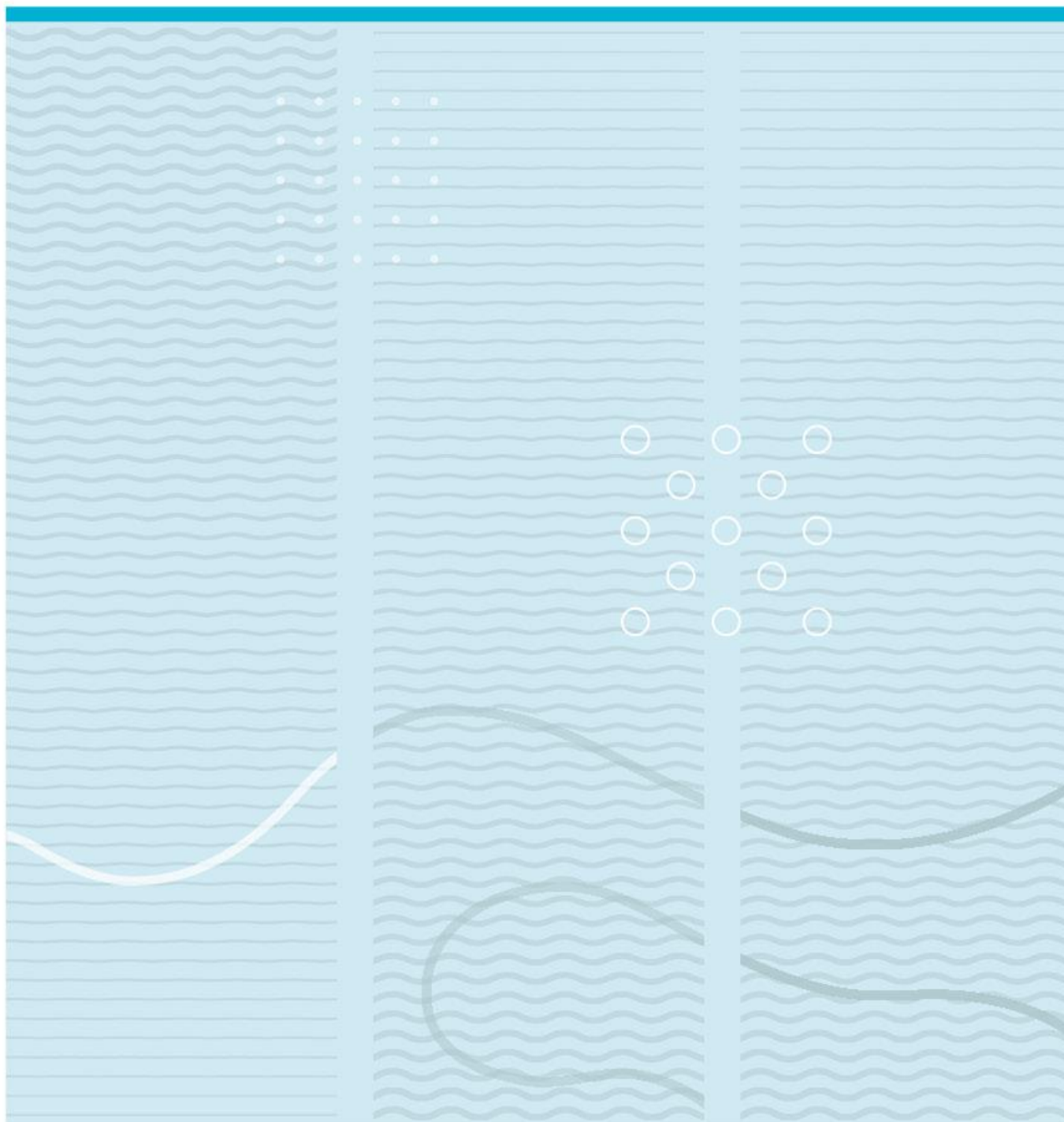


Magnus Gjøse Vatsvåg

# What are the consequences of digitalizing the care of senior citizens?

A case study of Berntsen being introduced to the sector for the care of seniors in Stavanger County.



