, simulations can be a good way of testing innovation safely as well as performing controlled experiments when the situation is very uncertain (Albury & Mulgan, 2005). As for example testing the innovation in a sample of users to identify and solve problems in advance (Arundel, et al., 2016).

The use of pathfinders to faster develop new prototypes has been widely used to accelerate the process of creating and eliminating ideas (Albury & Mulgan, 2005). Alternatively, the use of modelling techniques can help to avoid the high costs of creating prototypes while broadly testing possible ideas.

Another aspect to consider that are common in the private sector is the use of independent governmental funded incubators. Incubators that support new ideas by providing advice, space and/or funding to develop ideas. The authors suggest an example from the Singapore government which has created an incubator that provides funding for ideas that could improve the delivery of public services. These ideas can come from anyone, including citizens or organizations.

When it comes to developing new products or services, there are many initiatives in the public sector to convert ideas into prototypes, and governments are establishing support budgets to develop innovations as part of their main activities and not as an isolated unit.
Regarding incubating and prototyping one of the most important feedback is provided by the end-user. The earlier the end-users are introduced into the innovation process the higher the chances to identify more needs and challenges and thus, to develop better and suitable solutions (Albury & Mulgan, 2005). This also applies to the implementation process of new technologies or services.

3) **Replication and scaling up in the public sector**

If the pilot test was successful, then it’s time to implement the innovation on a large scale. For this stage, formal evaluations including qualitative assessments, political feasibility or assessments of organizational capacity need to be done. One of the problems usually is that the evaluation comes too late in this process (Albury & Mulgan, 2005).

The authors consider other two factors into account: the Hawthorne effect and the learning curve effect. The Hawthorne effect refers to the outcome generated from an innovation or pilot test performed on a certain situation but not for the innovation itself but for the change of behaviour of the people when they know they are being observed. The learning curve effect relate to the changes caused by the learning process of developing an innovation.

Giving monetary incentives as a reward to teams or individuals in the public sector doesn’t have as much power as the recognition from peers for having done a good job. On the other hand, giving monetary rewards to companies can create extra motivation since it is possible to develop more capabilities benefiting staff and end-users. Managers are very influenced by the support given by their peers and are an important element that connects the top of the organisation to the bottom (Albury & Mulgan, 2005).

In this framework the authors talk about two strategic approaches to innovation known as radical and incremental (Albury & Mulgan, 2005). Incremental innovations are those which add minor changes to an existing product or services (Schilling, 2013) and are usually found in environments were small organizations are under price pressure and customers can compare prices and the value of the product to other organizations. On the contrary, radical innovations are those which presents something completely new and different from prior solutions (Schilling, 2013) and come from large organisations that can implement systemic innovations with a small number of suppliers.
It is important to be aware that in the public sector, needs must be tailored to the local context and when processes are standardized, to apply best practice, the organisation is also reducing the possibility to be innovative and find other solutions (Albury & Mulgan, 2005). The authors suggest that to scale up and spread innovations sometimes it is necessary to implement changes in management. This process is known as change management and is defined as ‘the process of continually renewing an organization’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers’ (W. Moran & Brightman, 2000). With current technological revolution and digitalization of our society, the amount of changes nowadays is greatest than ever and developing the necessary skills to master change management is fundamental (W. Moran & Brightman, 2000). However, and going back to the different strategic approaches to innovation, the public sector is more likely to implement incremental innovations that are in line with already made investments (Hakansson, et al., 2007).

4) Analysis and learning in the public sector

Analyse and establish measures for assessing the success of the innovation will help to create a learning culture. However, the results from an implementation process are not immediate, thus, it’s important to develop real-time learning procedures to help monitor what is working and what is needed to be adjusted or changed. The procedures for evaluating should not be too rigid in case it could hinder innovation (Albury & Mulgan, 2005).

As previously mentioned, having a good supporting system among your network of peers will bring value by organizing creating learning communities. Also, the variety of backgrounds and capabilities from the employees must align with the organization’s environment to be able to deal with the possible challenges (Albury & Mulgan, 2005).

Developing good knowledge in managing innovation will benefit not only the organization itself but the findings can be generalized to and use it for spreading good practices inside the organization and outside (Albury & Mulgan, 2005).

Generally, the public sector doesn’t fail in generating ideas or prototyping, the weakest part of it is developing and implementing effective solutions (Curristine, et al., 2007).
To have a better understanding, the process has been represented as follows:

**Generating possibilities**
- Focus on the views from users, staff and middle managers
- Diversity of staff
- Learning from others
- Develop the capacity for creative thinking
- Working backwards from outcome goals
- Create space for creative thinking
- Break the rules
- Competition

**Incubating and prototyping**
- Pilot tests
- Pathfinders
- Incubators
- Modelling
- Simulation
- Controlled experimentation
- Funding for early development
- Involvement of end users

**Replication and scaling up**
- Incentives
- Peers
- Innovative capability
- 'Best practice'
- Change management

**Analysing and learning**
- Measuring success
- Real-time learning
- Peers involvement
- Evaluation hindering innovation
- Double-loop learning
- Variety employees

*Figure 2. Framework to foster innovation within the public sector revised from Albury & Mulgan (2005)*
2.2.2. Barriers to innovation public sector

In their study, Albury & Mulgan (2005), apart from defining the factors that foster innovation they also define the barrier to innovation (Figure 3).

These barriers include pressures and burdens of managers daily operations as well as political pressures or having to report to senior managers. Factors that can make it harder to find time to deliver better services or reduce pressures. Providing the necessary time and space to discuss new ideas within managers and employees will help to develop new innovations since many employees can feel stressed having to keep up with their daily activities as well as being innovative (Albury & Mulgan, 2005).

Also, an excessive focus on short-term budgets can diminish the competitiveness of the organization, forgetting about the long-term objectives. Similarly, for the innovative process to be successful it is essential that the organization possesses the necessary skills in change and risk management. The authors add three essential conditions to be
necessary for innovation to happen: motivation from the staff, an opportunity or an unmet need and having the needed skills.

Not giving enough incentives or rewards when developing or creating useful innovations can demotivate and hinder the development of new ideas. In relation to that, it is also important to align all their capabilities in terms of management, culture or systems that are involved with innovation.

The authors suggest that in both big and small organizations the possibilities to generate innovations are the same or even higher for smaller organizations because big companies tend to fall on a self-satisfied mood and the smaller ones strive to achieve good results.

Also, contrary to the private sector, where organizations need to innovate to gain competitive advantage, the public sector doesn’t need innovations to keep functioning and this can hinder the creation of new ideas. For this reason, the public sector tends to have a risk aversion culture where only known risks are taken.

In another study conducted by (Wihlman, et al., 2016) in four Swedish Municipalities, where the aim was to study innovation in welfare services, the authors identified that one of the main barriers for implementation of innovations was a gap between organizational levels. Senior and middle managers differed on their views of how innovation was taking place. Middle managers stated that innovation was happening but that there was a lack of time where other tasks were prioritized. On the other hand, senior managers noted different barriers to innovation related to the structure of the organization and a shortage of staff. In this first part of the study, the authors concluded that there was a poor communication between the middle and senior managers and a lack of holistic approach when implementing a culture of innovation.

From their study, they also observed how innovation, specifically in welfare services, was integrated into organizational policies. For this, 55 documents published in the national government and its agencies were analysed and found that there were many references claiming a need to improve the efficiency in welfare services within municipalities. The authors realized that there isn’t any existing national innovation policy and there is a need for more governmental support to innovation in the public sector.

From their last part of the study, and after reviewing national and municipal documents, they saw that the concept of innovation was understood differently at the central
governmental level than in the local governmental level. At the central level, the use of decentralized service delivered models and focus on citizens were more visible than in the municipality level. That means that the concept of innovations is understood differently between governmental levels as well.

Also, compared to the private sector, innovation in the public sectors often requires support from politics, making it difficult for managers but considered an advantage when politicians are involved and support innovative ideas. Also, the type of leadership used in the Scandinavian countries characterized by being low hierarchy and non-authoritarian is beneficial for developing new solutions (Wihlman, 2015). This creates favourable conditions for innovation especially in welfare services where the skills, knowledge and expertise from employees allow them to develop new solutions and participate in the organization change leading to benefits for the end user’s (Høyrup, 2010). This involvement of employees in this innovative process is known as employee-driven innovation and it’s a bottom-up approach that can emerge spontaneously but needs the support from the organization and managers within an innovative environment.

2.3. End-user driven innovation

Since many years ago, some organizations in the private sector have been incorporating and managing their ‘customer service experience’ as any other function inside the organization. It consists on not seeing the customer as a passive recipient of the service but as someone who has the potential for future improvements by analysing different aspects such as the quality, the interactions or the presentation of the service (Bate & Robert, 2007).

Nowadays, not only service organizations are concern about the idea of incorporating end user’s experience at the early stages of any design process but also product and organisational designers (Bate & Robert, 2007).

In the public sector, there is a lack of specific techniques to better incorporate the user experience in the public sector, although end users’ opinions have been incorporated into workshops or with their feedback during test beds. However, in the private sector, there are two methods that have been used and combined for incorporating the experiences of the end user’s through the process of developing new products. These are agile development and the user design experience (UX). Both methods have their origins in
software development, but their principals can be applied in any discipline (Ferreira, et al., 2012).

Agile software development comprises of a constant iteration of results while embracing any change occurring through the project following its four manifested values: “(1) individuals and interactions over processes and tools, (2) Working software over comprehensive documentation (3) Customer collaboration over contract negotiation (4) Responding to change over following a plan” (Cockton, et al., 2016).

On the other hand, user design experience is the process of creating products centred on the interaction with the user to provide value to the end-user by creating meaningful experiences (Cockton, et al., 2016). This will help to capture people’s attitudes and feelings regarding the use of a particular product or service.

Considering the experiences from the private sector, new approaches could be found to redefine the way end users interact with the public sector to better evaluate and integrate new solutions within municipalities.
3. Method

In this chapter, the research strategy, research focus, data collection method, the research approach, the quality criteria considered, data analysis and ethical considerations, will be presented.

3.1. Research strategy

Qualitative approaches help to study real-life situations while creating good descriptions and generate case studies (Patton, 2005). This approach has been used in this study to identify what are the opinions and perspectives of the public and private sector and the end users regarding the introduction of new products or services within Swedish municipalities. Qualitative methods help to answer “why” and “how” questions without controlling the interviewer’s behaviour (Lo, et al., 2017).

3.2. Research focus

Using a theoretical framework in a study helps the person who reads to conceptualize the study in a wider context and will work as the foundation, structure and support to evaluate the conducted study (Grant, et al., 2015). As defined by Bryman & Bell (2011), a study will help either to answer some of the consideration presented in the theoretical framework or to generate a theory based on the empiric results of the study. The former is known as a deductive theory, where the author will formulate a hypothesis based on the stated theory, and the second one as inductive theory were as a result of data collection, theories will be generated (Bryman & Bell, 2011). The approach used in this study is a combination of the inductive and deductive approach and is known as an abductive approach. An abductive approach interacts between empirics and theory and tries to find a reasonable explanation considering the empirical and theoretical material (Lipscomb, 2012).

3.3. Data collection

To have a broad and solid variety of opinions and perspectives, the aim was to interview more than three actors from the private and public sector as well as end-users. Public sector refers first and most to municipalities, but a county council was also interviewed as they had explored how PPP can collaborate to introduce MedTech in to their hospital; private sector refers to start-ups, brand organizations end-user representatives. Where end-used representatives included both patient organisations and lead patients. In this study data was collected through semi-structured in silico and face to face interviews.
In-silico interviews through skype can present both advantages and disadvantages. Disadvantage is related to the fact that it is not possible to see how the person behind the camera uses his/her body language (Janghorban, et al., 2014). In the present this disadvantage was minor as the quality and value of the interviews were not dependent on a physical presence of either the interviewer or the interviewee. Regarding advantage with in-silico interviews it is mainly related to that time, location or physical mobility will not provide a limitation for the interview to be conducted (Janghorban, et al., 2014). For this reason, Skype interviews have been used in more than one occasion during this study.

As mentioned, a semi-structured interview has been used to create a general structure for the interview, that covers the main questions, but allowing new questions to be formulated as the interview progresses (Bryman & Bell, 2011). This has helped to promote open discussions from open ended questions that allowed opportunity explore new issues and ideas that were not considered in the first place by both the interviewer and the interviewee.

A positive effect of interviewing and interacting with people is that an interview often leads to recommendation and introduction to other stakeholders of interest to meet and discuss with. In fact, several interviews have been conducted by recommendation of previous interviewees or by asking experts in the field which has helped to go straight to the right contacts and information.

### 3.4. Research approach

In the next graph are all the actors that have been interviewed presented as well as summarized in Figure 4. For further information regarding the people interviewed and their position, check the Appendix 1.

The study was initiated by interviewing (via skype) the innovation manager of the elderly care department at Uppsala municipality as well as the business development specialist from the central unit of the municipality of Uppsala. The aim was to identify how Uppsala municipality is introducing, evaluating and implementing new products or services into their organisation.

A municipality in Sweden known for having several well performed initiatives and defined procedures for introducing and evaluating technologies is the city of Västerås.
This lead to an understanding of what the possibilities are for many municipalities that haven’t defined any kind of procedure.

The third municipality contacted for the study was the city of Stockholm. From the city of Stockholm two strategies from the elderly care department were interviewed.

This three municipalities have been chosen because they are very different in their nature meaning that Uppsala is a University city, well known for life sciences, Västerås is an industrial city and Stockholm is the capital of the country.

This variety between cities helped to contrast and compare how public organisations with different environments approached innovation processes, i.e. introduction, evaluation and implementation of new innovative technologies for healthier lives of their citizens.

Furthermore, the ‘Swedish Association of Local Authorities and Regions’ (SALAR) was contacted via email and they provided a brief overview of the situation in Sweden and pointed out factors that are addressed to improve the innovation process in Swedish municipalities.

Another perspective important to be included, to understand the current situation in Sweden, were the experiences from the private sector. Interviews were conducted with two Swedish med-tech start-ups, as well as the ‘Swedish association of medical technologies’ and the national strategic innovation program within medical technology ‘Medtech4health’. The aim with interviewing start-ups was to see how they have approached municipalities, what are the key steps that they have followed and what are the main challenges they have encountered. Interviewing the two interest organizations provided an insight to current PPP as well as programs and strategies in Sweden to enable collaboration between public and private organisations to introduce, evaluate and implement new health-associated technologies.

Once the perspectives and experiences from the private and the public sector were understood, the end-user perspective was investigated through interviewing two persons with self-experience of chronic illness and one relative to a person with a chronic injury.

The study in this group started by interviewing a person living with a muscle disease. This person is also employed by the elderly care home at the municipality of Uppsala and is also a member of the ‘Swedish Association for neurological diseases’ (Neuroförbundet) and has hence a deep understanding and thorough knowledge regarding introduction of
new technologies from both a professional and end-user perspective. The aim with interview was to understand how people with different diagnoses and their caregivers as well as relatives are involved and considered when incorporating new services or products into their lives.

The second person that was interviewed was a relative of a person who has lost the mobility in her body. This interview provided an insight to how relatives can work together with the municipalities to improve the quality of life of a person obtaining support from the municipality.

The last person interviewed in this study is a person that obtain support from a Swedish municipality to be able to live an active life with the challenges of a chronic muscle disease.

![Figure 4. Graphic representation of all the participants of the study](image)

3.5. **Quality criteria**

Trustworthiness in qualitative research has been questioned and discussed as validity and reliability cannot be addressed in the same way as in quantitative methods. However, several experimental designs for qualitative studies are developed to be able to ensure a scientific trustworthy study (Shenton, 2004). For example, corresponding to the positivism paradigm a four different criteria approach has been developed by (Guba,
1981), including Credibility (a), Transferability (b), Dependability (c) and Confirmability (d)

a) Credibility
Credibility corresponds to the ‘internal validity’ defined by positivism and it ensures that the study measures what it wants to be measured. In qualitative methods, the question is more related to how similar the findings are with reality (Shenton, 2004). Many researchers have developed many techniques to ensure credibility in qualitative research for example: prolong engagement with the participants of the study, deeply observe the situation, use more than one data collection method or analyse the data and exclude information that contradicts or doesn’t add value to the study (C. Pandey & Patnaik, 2014). In the case of this study, engagement with the participants has been established sometimes more than once during the interview stage. Contacting again with the interviewees helped to clarify some of the aspects that were unclear during the analysis and to ask further questions that came up after collecting other data. Also, once the study was finalized, some of the participants were contacted to give feedback and opinion on the suggested assessment.

b) Transferability
Transferability correspond to the ‘external validity’ defined by positivism and it refers to how the findings can be applied to a broader population. In case of qualitative methods, it is very difficult to demonstrate that findings are applicable to another context since they are often very specific (Guba, 1981). The best technique described by C. Pandey & Patnaik (2014) known as ‘Thick description’ and refers to describing the situation with a lot of detail referring to the social and cultural aspects. In this study, when doing the interviews, it has been tried to give the most detail as possible from the interpretations that the author of this study had regarding the people’s feelings and opinions (Guba, 1981). Dependability corresponds to the ‘reliability’ concept defined by positivism and states that if the study is repeated in the same context, with the same methods and participants, it will show the same results (Guba, 1981). In this study, the results won’t be the same if the participants are interviewed again because it can be that in a few years better policies and collaborations for innovation in the public sector are established and this will show different results.
c) Confirmability
Confirmability compares to the concept of ‘objectivity’ in quantitative research and ensures that the results of the study describe the experiences of the people interviewed and that the opinion of the researcher is not influencing the results (Guba, 1981). To eliminate biased in this study, the experiences of the interviewees and the analysis of the author have been described in different sections in this study. The section ‘Empirics’ describes what the interviewees’ perceptions and opinions about the situation and in the section ‘Analysis’, the author describes her interpretations of the results.