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This thesis is worth 30 study points.

## Summary

Digital innovation is often viewed as the way forward, leading to massive digitalization efforts in various sectors, both public and private. This digitalization effort is usually driven by a desire to cut costs so that the business can run more efficiently. This is also the case for Berntsen, who, if able to cut costs by just 10%, could save Stavanger County Kr 20 million. However, cutting costs should not be the only factor when considering digital innovation, especially in the public sector, where the county is directly responsible for the well-being of hundreds of senior citizens. This means that the impact of Berntsen on the well-being of its senior users is central to determining whether it is a good investment.

Berntsen is able to perform needed supportive behavior for the senior citizens' need for competence and autonomy through its activity program. However, Berntsen distinctly lacks functionality around satisfying the need for relatedness. This means that human connections need to be found elsewhere, which may be difficult if the user is already lonely and does not have anyone close to them. However, when Berntsen is paired with someone who has the desire to increase their fitness, then Berntsen will do a good job of continuing to motivate them without having to occupy the time of health professionals.

Berntsen is overall a good innovation that can help those who need it, despite it being more limited in functionality than it might appear. However, some other solutions will need to solve the problems facing the sector for the care of senior citizens.

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## Foreword

After this foreword, the master thesis “What is the consequence of digitalizing the care of senior citizens?” will be presented. It has been written to fulfill the requirements of the master’s in strategy and competence leadership program at the University of South-Eastern Norway (USN) in Hønefoss, Norway. I was researching and writing this thesis from October 2022 to May 2023, with most work being done in spring 2023 while living in Stavanger.

I am thankful for the operations manager at Haugåstunet nursing home, Line Ekker, who was willing to provide useful answers surrounding the use of Berntsen at their facility.

I want to thank my supervisor Etty Ragnhild Nilsen, for sticking with me and guiding me through my extended journey. You are both the inspiration for my master’s thesis and have supported me through it all. In addition, I would like to thank Halgeir Halvari, my lecturer in motivation and mastery, who always gave his all and inspired me to use motivational theory for my master’s. I would also like to thank my economics teacher in high school, Monica Meling, since if it was not for you, I would not be studying economics at all.

Finally, I would like to thank my family, who supported me throughout my time at Hønefoss, as well as my time at home in Stavanger. I would also like to thank my friends made at the university who has supported me throughout my time at USN. Lastly, I want to thank you, the reader, for taking the time to read my thesis, so please enjoy it.

Stavanger, May 3, 2023

Magnus G. Vatsvåg

*The foreword structure is based on a template (George, 2022).*

# 1 Introduction

Digitalization is a concept that is becoming more common as there is a reliance on technology and digital solutions. The implementation of digital solutions has uprooted many ingrained industries, from the taxi industry with Uber or Airbnb to the motel industry. However, one place that has also been affected by digitalization is care homes for senior citizens. Robots are allowing prolonged stay at home so that there are more open spaces at retirement homes. This could be crucial with the advent of an elder wave due to hit Norway with its aging population.

The problem faced by Norway is that of low population growth (Statistisk sentralbyrå, 2023), accompanied by a large group of people in their late 50s (Statistisk sentralbyrå, 2022). This leaves a generation of Norwegian with not enough people to take care of them, and certain cities are already feeling the strain of shortages of nurses in several counties (Hatland, Sørbø, & Morten, 2022; Bø, 2022). This is not necessarily an uncommon problem, but a new digital innovation is being trialed in parts of Norway called “Berntsen” feetless.

Berntsen is a robot created by the company Innocom AS in cooperation with Stavanger County, which is also the first area that has been testing this new technology. Berntsen is an activity robot designed to help senior citizens to do daily exercises and remind them to take essential medicine and perform other valuable functions. It also has a camera and microphone, which makes it possible for nurses and other health personnel to do check-ups on them without having to visit them directly. This would allow nurses to spend their time more effectively while at work, but it brings with it particular safeguarding concerns regarding the well-being of senior citizens.