3.6. Data analysis
To perform data analysis information from the different stakeholders were grouped together and analysed through a technique known as coding. Coding refers to recognising topics, similarities or differences that have been discovered through the interviewees’ experiences and interpreted by the researcher (Sutton & Austin, 2015). Coding has been done manually by highlighting and naming sections of the text, known as theming. Under each theme, the different codes will be described and will reflect the research interpretations of what the themes mean (Sutton & Austin, 2015). All findings were summarized into tables.

3.7. Ethical considerations
The current study has been conducted considering following the next ethical principles; lack of informed concerned, invasion of privacy, data management and confidentiality (Bryman & Bell, 2011).

The first principle, lack of informed concerned, is related to the idea that the participants have all the information related to the study and are informed that their participation is totally voluntary and that they are entitled to leave the study whenever they want. The second principle, invasion of privacy relates to the principle that the person has the right to not answer certain questions that are covering topics that they don’t want to make public. The third principle, data management, relates to using the data collected only for research purposes. The fourth principle, confidentiality, concerns that all the data
collected should be taken care of keeping privacy and avoiding the possible identification of persons or organizations without their consent.

To deal with these ethical principles, the participants of the study were asked if they wanted to collaborate and were informed of the purpose of the study. Regarding the second principle, some participants didn’t want to answer some questions that might have disclosed some private information regarding their internal processes. The author of the study was aware of this possibility from the beginning and respected the position of the interviewees. Concerning the third principle of data management, the participants were informed at all times that the data was only used for research purposes and that the information wasn’t going to be shared or used for other purposes. Regarding the fourth principle of confidentiality, participants didn’t ask to be considered anonymous in the study, but the author of this study has treated the participants anonymously and their names are not provided. However, the job positions of all participants interviewed have been provided.
4. Empirics

In this chapter, the data collected from the interviews with the public sector, the private sector and the end-users will be presented, as well as describing a brief situation analysis. At the end of each section a small summary with the main learnings from each stakeholder interviewed will be presented.

4.1. Situation analysis

With demographic changes in society it is vital for municipalities to review and reorganize their work to incorporate digital services in collaboration with the users, i.e. end users, relatives or staff. The primary focus is on understanding the needs and conditions of the ones using these technologies.

In Sweden, there are many initiatives that the government and their innovation agencies are doing for promoting innovation in the public sector, especially within the healthcare sector. In addition, several fairs and scientific meetings are organized on a yearly basis to increase awareness around current developments and innovations in the field of medical and health technologies. An example of a yearly fair is the ‘Swedish national meeting place for welfare technology and e-health’ which is a two days conferences and organizations fair with the aim of sharing experiences on the introduction of welfare and e-health technologies into municipal healthcare and social services.

Moreover, Sweden is taking great initiatives to introduce welfare technologies by sharing knowledge and experiences with other national and international municipalities and county councils (MVTe, 2018).

The upcoming section presents the findings on how the public sector, the private sector and the end users have experienced the introduction of new health technologies into the public sector and what have been the main drivers and challenges.

4.2. The public sector

This section presents the findings on how three municipalities in Sweden are currently assessing and implementing new technologies. This is exemplified through the Elderly Care department at the municipalities of Uppsala, Stockholm and Västerås. Since all 290 municipalities in Sweden are self-governed, with their own internal procedures and structures this study can be considered as a case study and should not be used to generalize
how Swedish municipalities assess and implement new technologies in their organisations. In addition to the above-mentioned municipalities the rehabilitation unit of Danderyd hospital in Stockholm and the Swedish association of local authorities and regions (SALAR) were also interviewed.

4.2.1. The municipality of Uppsala

The main challenges the municipality of Uppsala is specially a shortage of staff and busy daily operations. The efforts to meet these challenges include finding new ways of delivering qualitative care and introducing new solutions aimed to decrease workload and improve people’s experiences and quality of life.

The municipality of Uppsala does not have a current formal procedure for the evaluation and implementation of new technologies, products or services. Nowadays when a company wants to approach the municipality to sell its product, they call the specific department targeted and try to find the “right person” to talk to, which usually is a manager. The managers, once have established contact with the company, decide how they want to proceed and if they want to meet the company or not. From the experiences of the elderly care department, they currently answer, in the majority of the cases, that they are in the process of defining and prioritizing among identified needs and that they might contact them in the future if needed.

Discussing the needs, the person from the business unit stated that innovations must always come from bottom-up where citizen’s and end user’s needs are the driver for innovation in the municipality.

An important factor mentioned by the interviewees, that help foster innovation and the introduction of new technologies within the municipality of Uppsala, is the support from politicians. Politicians in Uppsala are establishing policies regarding innovation that are aimed to help the municipality to increase their innovation capability. Both managers from the elderly care department and the business unit were content with the innovation policies that are taking place in the city.

Another factor mentioned, is how the word innovation should be redefined and adjusted into the context of the public sector. The word innovation within the public sector can sound scary for many employees and in many cases innovative procedures, services or
Moreover, to help create better or new procedures, manager at Uppsala municipality have learned about service design processes and how to run an innovative process as a self-help tool.

On the other hand, some of the hinders that one of the managers identified is that there are many management levels inside the municipality and the process of introducing or developing something new is very slow. It is also not easy to delegate decisions at lower levels because the system doesn’t support it.

Time is another constraining factor for innovation processes since the operation managers as well as the staff basically have no time to talk about incorporating new technologies into their everyday work since they are completely occupied by daily operations.

Regarding the current situation and the actions that are being taken for introducing new technologies, at a central level, the business unit is working on defining an innovation procurement. For them, an innovation procurement should be defined together with an innovation support system where end-users’ as well as employees’ needs must be prioritized. This innovation support system will bring in business, industrial and technical expertise to help develop a better assessment procedure, where the procurement office should be able to evaluate other aspects of the product (e.g. environmental impact).

4.2.2. The municipality of Västerås

Since 2007 the municipality of Västerås has been working on defining an end user focused process to develop and implement new solutions into their organisation. In 2012 the municipality was granted Vinnova funding to create a structured process that integrate the end user’s perspectives in the development of new products and services. A project referred to as the MISTEL project (Figure 5). This project has assisted several companies to develop their products or services in collaboration with necessary expertise and with feedback and opinions from end users that are targeted by the supported technologies.

The MISTEL project worked as follows: First, the innovator or the company contacts the responsible from the test bed in Västerås. The new idea should help increase the
independence and the comfort of elderly people or people with disabilities and improve personal care services within the municipality. The concept of innovation can be anything from products or services to processes and organizational solutions that bring new value to the market. It can also be an existing product that targets a new segment of the market. The innovator/company receives a questionnaire regarding the innovation. The MISTEL will make an initial evaluation and see if they are the right support for the innovation. If approved, the innovator and MISTEL will proceed to have an initial meeting. This meeting is aimed to provide will help MISTEL with an understanding of the innovator’s needs and wishes as well as determining the innovation process stage of the innovation. Following the initial meeting, the MISTEL will describe a plan that will include the price of the service and the resources needed. If additional resources are needed such as travel expenses for extra staff or material, the innovator should apply for that funding.

After the planning phase, MISTEL will offer the innovator a customized test design. The test design will include collecting data from users through focus groups, interviews or surveys as well as testing the innovation with the intended users. The test can be performed in regular housing, in sheltered housing or in MISTEL’s own test apartment. Once the appropriate method is selected, MISTEL is responsible for sharing the legal agreements between the different actors, investigate the ethical aspects and conduct a risk analysis. During the implementation of the test, MISTEL will help to be a connection between the innovator and the test environment. After completion of the test, the innovator will receive a result report with the background, purpose, test design and method, result, discussion and MISTEL’s recommendations. At the end of the process, MISTEL can also offer training through the municipal personal care and public procurement.