Although intended as a time and cost-saving measure, it brings up questions of how removing the human contact provided by the nurses will affect their mental well-being. This is especially important as many elderlies already feel lonely, with generally a smaller social network, less frequent social contact, and fewer people to receive emotional support from (Pinquart & Sorensen, 2001). The question then becomes: “What are the consequences of digitalizing the care of senior citizens?”.

## **2 Theoretical background**

Central to the question posed by this study is how well-being is affected by changes in the environment caused by Berntsen. There are two approaches to this problem, with the most straightforward being to measure well-being in groups that do utilize Berntsen and those that do not. Given a large enough sample size, it could get some viable results, but this would ignore the reason for them feeling this way. So, the second approach is to measure the changes in factors that affect well-being. This will allow for both exploration of changes in well-being and possible explanations for these changes. The theory that I will be using for exploring changes in well-being is the Basic Psychological Needs Theory (BPNT), which is one of the six mini theories that are a part of Self Determination Theory (SDT) pioneered by Richard Ryan and Edward Deci. In addition to SDT, certain other concepts also need to be defined.

### ***2.1 Definitions***

#### **2.1.1 Digitalization**

Digitalization is closely linked to the concept of digitization, which can be defined as the process of converting analog data into a digital form. However, digitalization is a broader term referring to the changes associated with applying digital solutions to all aspects of society (Stolterman & Fors, 2004). There are many possible benefits of digitalization, among them cost-saving, time-saving, and automatic data collection, to name a few (Parviainen, Tihinen, Teppola, & Kääriäinen, 2017). This means that digitalization can be central for sectors that lack the workforce or have a tight budget.

#### **2.1.2 Digital Innovation**

Digital innovation can be understood as either a process or outcome that is enabled through the use of digital technology (Skog, Wimelius, & Sandberg, 2018). A contributing factor of digital innovation is the drive to digitalize society, with both large-scale digitization processes and exponential improvements in basic computing capabilities, which makes it easier to adopt digital solutions on a social and institutional level. Due to the propensity for digital infrastructure to be universally standardized, it allows actors to combine digital and physical elements far more intensively than in other technological innovations. This leads there to a continuous process of actors combining various elements, which is compounded by the ever-expanding digital space (Lyytinen & Rose, 2003).

### 2.1.3 Well-being

Well-being, also known as wellness, is a much-debated topic among scientists, psychologists, theologians, and philosophers, with several perspectives having emerged over time. The hedonistic perspective is that well-being is the presence of positive effects and the lack of negative effects. When combined with a self-evaluation of life satisfaction, it is commonly known as subjective well-being (SWB). This perspective is liked by some researchers as it allows them to determine what the “good life” is through empirical means, and it is convenient to measure when researching (Ryan & Deci, 2018, p. 239). However, this perspective has also been criticized for having hedonism as a life goal, thereby making humans slavish followers of base desires.

The eudaimonic view is preferred by many scholars, as it has a higher ideal than the hedonistic perspective. The eudaimonic view is that when humans cultivate and express the best within them, then it will reliably lead them to happiness. This position dates to Aristotle, who expressed that “true happiness” is found in the expression of human excellence and virtue. In simpler terms, happiness is achieved by doing something worth doing (Ryan, Curren, & Deci, 2013). However, the eudaimonic view distinguishes between subjective desire, whose satisfaction may lead to feelings of pleasure and basic human needs that feed into the growth and wellness of the human condition (Ryan & Deci, 2018).

This leads to a defined split between happiness and wellness, with happiness being assessed by the presence of positive effects and lack of negative effects (much like the hedonistic view of wellness). Meanwhile, wellness is something more than the subjective experience of happiness, as someone can experience one without the other. E.g., a homeless drug addict that wins the lottery may feel a lot of happiness, but one would not consider them to be well regardless. However, this does not mean that happiness is unrelated to wellness, but one should consider happiness to be a symptom of well-being. Wellness should be considered a state of thriving or being fully functioning. Thriving is defined by vitality, awareness, access to and exercise of one’s human capacity, and true self-governance (Ryan & Deci, 2018, pp. 240-241).



#### 2.1.4 Technostress

Technostress is the concept of technology as a source of stress or anxiety, usually related to the digitalization of the workplace (Dragano & Lunau, 2020). The reason that it is most prevalent in the workplace compared to other aspects of life is that it is unavoidable, and your livelihood is dependent on understanding it. These feelings may occur outside of work if a similar situation is present (Dragano & Lunau, 2020).

### 2.2 *Self-Determination Theory*

SDT is a large framework that is used for studying the motivation and personality of humans. It is based on the fundamental assumption that humans are evolved to be naturally curious, physically, and deeply social beings. This means that human development is defined by proactive engagement, integrating information and regulation of behavior, and assimilating into social groups. From a young age, if raised in a supportive environment, people will manifest an inherent will to explore, learn about, and achieve mastery over their inner and outer world (Ryan & Deci, 2018).

This inherent will to explore, learn, and manipulate is associated within SDT with the concept of intrinsic motivation. While the wish to assimilate social norms and into social groups is within SDT associated with the concept of internalization and integration. The propensity for and pursuit of intrinsic motivation, internalization, and integration leads to satisfaction through feelings of autonomy, competence, and relatedness. The feelings of autonomy, competence, and relatedness can be described as the essence of human thriving and are predictors for any number of indicators for well-being and vitality (Ryan & Deci, 2018).

### 2.3 *Basic Psychological Needs Theory*

The word 'need' can be used in many ways, as it can mean anything from a preference to a strong desire. This leaves the word, when in common use, as a quite loose term that can change meaning depending on the circumstance. However, in BPNT, the term basic psychological need has a specific and narrow definition as *a psychological nutrient that is essential for individuals' adjustment, integrity, and growth* (Ryan R. M., 1995). The satisfaction of this need is essential for individuals' well-being, while its frustration increases the possibility of passivity, ill-being, and defensiveness (Ryan & Deci, 2000b). Over time it has also developed specific criteria for defining what a basic psychological need is, which is described in Table 1 (Vansteenkiste, Ryan, & Soenens, 2020).

Table 1. Description of Basic and associated criteria within BPNT copied from (Vansteenkiste, Ryan, & Soenens, 2020, p. 4).