To define the process, a researcher took part of the innovation evaluation and project development to scientifically improve the service. A lawyer was also engaged to define the process and tackled the legal problems that could arise, e.g. concerning the creation of a test bed and the incorporation of end users.
After the MISTEL project was finalized, the city of Västerås decided to move this project into its business unit and was incorporated inside the municipality. Currently, the municipality wants to start testing new solutions based on needs. They are considering how to identify their needs and how to prioritize among them (Figure 6). They also want to test new solutions that are already out in the market instead of developing an idea from the beginning. For this, after prioritizing the needs they must investigate the already existing solutions. If they don’t find anything that adjusts to their needs, they can use the test bed and look for innovations.

The process that the city of Västerås is developing to integrate existing products or services into the municipality starts by analysing the needs from the municipality and then prioritizing among them. Once the needs have been prioritized, a call for proposal will be open and companies can come and suggest their solutions. A test bed including end users will be conducted for the new solution type. After the results from the previous stage have been analysed and approved, to go into the next stage a pilot test will be performed. Once the pilot test has taken place, the municipality will organize the public procurement and implementation strategy. Although the process is defined, there are currently no specific guidelines established on how the procurement or implementation process should look like and what actors should be included.
In the pilot stage of this process, the municipality is evaluating the possibility to use an evaluation model from the technological institute centre for welfare and interaction technology in Denmark, known as the Welfare Technology Assessment (Figure 7).

The Welfare Technology Assessment tool is based on methods and procedures and thorough studies and analysis of welfare technologies. The aim with this tool is to provide an evaluation of the impact of welfare technologies in relation to citizens, organizations, technology and economics. The evaluation includes a formal assessment of the potential of a given welfare technologies as well as identifying where they can be implemented and what needs they can meet. Furthermore, the tool can also help with identification of advantages and disadvantages of a given technology by contributing to relevant analysis, assessments and suggestions in the purchase as well as the implementation phase of a technology.
Apart from the MISTEL project, the city of Västerås has done other initiatives for incorporating new solutions into the municipality. As an example, a few years ago the city of Västerås held an event called ‘Idea Hunting’ where they described one of their needs and innovators could present their solutions. However, a challenge with these types of events is to reach out with information to attract internal and external innovators to engage and come with solutions.

Considering the hinders and drivers for innovation to happen inside the municipality, the person interviewed explained that during the MISTEL project and later during the integration of the project as part of the city of Västerås, they did not encounter any difficulties since the local politicians as well as the national social department were engaged from the beginning and provided good innovation policies as well as feedback of the development of the project. Thanks to this they didn’t have to go through many management levels which would have slowed down the process. The person interviewed stated that they are aware of how lucky they have been when receiving the right support because other colleges from different municipalities, that are also working in the
incorporation of new technologies, have been struggling due to the situation of not having the support from politicians and senior managers.

One of the main obstacles for innovation and introduction of new technologies is the public procurement procedure that is used for any product purchased by the municipality that costs more than 500,000 SEK. The procurement procedure is a challenge since it is a regulated non-dynamic process that is extremely time and resource consuming.

Regarding the current situation, the municipality of Västerås is further developing the MISTEL process incorporating the The Welfare Technology Assessment tool.

4.2.3. The municipality of Stockholm

The municipality of Stockholm has a support system to test and develop new product or services in a project called Stockholm digital care. The ‘Stockholm digital care’ (SDC) is a five-year EU project financed to create growth for small and medium enterprises in the region of Stockholm that work with welfare technology. (SDC, 2018). However, regarding existing technologies that are commercially available the municipality of Stockholm does not currently have a formal procedure initiated to evaluate and integrate new technologies with existing procedures.

As in the case of Uppsala municipality, Stockholm municipality are contacted by companies that search for relevant contacts inside the municipality to present or test their products. Most of the projects are delivered to the SDC project because the elderly care department does not have a procedure themselves to test new things.

The reason for this is that the law is so firmly formulated and regulated so that it is not possible to be dynamic and make needed adjustment for innovation to happen since they are not supported by current legislation.

Municipalities need to follow regulations and directives from politicians. This conflicts with expressed thought of employees at different levels of interviewed municipalities as well as reported theory that sometimes to be innovative one needs to “break” some rules. In relation to politicians’ their support and delegations to try and implement new things makes it possible for municipalities to act and work innovative. However, in many cases are the politicians not used to think in these areas and they are them self strictly regulated
by legislation. Furthermore, politicians age, expertise and knowledge affect the decisions they take and usually politicians are not experts in innovation processes and needs to foster an innovative and developing environment.

As previously mentioned by other municipalities, the procurement process is considered an obstacle since the criteria for evaluating new solutions is very rigid and product specific and do not allow for different types of products that meets the same need to be simultaneously evaluated. To develop a more transparent and efficient procurement process collaboration between companies, municipalities and end users is raced as a key factor by Stockholm municipality.

Furthermore, the system is not built to support new technologies that are context dependent and therefore requires change management and new processes to be implemented. The people from the municipality stated that there is a difference and has to be recognized between test beds for development and test beds for implementation. Many new innovations are being developed with the help of test beds, but they are not implemented in the municipality or scaled up. In their opinion, there is a need for guidelines that map the steps on how to implement new technologies inside the municipality. Mapping an innovation process would help to see in what stage each municipality is, why they are stopped in a concrete stage and what they need to do to continue forward.

Regarding the creation of an innovative system, they would suggest an open-ended as well as iterative system that can adjust to the needs of each municipality. Another aspect to be developed within municipality are systems to know what kind of products are already on the market for specific needs. Another of their suggestions is having an external independent collaborator that is accepted by all actors to facilitate collaboration between municipalities, companies and end user’s.

Although they have a clear idea of how this process should look like it is not currently an integrated process inside the municipality.

4.2.4. Swedish Association of Local Authorities and Regions (SALAR)

A member from the innovation unit in SALAR agrees that there is a lack of methods and tools for evaluating and implementing new solutions. However, this is an area where they
will work more in the future since they see a great need to identify solutions to evaluate new technologies and design processes for dissemination and implementation of new technological innovations in the municipal sector. On an overall level, SALAR thinks that many municipalities have a clear picture of key perspectives that should be used as guidelines when introducing new solutions. At the same time, this is an issue that concerns both the solution/technology itself and the routines and work processes that an implementation implies. Then there are also significant cultural differences in different parts of the public sector that needs to be considered for successful implementations. Furthermore, it was acknowledged that in parts of the health care sector there is a good knowledge regarding implementation of new methods and techniques, where knowledge at the municipal level is more varied.

4.2.5. Danderyd Hospital - Stockholm County Council

Danderyd hospital was contacted as they have carried out a workshop on how to evaluate and introduce new medical devices in municipalities and county councils. A workshop initiated after identifying that there is no central authority for new medical devices which has led to an unregulated introduction of new technologies (Borg & Palmcrantz, 2017). The aim with the workshop was to develop a consensus among the different actors in relation to the procedures that are required to establish evidence for products that are introduced to the healthcare sector.

The workshop included representatives of SBU (the State Preparatory for Medical and Social Investigation), SLL (Regional HTA Unit in Stockholm County Council), assistive bodies (from Norrbotten and Västernorrland), Stockholm county council, medical technology companies and clinical researchers (Borg & Palmcrantz, 2017)

Through the workshop, all the actors discussed the factors that affect the introduction of new technologies in healthcare from a contextual and evidence perspective leading to a proposal for a systematic development and evaluation of medical technologies in Sweden.

After the workshop the proposed suggestions were (Borg & Palmcrantz, 2017):

- There should be a close collaboration and communication between companies, academia and the public sector. There should be R&D units at a county level to govern and coordinate this cooperation. It could be established at the university hospitals where there is existing knowledge in those type of cooperation.
-This R&D central unit can have the role of defining a national procedure with a quality evaluation of the safety and usability of new medical devices. This unified process should be accepted for all municipalities and county councils in Sweden.

-The municipalities and county council need to find funds for this cooperation.

-Once the systematic process of testing and reporting safety and usability has been done, the benefits and cost should also be evaluated.

After the workshop, Danderyd hospital is now in the process of contacting other agencies that are working in similar processes and mapping the current situation.