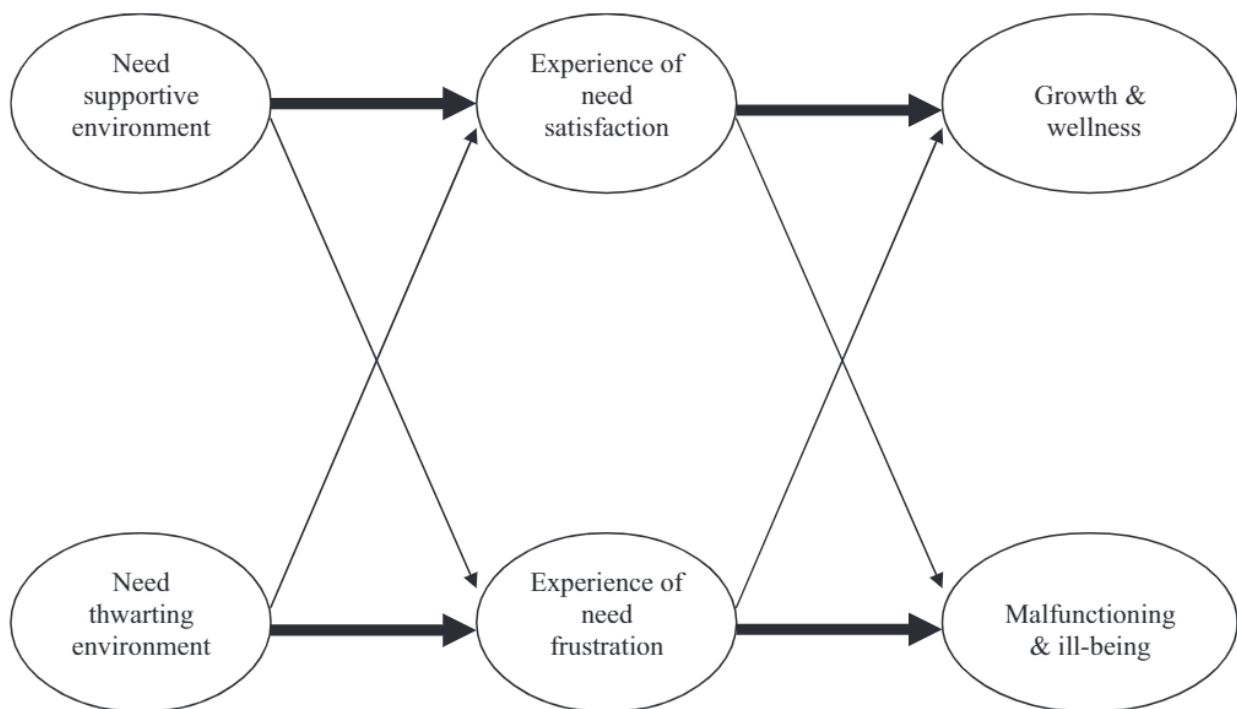
<b>Basic criteria</b>	
1. Psychological	A basic need concerns the psychological and not the physical functioning of human beings.
2. Essential	The satisfaction of a basic need contributes to growth, well-being, and adjustment <i>and</i> the frustration of the need predicts problem behavior, ill-being, and psychopathology.
3. Inherent	A basic need represents an evolved aspect of our psychological nature due to adaptive advantages associated with need satisfaction.
4. Distinct	A basic need concerns a distinct set of experiences and its emergence is not contingent upon or derivative from the frustration of other needs.
5. Universal	Felt need satisfaction and need frustration should predict the thriving and ill-being of <i>all</i> individuals, regardless of differences in socio-demographics, personality, cultural background or need strength.
<b>Associated criteria</b>	
1. Pervasive	The effects associated with need-based experiences should be reflected in myriad cognitive, affective, and behavioral outcomes, while also surfacing at different levels, from the psychological to the neurological/biological.
2. Content-Specific	Satisfaction and frustration of a basic need manifests through specific behaviors, experiences, and is well represented in natural language.
3. Directional	A basic need directs and shapes individuals' thinking, acting, and feeling, thereby spurring the pro-active search for need-conducive circumstances, partners, and activities under supportive conditions, while eliciting corrective behavior under need thwarting circumstances.
4. Explanatory	A basic need helps to account for or explain the relation between variations in social contexts, both growth-promoting and toxic, and wellness-related outcomes.

Through these requirements, Ryan & Deci (2000) narrowed the list down to just three basic psychological needs, which are Autonomy, Competence, and Relatedness.

### 2.3.1 Need satisfaction, frustration, and support

Within BPNT, the described needs can either be satisfied or frustrated, with need satisfaction of needs being fundamental for psychological thriving and need frustration (or thwarting) can be harmful to the well-being of the individual. It is also important to note that need frustration is not the absence of need satisfaction but is a more intense feeling derived from their basic psychological needs being deprived (Vansteenkiste & Ryan, 2013). Both need satisfaction and need frustration is important to consider when researching basic psychological needs.

Need support is an active behavior that aims to fulfill one or several of the basic psychological needs of another. Having a need-supportive environment is a good indicator that the individual will experience need satisfaction (See Figure 1). On the contrary, having a need-thwarting environment is a good indicator of need frustration. However, the absence of a need-supportive environment is not the same as a need-thwarting environment, as it rather represents a more passive form of socializing (Vansteenkiste & Ryan, 2013).