Good procedures and existing strategies to implement new technologies are available at several hospitals in Sweden, e.g. Danderyd hospital and The Uppsala University hospital, where both hospitals have innovation units, with defined processes, where companies can come and test their products or ideas involving the user in early stages to better benefits the patients. At Uppsala the innovation unit also offers usability tests and evaluation of products inside the hospital environment.

<table>
<thead>
<tr>
<th>Learnings from the public sector:</th>
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<tbody>
<tr>
<td>• Each municipality in Sweden has different procedures.</td>
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<td>• No municipality have any formal procedure to evaluate and assess new products or services to be implemented within the municipalities.</td>
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<tr>
<td>• The municipality of Västerås is developing a formal process to introduce new technologic interventions based on their experiences from the MISTEL project.</td>
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<tr>
<td>• Both municipalities of Uppsala and Västerås are in the process of identifying their needs and prioritizing among them.</td>
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<td>• It is beneficial when politicians are involved in developing innovation processes.</td>
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<td>• Innovations are most beneficial when they come bottom-up.</td>
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<td>• The word innovation should be defined in the public sector.</td>
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<td>• The procurement office should be involved in the innovation process and find new ways of evaluating new products.</td>
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<td>• Usually there are many levels of management inside municipalities that need to be addresses which increases the time the process of developing and including something new takes for the organisation.</td>
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<td>• Legislation makes it difficult to be innovative.</td>
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<td>• There should be different processes for developing new solutions and implementing new solutions.</td>
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<td>• Change management needs to be considered and addressed for successful introduction of new health-associated technologies in municipalities.</td>
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4.3. The private sector

The aim of this section is to investigate the experiences of two med-tech start-ups when addressing and implementing their products into the public sector. Also, the Swedish association of medical technology and Medtech4health have been interviewed to understand the current initiatives in Sweden.

4.3.1. Med-tech company 1

This first company interviewed is focused on a strengthening glove designed for people with impaired hand function or for people with grip-intensive professions. The glove adds extra force, on people that suffer from an impaired grip strength, where power is lacking due to muscle and nerves damage, diseases or pain (Bioservo, 2017).

To sell their product to the public sector, the company doesn’t approach municipalities because all 290 municipalities in Sweden have different procedures which makes it very complicated, time consuming and expansive. Instead, they contacted the Swedish Association of Local Authorities and Regions (SALAR), which advocates the interest and offer support to develop a better welfare system and services for municipalities, county councils and regions in Sweden (SKL, 2017). SALAR provides the help and guidance on how companies can approach their market solution. Once the company knows how they can provide their product to the public sector they approach the county council and explain their solution. If the product is considered of interest for the county council it will go through a public procurement. This procurement will be based on evaluation criteria that the product must fulfil. The evaluation process consists of testing the equipment for example in 10 individuals for 3-6 months and interview them to see what their opinions are. If the product is accepted after the evaluation process, it will go into a list of products approved for reimbursement and approved to be purchased by clinics in that specific county council.

The person interviewed claimed that Sweden is the second country in the world with more innovations but there is a lack of formal procedures to commercialize these innovations. The main obstacle is that there are no national processes to evaluate new technologies and implement them in clinical settings.

Also, when defining an evaluation method there should be a way to evaluate both soft values (quality, end-users’ feelings, etc) and hard values (reduction of costs, increase of revenues, etc).
Nowadays the company’s product is being evaluated by four municipalities and the process is time consuming due to this lack of national procedures for evaluation and implementation. In fact, their product has been promoted for 4 years and they are getting evaluated now. Luckily, during this time they have been able to focus on other markets, including industry as well as private customers.

4.3.2. Med-tech startup 2
The second company interviewed designs, develops and implements digital health solutions to improve the quality of life and better care management. The company has three main products: a mHealth application that delivers continuous communication between a patient and a physician; a platform to integrate different digital health data and a smart bed sensor that collects data on weight changes and sleep quality (Cenvigo, 2017).

To approach their products to municipalities, they usually try to contact the person who is the decision maker of the department they are interested to talk to. Their strategy is to start with an initial presentation addressing the current issues threatening healthcare today, regarding a growing ageing population and the need for better-personalized services, in accordance to what the government has stated needs to be achieved in Sweden in the upcoming years. Since this is a hot topic right now it is quite easy for them to establish an initial meeting. In the initial meeting, they properly inform municipalities about what the company works with, why, what value their products creates and to whom, how to use the products, including economic calculations for the customer.

From their experiences when working with municipalities, any new technology that they want to be implemented in a new environment, needs to be tested in a collaborative manner. One of the common problem, when establishing this type of collaborations between companies and municipalities is that the municipality doesn’t assign a project leader to drive the process and therefore a lot of time is lost on identifying who will be the person taking care of this project.

However, they mentioned a good experience regarding the introduction of one of their products to the municipality of Upplands Väsby. In Upplands Väsby, one person was assigned as the main responsible for the project and took care of the learning period for the municipality for five months. This person was also in charge of explaining to other colleagues how to install the product, how to connect the sensor from mobile to the server, how to interpret the data, etc. The company also mentioned that it is important for the
implementation process their customer’s employees are motivated, interested and are willing to see the benefits of using a new technology.

As a suggestion for improvement, the person interviewed stated that it is crucial that regions and municipalities communicate with politicians to establish good policies to facilitate innovation and the introduction of new technologies. For the company perspective, communication is a big part of changing the world and in this situation, there are many different levels to communicate with: end users, relatives, workers, politicians, decision-makers, etc. Another important aspect is that the process of assessing and implementing new technologies should be influenced by the people who are working with other people. It is very important to take into consideration the end user’s perspective.

4.3.3. Swedish Med-tech

The Swedish Medtech is the association for medical technology in Sweden. It is composed of 170 companies consisting of both manufacturers and distributors, including a wide range of products. The goals for this association are to create an interactive network between company members and healthcare institutions, to highlight the importance of medical technologies in healthcare, create a good environment for research, innovation and investment of medical technologies as well as to increase the visibility and business conditions for medical technologies worldwide (SwedishMedTech, 2017).

Discussing with the association about their connections with municipalities they mentioned that they do not have direct contact with municipalities to day, they usually discuss with county councils on how can increase collaboration.

Regarding the introduction of health-associated technologies, the county councils have a tender process where there is a list of criteria that companies must fulfil to present their products to them. According to the person interviewed, these criteria are too specific for enable innovation processes, in fact innovation is not a part of this process. The products approved are defined in a very strict way and there is no space to present alternative solutions. According to the interviewee, innovation, meaning new ways of evaluating,

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1 Tender refers to the process where governments open a proposal and seek other businesses that respond to a particular need, through the supply of goods and services.
should be part of the procurement process because it’s a huge barrier for innovation incitement in the public sector.

Another aspect mentioned is that many times entrepreneurs and the public sector collaborate in a test bed and end up in a pilot test, but the idea stays there, and they finish the innovation process before the product can be evaluated for implementation in health care settings that are governmental financed. Invested money by the public sector is largely spent on testing instead of buying and implementing.

Concerning the development of an innovation process, the person interviewed thinks that the public sector needs a clearer understanding that everybody is needed and that the private sector is an important part of the health care ecosystem, just as important as the patient. With better transparency between companies and the public sector, collaboration can increase and be easier conducted. It is also important to have a common goal and all actors must together strive for the patient and end-user’s satisfaction.

One last suggestion was that there should be an agency that drives this process and makes sure that everybody is in the process with clear responsibilities and obligations for patient-centred healthcare.

4.3.4. Medtech4health

Medtech4health is a strategic innovation programme in medical technology financed by Vinnova (Medtech4health, 2018). One of their main activities is to follow the goals set by the European initiative, Horizon 2020. The Horizon 2020 is a big research and innovation project from EU with the aim to remove barriers to innovation and facilitate the interactions between the public and private sector (EU, 2018).

As in the case with Swedish Med-tech, Medtech4health does not focus on municipalities but rather county councils because they are less in comparison to the 290 municipalities in Sweden and it is also easier to establish collaborations with the county councils than the municipalities. However, they want to get closer and more involved with municipalities’ activities and understand how Medtech4health can meet the needs of municipalities considering their mission for the Horizon 2020 programme.

Regarding their collaboration with county councils, Medtech4health wants the county councils to become the engine of their own innovation. They want to help them to find ways to work together with academia and companies while increasing innovation speed
and extend the possibilities of implementing new solutions. Medtech4health usually has many interactions with county councils because some of their members are on the Medtech4health board where they work together to address issues about implementing new innovations.

One of the main barriers that they have seen when working together with county councils is the procurement procedure. It is a process that can last for over four years and it is also very hard for a new solution to get into the procurement process. They have identified a need for a general process around the procurement process and structure that supports this process. Discussing the procurement procedure, Medtech4health thinks that it is important to find another way to write specifications focusing on the functional description instead of describing hard and stiff criteria. Although they want to make this process as innovative as possible, it is a challenge to evaluate a product if the specifications are very open. One of the challenges of an innovative procurement is to evaluate something that you are not sure what it is and also compare different solutions when they are completely different. A balance needs to be found between how to write demands and how to evaluate it from an innovation perspective. In general, they need to increase the knowledge on how to work with these types of processes. She also mentioned that healthcare professionals and end users have to be included in this process as early as possible.

Another barrier in Sweden is that when a product is approved for reimbursement in one county council it is not be approved in another county council because they all have different processes. She suggests developing a process where a product can be accepted in all country councils.

Regarding how an innovative process should look like, one possibility is that companies can work closely with healthcare professionals ensuring that the product that they are developing or evaluating fulfills their needs. The public sector needs to have a transparent innovation structure that companies can check and work from. County councils and municipalities need to be restructured and be open for cooperation to understand better the healthcare systems opportunities with current technological and scientific achievements. What also needs to be taken into consideration is that if any new process or product is implemented this is only a small part of the innovation process because this implementation will have a big impact in all the aspects surrounding the new solution such as the resources needed to actively use the solution in clinical practise.
From experiences end user’s perspective need to be included when incorporating new solutions to county councils. Personal at the county council is almost always included to some extent but not patients. Nowadays discussions in the field of medical technologies is focused on how patients can participate, and how specifications should be formulated for new evaluation processes. To define this process, a possibility is to work with focus groups and listen to what is important for the patients as well as provide the end users with products to test at home and then give feedback on. Since all 290 municipalities in Sweden are very individual and have their own organizational structures and procurement processes, it might not be realistic to create a standardized process. Rather it might be possible to create a database to share criteria and experiences with products and new interventions for evaluation between other municipalities or county councils.

Starting by sharing good examples and try to work through shared experiences can help other municipalities and county councils to improve their own processes. But most important, an innovation-friendly procurement process with evaluation methods and criteria need to be created.
The end-users

End user 1

The first end user interviewed explained that the services that citizens receive from municipalities depend on each municipality and county council since each of them works differently. There are some county councils that offer different services than others. If you like to get services from another county council, it’s hard to be approved and if you pay privately it is expensive.

Regarding the implementation of health-associated technologies and the end user’s perspective, the person interviewed did not have experience on the implementation of health-associated technologies, but she had been involved in the development of new products, by assisting companies to develop their products. This normally involves her taking the products home to test them in her everyday life and then providing feedback.
back to the companies. Usually, companies contact her through the orthopaedic centre or her doctors and ask if they can help them get in contact with patients or users to try their products.

An example from a friend of her that needed a bike, as an assistive tool for disable people, was denied by the municipality until she started to contact and complain to politicians that the municipality did not meet her and other citizens needs which they are entitled to by law.

When defining an innovation process for municipalities she thinks that not only end user’s (if it’s someone with a diagnosis) should be included but also healthcare professionals. Healthcare professional can help end users to define their needs as they know how they are going to evolve with a diagnosis and what the need for this person will be over time.  

**End user 2**

The second person interviewed explained how his willingness to give a dignified quality of life to his wife has made him invest time to find new solutions that can help her live better life in relation to the injuries she has suffered. He thinks that in many cases, people’s relatives have to be the engine of the movement in order to facilitate their lives.

One of the main issues that he sees is that innovative technologies cannot be implemented if the basic needs are not covered. For example, there is a lack of staff at the elderly home where his wife lives. A situation he thinks is related to a lack of people who are willing to take care of people who are in need. It is not an attractive job and the salary is not so good. Another reflection is that employees at these positions are generally not very motivated and curious about exploring new things. Furthermore, some of these jobs do not require a high education and it can also be the case that some staff don’t speak enough Swedish or English to be able to understand what is required to implement new things or even communicate with the persons they are employed to assist. For this reason, if they don’t have enough people to take care and cover the basics of the ones who are in need, there is fore sure no staff that have time to try new things. One could say that basic needs are competing with innovative introduction processes. The demand and needs for help are enormous and the government and municipalities need to put additional resources to improve the situation for employees and there by the patients. Otherwise, it will be a waste of investment to keep putting money in to innovation and in buying new things. When discussing new technologies, he thinks that the balance needs to be found between
using this technology to release work from the staff and to allow them to spend more time with the people who need help and for example are living in the elderly care homes. Technology should never replace human connections because what people needs most of all is human contact and the interactions with others. Robots cannot respond to human needs and emotions.

In order to achieve successful innovations, municipalities should employ more staff to be able to cover the basic needs of people, improve the salaries and find ways to make jobs in the healthcare sector attractive. The main goal with all the above suggestions is to find effective ways of making the daily life easier and better for the people who are in need of help with daily life activities.

End user 3

The third person interviewed explained how she needed to arrange her apartment in Stockholm due to a weakness in her muscles that stops her from walking properly, as well as sitting and standing up without assistance. In order to re-arrange her apartment and to readapt it for her needs, she had an assessment of her home done by the municipality of Stockholm. She especially needed something to assist her to stand up and sit down and she had found on the internet a device for 5000 SEK that could help her to do these movements. She showed and explained to the evaluators this aid, that furthermore is portable and can be placed anywhere where she needs assistance to get up. An aid that would improve her life quality significantly since she will not be dependent on having people around to be able to sit in a sofa or at a table. The evaluators said that they could not get her this device because it was not in the list of products for reimbursement of the municipality but that they could employ a personal assistant that can be with her for eight hours a day and assist her with this movement. After continuously asking without receiving any information on how to get this product into the list, she gave up and just bought it for herself from America. She noted that the unavailability of this rather inexpensive innovation in the list of products for reimbursement of the municipality will stop other people who might be in need as well to improve their life quality. It is also remarkable that the municipality is willing to pay around a million per year for an employee rather than getting a device for 5000 Swedish kronor. Furthermore, she didn’t like the idea of having someone at home with her because she is not sick and dependent, she just needs something to help her stand up and sit down but for the rest she can live
independently. So, the feeling of having someone at home made her feel like a sick and dependent person which is what she is fighting against.

Her opinion on how to better introduce health technologies is to have a clear budget for innovation that citizens in need can apply for and use to try different solutions to innovate their life situation that is limited by an injury or a disease. The municipality should also have a database where information and experiences can be shared regarding innovation that has been tested by end users and municipalities’ and county council’s staff. There is also a need for transparency regarding the procurement process, for both citizens and employees. Employees also need more knowledge and information about procurements and innovation processes in the municipality so that the staff, that is meeting the citizens, can help and assist people in need and not meet them with a mindset that “this is not possible”.

Learnings from the end users:

- Both healthcare professionals and end users should be involved in the innovation process.
- Municipalities need to attract more staff to cover the basics for the people in need before investing in new technologies and innovation processes.
- The disposition to introduce new technologies or products needs to come from the end user’s and their willingness to improve their life quality more than from the municipality.
- Stiff and unclear procurement processes don’t allow people to get the help their need.
- Additional resources need to be put in basic care.
- Increased knowledge and an innovative mindset is needed among employees at municipalities and county councils to be able to assist people looking for solutions to improve their life quality after an injury or due to a disease.
5. Analysis

*In this chapter the empirical data collected through interviews and documentation is analyzed through the lens of the theoretical framework.

The first research question will be analyzed by looking into the theoretical framework developed by Albury & Mulgan (2005) where the authors talk about generating possibilities for innovation into the public sector, incubate and prototype ideas, scale them and analyze the outcome. These four stages will be related to the three-step process of how health-associated technologies have been introduced, evaluated and implemented nowadays.

The second research question will be related to the theory around barriers to innovation in the public sector by Albury & Mulgan (2005) where the authors define six main barriers which will be analyzed in relation to the introduction, evaluation and implementation processes to introduce health-associated technologies. The analysis will also be supported by a study conducted by Wihlman, et al. (2016) were the authors state that one of the main barriers for innovation in the public sector are gaps between organizational levels.