*Figure 1. Graphic overview of self-determination theory's view of the role of need satisfaction and need frustration (Vansteenkiste & Ryan, 2013, p. 265).*

### 2.3.2 Autonomy

Autonomy is the organismic desire to self-organize their own experience and behavior and to have activity be in line with one's integrated sense of self (Ryan & Deci, 2000a). It is connected to the concept of intention, as an action needs to be intentional to be considered autonomous. In addition, the action needs to be an expression of oneself, as opposed to the action prescribed by others to the self. The less outside pressure that is exerted on the individual performing an intentional action, the more autonomous that action can be said to be. Thus, the concept of intention and self-determination is important for autonomy within SDT as a basic psychological need (Deci & Ryan, 1987).

In the early history of psychology, the concept of intention was disregarded, as behavior was seen as only a product of stimulus inputs (Skinner, 1953) or internal drive simulations (Hull, 1943). These perspectives saw the regulation of behavior only as a function of associative bonds developed through reinforcement processes. Later cognitive theories of behavior became more prevalent, which saw the initiation of behavior as a function of expectations of outcome contingencies and the psychological value of outcomes (Atkinson, 1964). Meanwhile, the regulation of behavior was viewed as a process of comparing one's current state to a standard and then reducing the discrepancies (Kanfer, 1975). This shifted the focus from the repetition of past behavior to the expectation of future behavior (Deci & Ryan, 1987).

Within cognitive theories, the concept of intention became important due to behavior now being understood in terms of people's intention to achieve a certain outcome. However, a further distinction is needed to fully explore intention as a concept, as intention generally can be considered as either controlled or self-determined. However, it must be specified that these are not two separate categories but a continuum in which intention may inhabit. In the organismic approach of SDT, the concept can be defined in simpler terms as self-determined intention. However, there are no practical ways to empirically determine how self-determined an intention is, which leaves autonomy as a more theoretical concept (Deci & Ryan, 1987).

The theoretical nature of autonomy makes it a less favored concept within certain circles, as it is much less used than competence and relatedness within empirical psychology (Ryan & Deci, 2000a). Also, due to its more obtuse qualities, it is often mistakenly equated with ideas of internal locus of control, independence, or individualism (Deci, Koestner, & Ryan, 1999). However, autonomy is more about integration and freedom, and it is an essential part of healthy human functioning (Ryan & Deci, 2000b). This leaves autonomy within SDT as probably the most studied and debated need, as its satisfaction is considered important for internal motivation and well-being (Vansteenkiste, Ryan, & Soenens, 2020).

### 2.3.3 Competence

Competence can be defined as the need to experience effectiveness and mastery, which is satisfied when one is capably engaging in activities that utilize the skills and masteries of the individual (Vansteenkiste, n.d.). When someone is prevented from developing skills, mastery, and understanding, the need for competence is not met (Ryan & Deci, 2018).

### 2.3.4 Intrinsic motivation

Intrinsic motivation is an important concept within SDT, and among the different types of motivation, it is usually considered the most desirable or highest quality. A behavior is considered to be intrinsically motivated when the main “reward” for engaging in an activity is the feelings of interest or enjoyment that are both part of and inextricably linked to doing the activity. In other words, it is an inherently pleasurable activity. In contrast, the activities that are motivated through the consequences of doing or completing the activity are considered to be extrinsically motivated (Moller, n.d.).

When someone is intrinsically motivated, they engage in activities that they consider to be inherently appealing and interesting. This means that a sense of spontaneity and volition is associated with intrinsic motivation (Ryan & Deci, 2000b). Because of this, the satisfaction of the need for autonomy is considered to be integral to the growth and nourishment of intrinsically motivated activities. Similarly, satisfying the need for competence is also central to the enjoyment of intrinsically motivated activities (Vansteenkiste & Ryan, 2013).

In addition to autonomy, the satisfaction of the need for competence is also central to the enjoyment of an activity, even more so when it is done volitionally. In addition, the need for competence and autonomy does not only nurture intrinsic motivation, but it is also a result of intrinsic motivation. For example, when curiosity guides exploration and learning, the experience is more likely to be filled with a sincere sense of surprise, which makes it easier to absorb knowledge, which contributes to building competence (Vansteenkiste & Ryan, 2013).