5.1. The key steps to introduce, evaluate and implement health-associated technologies into different Swedish municipalities

-Introduction

The introduction of health-associated technologies varies in each municipality. This variation among municipalities is due to the self-governance of Swedish municipalities that in turn allows them to attend to their individual needs and develop individual organisational cultures. Counties have to compete with each other within the system to become more efficient, creating an internal competition with notable differences among municipalities. From the perspective of single municipalities or county council, these differences are beneficial for municipalities and county councils since it makes them more competitive, although these differences will reflect on the way services and care are delivered creating an unequal situation in Sweden.
Nowadays some municipalities are in the process of developing introduction processes that will guide organizations and end users to approach municipalities either with their needs or suggested products. As for example the municipality of Västerås that is developing a process to introduce new solutions from the municipality’s needs based on their previous experience with the MISTEL project. Also, the municipalities of Uppsala and Stockholm are in the process of identifying their needs and prioritizing among them with the intention to eventually define an introduction procedure.

This links to the idea developed by Alburgy & Mulgan (2005) where they state that half of the innovations inside the public sector are not originated from the top of the organization but generated in practice by end users, staff or middle managers. Knowing that a numerous amount of new solutions will come from end users, which can be citizens or staff from the municipality, guidelines need to be developed to facilitate transparency and communication between municipalities and other stakeholders.

Using creativity techniques is seen by Albury & Mulgan (2005) as an effective tool to generate and introduce innovative processes. For example, in the municipality of Uppsala, the innovation manager from the elderly care home attended seminars to learn about service design processes and how to develop and introduce innovative procedures. But to create new procedures will depend on the rigidity of the municipality’s organizational structures. Thus, to create and introduce new procedures, for introducing already existing technologies, rules and legislations will be a determining factor, since innovation requires an open-ended structure that enable agile and dynamic work processes (Albury & Mulgan, 2005). Rules drive and regulate both internal and external collaborative efforts in organizations to develop new solutions as well as redefining existing procedures. If municipalities have not been assigned and provided resources to engage in the introduction of innovative processes by politicians, they cannot include innovation within their daily operations. Albury & Mulgan (2005) suggest that to introduce and create innovation in the public sector, organizational rule-breaking should be encouraged and managed. Rule breaking refers to breaking softer organizational rules and municipalities didn’t see it as an option since they do not experience that legislations are organized in such a way that allow employees to stretch established guidelines and rules.

Due to the lack of procedures for introducing new solutions into some of the municipalities, external organizations, citizens and staff, will have to rely on their network
to identify who has the personal responsibility in the desired department, furthermore to pinpoint who has the right to decide on a future meeting and potential purchase.

-Evaluation

As stated by Albury & Mulgan (2005), evaluating and assessing new solutions require spaces to test innovations where it’s important to have defined procedures, enough funds and realistic connections between action and results. The empirics show that one of the municipalities interviewed is starting to use an evaluation model that can assess the technology from a broader perspective compared to other municipalities. This model consists on evaluating the new solution from an organizational, technological, economical and citizens point of view. A broader perspective will aid estimations on how, for example, the technology impacts established routines of the organization or improves the efficiency and quality of daily practice, point to financial aspects such as investment made and potential financial gains and how the technology can contribute to the enhance the quality of life for the users. Also, this broader perspective will help to provide a formal assessment of the potential of a given welfare technology by identifying where it can be implemented, the kind of needs it covers, as well as its advantages and disadvantages contributing to relevant analysis, assessments and suggestions when deciding to purchase and implement a technology.

Having a well-defined evaluation method where the opinions of the different stakeholders are considered, will help to better incorporate new solutions. Regarding funds and according to Henriksson (2017), municipalities are restricted in their financial priorities due to a system of one and four years budgets. The stakeholders interviewed agreed that municipalities should have a clear budget for innovation where citizens and users can test new solutions as well as finding funds from external actors for this cooperation.

Regarding the use of test beds, Albury & Mulgan (2005) stated that the earlier end users are introduced in the process of testing and evaluating new solutions, the higher the chances to identify more needs and challenges and develop better suitable solutions.

Municipalities have created test beds for developing new solutions together with companies and end users in safe environments. However, municipalities invest many resources in helping companies to develop their products but most of the time these new solutions are not introduced into the municipality.
-Implementation

Introducing end users early in the process of implementing new solutions will also help to deliver better solutions as it’s seen in the evaluation process (Albury & Mulgan, 2005). However less resources are invested in creating implementation strategies of existing products into the municipalities compared to the development of new solutions. As stated by Albury & Mulgan (2005), the public sector doesn’t fail in generating ideas, the weakest part of it implementing effective solutions. This is related to the idea that none of the interviewed municipalities are in the process of developing implementation guidelines. For this reason, a supportive system around the implementation of new technologies could be developed as well as investing more in test bed for implementation as it’s done for development.

5.2. Challenges and opportunities to introduce, evaluate and implement health-associated technologies into different Swedish municipalities

-Introduction

The inexistence of introduction processes into municipalities makes other stakeholders as the private sector and end users to mistrust the public sector. According to Sharma & Bindal (2014), lack of transparency and mistrust is one of the biggest challenges in this type of cooperation. Related to this idea, since there aren’t national procedures and regulations for the introduction of health-associated technologies at a municipal level, companies feel unsure on how to approach the public sector and invest their time and money to reach the market.

Alburty & Mulgan (2005) also state that one of the barriers for introduction and widespread use of innovations is due to the pressures and burdens of employees’ daily operations as well as political pressures and having to report to senior managers. Indeed, time is a constrained factor and it has been experienced and acknowledged by both interviewed public actors and end users. Managers and other employees experience that they have no time to invest in innovation-driven management. Albury & Mulgan (2005) suggest that providing the necessary time and space to discuss amongst managers and employees will help to create procedures that can facilitate the introduction of new solutions. There are also many management levels inside the municipality and the process of introducing something new is very slow.
However, establishing new procedures requires necessary skills in change management (Albury & Mulgan, 2005). As mentioned by municipalities, change can be difficult to accept and therefore actions taken need to consider all the phases from policies to implementation. In order for these changes to take place, changes in the structure of the organization or new internal and external collaborations have to occur. This is seen as an opportunity for municipalities to redefine their needs and priorities and establish better policies together with politicians.

-Evaluation

Albury & Mulgan (2005) state that procedures for evaluating should not be too rigid in case it hinders innovation. This has been seen in municipalities where different products can’t be introduced due to the rigidity of the specifications defined in the evaluation as part of the procurement process. The procurement process also raises an obstacle for the end-users as they cannot get access to technologies and interventions that are not in the list of products bought by the municipality. For example, one of the end users interviewed wanted to get a new product for herself at home and because it was not in the list of products bought by the municipality and no one, after asking several times, could answer her how to get this product into the list, she bought it herself.

The fact that each municipality has individual lists of products, in some cases provide major inequality between Swedish citizens regarding the support they can get for daily living and life quality. As for example, one of the end users interviewed wanted to get a specific service for rehabilitation that was not offered in her municipality but in the neighboring municipality and if she wanted to have access to it, she had to pay for it herself.

-Implementation

Regarding implementation, none of the interviewed municipalities had an established implementation strategy in their pipeline, nor did they have an outcome analysis. The municipality of Västerås is the one that is closest to define an implementation strategy since the previous stages, introduction and evaluation, are more being defined. As seen from the three municipalities interviewed, there is a need for guidelines that map the steps on how to implement new technologies inside the municipality. According to Albury and Mulgan (2005), the results from an implementation process are not immediate and it’s important to develop real-time learning procedures to help monitor
what is needed to be adjusted or changed. The public sector is aware that there is a need for designing processes for implementation in the municipal sector.
6. Conclusions

*In the following chapter, the findings of the study will be summarized.*

The aim of this study has been to identify the key steps, challenges and opportunities for the introduction, evaluation and implementation of health-associated technologies into Swedish municipalities. For that, actors from the private and public sector as well as end users have been interviewed.

As a general observation, noticeable differences have been identified between municipalities as each one has individual needs and has different internal procedures. Due to a large number of municipalities in Sweden, 290, and the different internal procedures and structures, private organizations prefer to establish collaborations with county councils instead of municipalities because there is a lower number of them. This leaves municipalities a bit unattended and less involved in innovation activities. Efforts must be maximized to connect municipalities more between them and share good practices as well as receiving more support from the strategic innovation programs in Sweden.

Regarding the introduction procedure, the main differences between municipalities are that some are further in the process of developing formal procedures for organizations and end users to contact the municipality and approach their products or needs. Municipalities are more focused on collaborating with companies in order to develop new products with the end users as a strategy to facilitate the introduction of new solutions that are based on the actual needs of the municipality. Today the introduction is normally a big challenge for companies since to introduce any product into municipalities, private organizations and end users today will have to rely on their extended personal network. Also, legislation and rules established by politicians in each municipality become an obstacle when municipalities have not been assigned and provided resources to engage in innovative processes and thus cannot include innovation in their daily operations.

Regarding the evaluation procedure as part of the procurement process, there is no space for evaluating a new solution considering different aspects of the technology including its value to the municipality and the end-user. It has been seen as a big obstacle both for companies, that want to sell their products with a reasonable amount of time to municipalities and for municipalities for not being able to evaluate new products from different aspects. This process also raises an obstacle for end users as they cannot get
access to technologies that are not included in the list of products bought by the municipality.

Regarding the implementation procedures any of the three municipalities interviewed are in the process of developing an implementation procedure. Implementation procedures do not exist and should be established and benchmarked in the testbed, where it is important that the implementation procedure includes an iterative evaluation process as all technologies and workplaces are in constant optimization.
7. **Discussion**

*In the next section, the main leanings from the study will be summarized, as well as stating its academic contribution, possible future considerations and further research.*

7.1. **What can we learn about innovation in municipalities from this study?**

As seen from the framework developed by Albury & Mulgan (2005), when trying to standardize processes and apply the best practice, it is a risk to overlook needs of organizations and individuals. Due to the diversity of organizational structures and procedures in each municipality, the development of a standardized process in Sweden has been considered an unrealistic option for many stakeholders. A standpoint mainly due to the diversity of organizational structures and procedures in each municipality as well as the individual needs that every municipality presents.

However, from the empirical data and the above analysis, and due to the fact that the evaluation as part of the procurement process is considered one of the biggest barriers, it would be easier for citizens and end users if municipalities broadened the evaluation criteria. These criteria could be similar to the one that the municipality of Västerås is using and consists on evaluating the technology from a citizen, technological, organizational and economical perspective. The first step would be to identify the need that the technology wants to cover. The next factor would be to estimate if this type of technology will meet the established need. Then the organisation could be evaluated in relation to the product, i.e. if the organisation can from both a practical and financial aspect implement the suggested type of technology in to already existing activities. The last factor to be evaluated would be if the suggested product is financially reasonable to invest in regarding return of investment (ROI).

This evaluation could also incorporate the end-users’ perspective at an early stage by identifying existing needs within the organization and/or what potential needs a product can fulfil for the organization or the end-user. According to Albury & Mulgan (2005) having an organization where the staff has a wide variety of backgrounds and mindsets, with different viewpoints, is more likely to be innovative. For this reason, in order to have a mixed team of people when evaluating the technology, the innovation unit doing the evaluations could be composed by technical, business and industrial expertise as well as end-users’ expertise.
This evaluation would facilitate the development of an innovation procurement that would evaluate what specific product should be purchased and evaluated in an agile and dynamic testbed procedure. Furthermore, this test bed could be based on an organization specific developed implementation strategy that is evaluated according to previously conducted estimations. After evaluating the test bed, the municipality could decide if the technology would be implemented into the daily activities of the organization as well as making it available in a larger scale to other department and actors within the municipality.

7.2. Academic contribution

When performing the literature review there were many articles regarding innovation in the public sector. Most of these articles talked about developing new products or services from an initial idea together with an organization, but there were very few of them talking about how to implement existing products into municipalities. There were even less empirical results on the implementation of health technologies into municipalities. This study has done a contribution to research by providing an overview of the situation, with the case of three Swedish municipalities, regarding introduction of already existing products, as well as the key steps identified, and barriers encountered for introduction, evaluation and implementation by all stakeholders, i.e. the public, private sector and citizens/end-user.

7.3. Future considerations

After performing the study and gathering data from the interviewees, theory around implementation and previous practical examples should be looked into and added in the study. In this way it will be easier and more relevant to relate the data gathered with the theoretical framework.

It would also be interesting to see what have county councils been doing, and how the procedures differ in comparison to the municipalities regarding the introduction, evaluation and implementation procedures of health-associated technologies.
7.4. Further research

An aspect to consider is that the study can be interpreted as good and bad practises from different municipalities are being compared, when the intention is to show how good practises can be shared and how different municipalities can learn from each other.

Thus, a suggestion for further research is to draw a timeline regarding evolution of innovative practises at different Swedish municipalities. A timeline that can show how municipalities in Sweden previously have handled the introduction of health-associated technologies, how it is done nowadays and how they can prepare new processes for introducing innovations in the future.
## Appendix 1: Conducted interviews

*Table 1. List of participants of the study*

<table>
<thead>
<tr>
<th>Person interviewed</th>
<th>Position</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Person A</td>
<td>Innovation and change leader at the elderly care department at Uppsala municipality</td>
<td>02/02/18</td>
</tr>
<tr>
<td>Person B</td>
<td>Business strategist and specialist at Uppsala municipality</td>
<td>19/02/18</td>
</tr>
<tr>
<td>Person C</td>
<td>Project manager MISTEL project at city of Västerås</td>
<td>26/02/18</td>
</tr>
<tr>
<td>Person D</td>
<td>Sales and marketing director of company 1</td>
<td>07/02/18</td>
</tr>
<tr>
<td>Person E</td>
<td>Sales manager at company 2</td>
<td>06/03/18</td>
</tr>
<tr>
<td>Person F</td>
<td>Project manager at Medtech4health</td>
<td>28/03/18</td>
</tr>
<tr>
<td>Person G</td>
<td>Project manager for innovation and growth at Swedish Medtech</td>
<td>09/03/18</td>
</tr>
<tr>
<td>Person H</td>
<td>Occupational therapist and strategist at the elderly care department at the municipality of Stockholm</td>
<td>12/04/18</td>
</tr>
<tr>
<td>Person I</td>
<td>Occupational therapist and strategist at the elderly care department at the municipality of Stockholm</td>
<td>12/04/18</td>
</tr>
<tr>
<td>Person J</td>
<td>End user 1</td>
<td>04/04/18</td>
</tr>
<tr>
<td>Person K</td>
<td>Adjunct professor and chief physician at the Rehabilitation Medicine University Clinic at Danderyd Hospital.</td>
<td>09/04/18</td>
</tr>
<tr>
<td>Person L</td>
<td>End user 2</td>
<td>17/04/18</td>
</tr>
<tr>
<td>Person M</td>
<td>End user 3</td>
<td>18/04/18</td>
</tr>
</tbody>
</table>
## Appendix 2: Assessment questions for welfare technologies

The intention is to answer to the following questions from each category when assessing the welfare technology (FredericiaKommune, 2018):

*Table 2. Assessment questions for welfare technologies*

<table>
<thead>
<tr>
<th>ORGANIZATION</th>
<th>TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the technology affect the employees' working environment?</td>
<td>How can the technology improve the efficiency and quality with its daily practice?</td>
</tr>
<tr>
<td>How does the technology affect the current solution of tasks, including work routines and the organization? Do you have to change or remove tasks?</td>
<td>Does the technology replace previous technology or services?</td>
</tr>
<tr>
<td>How is the communication and relationship affected between the citizens and the employees due to the technology?</td>
<td>What is the margin of error, how often does the technology fail? What are the consequences?</td>
</tr>
<tr>
<td>Have the employees and management the right skills to integrate the technology?</td>
<td>How energy efficient and environmentally friendly is the technology regarding procurement, operations (energy consumption) and disposal? Safety?</td>
</tr>
<tr>
<td>How does technology interfere with the culture of the organization?</td>
<td>How frequently should the technology be replaced, supplemented or repaired?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECONOMIC</th>
<th>CITIZENS</th>
</tr>
</thead>
<tbody>
<tr>
<td>What direct financial gains can be expected? (time saving, staff, wages, etc)</td>
<td>How does the technology support the citizen’s ability to master his/her own life?</td>
</tr>
<tr>
<td>What derived gains can be expected? (reduced number of falls/illness/stress among employees)</td>
<td>Does technology contribute to the quality of life of the citizen?</td>
</tr>
<tr>
<td>What are the investment costs? (procurement of technology, hardware, software)</td>
<td>Is the technology user-friendly and relevant in the everyday life of the citizen?</td>
</tr>
<tr>
<td>What is the cost of operation? (maintenance, updating, repair, etc)</td>
<td>Does the technology require special prerequisites?</td>
</tr>
<tr>
<td></td>
<td>Does the technology create insecurity, distance or anxiety?</td>
</tr>
<tr>
<td></td>
<td>How does the technology affect the relationships with professionals, relatives, friends, etc.?</td>
</tr>
</tbody>
</table>
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