### 2.3.5 Relatedness

Relatedness is a term that is used to describe several different concepts in different fields, for example, how related an item is to another item. However, SDT uses relatedness to refer to the experience of human bonding, feeling connected, and having a sense of belonging (Ryan & Deci, 2018). Relatedness is satisfied through human connection with a significant other, while it is frustrated through the experience of social alienation, exclusion, and loneliness (Vansteenkiste, n.d.). Relatedness is experienced in both being cared about and caring about others, as both directions of care give a sense of connectedness (Deci, La Guardia, Moller, Scheiner, & Ryan, 2006).

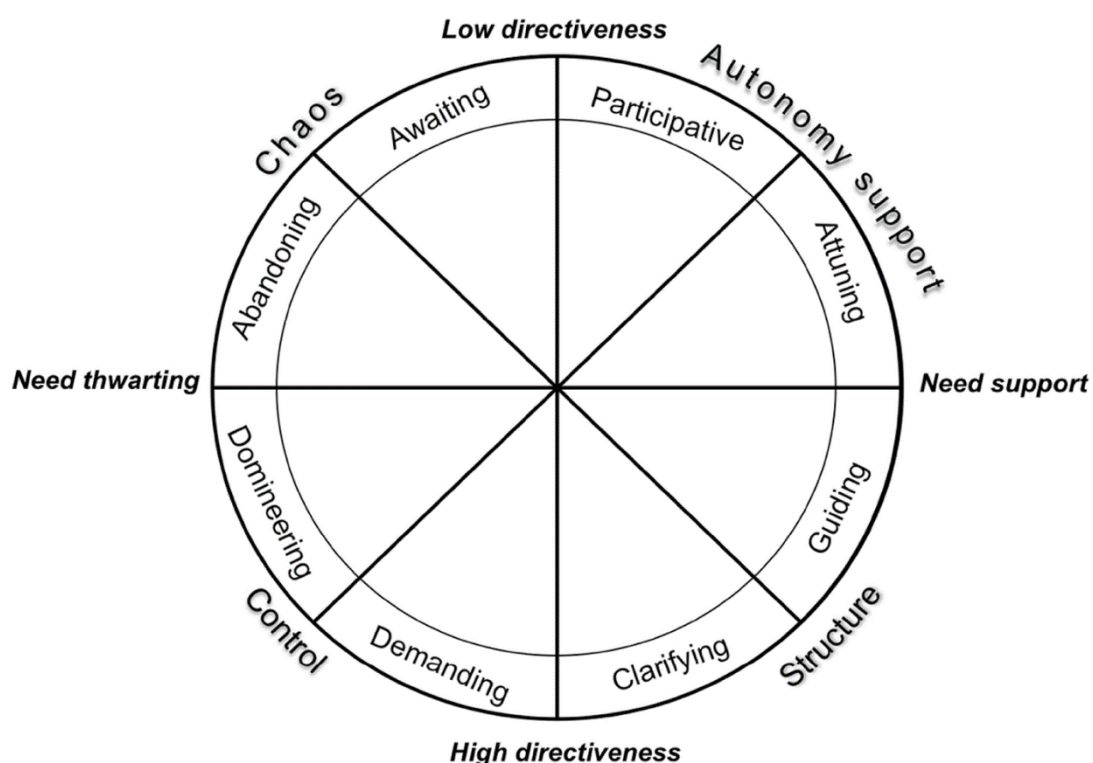


Figure 2 Graphical representation of the circumplex model (Aelterman et al. 2019)

### 2.3.6 Effect of need frustration on Well-being

Within SDT, it is believed that the frustration or neglect of any of the basic psychological needs will result in some sort of psychological decrement, like diminished vitality, loss of volition, or lowered sense of well-being (Ryan & Deci, 2018). An example would be a child being subjected to maternal controlling parenting, a decidedly need-thwarting environment (Aelterman, et al., 2019), which was a strong predictor of aggressiveness, a common compensatory behavior (Joussement, et al., 2008). However, while compensatory behavior as a coping strategy is commonly the result of prolonged need frustration, a more immediate effect is greater ill-being (Vansteenkiste & Ryan, 2013).

#### NEED FRUSTRATION AND VULNERABILITY

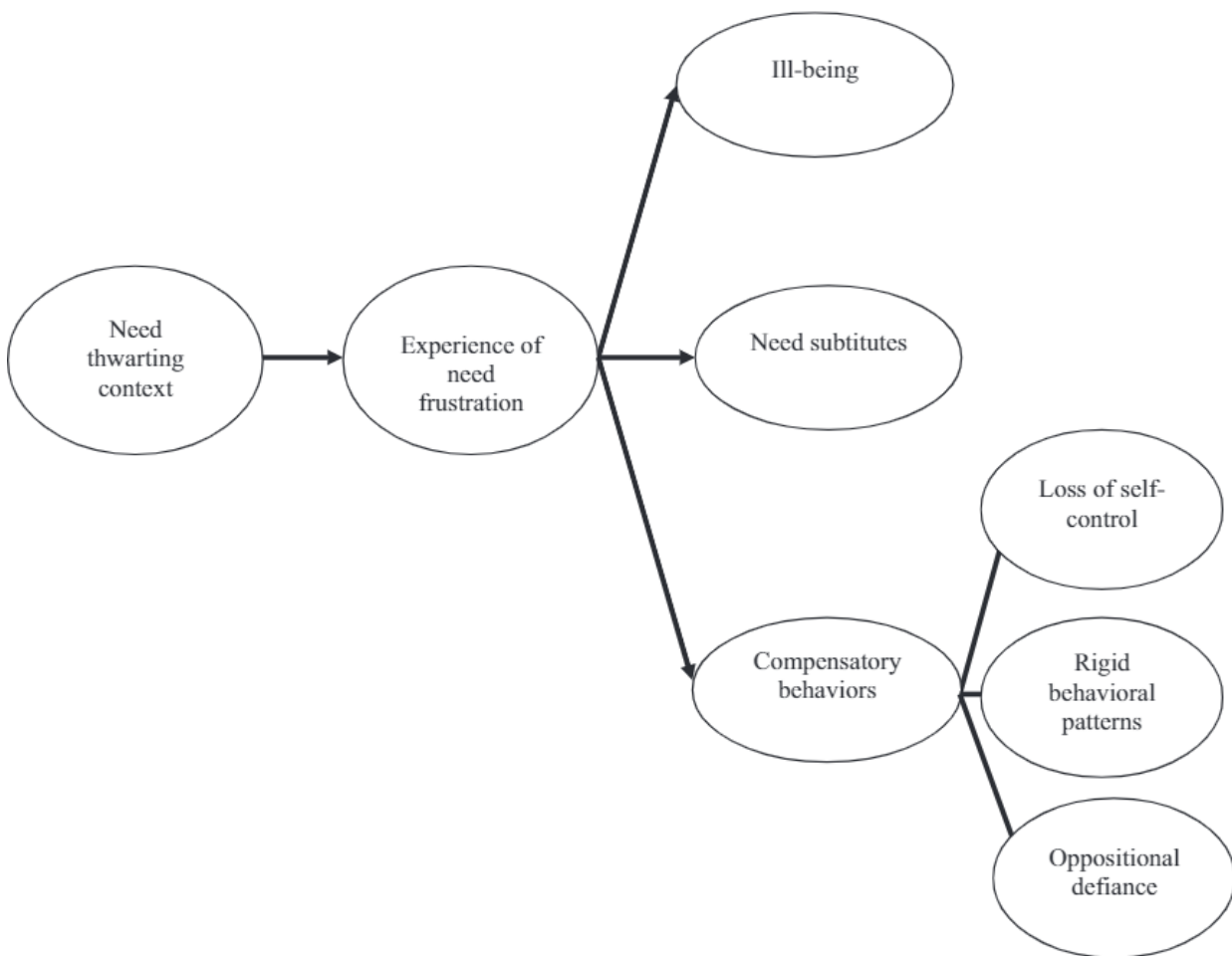


Figure 3. Graphic overview of the consequences related to the experience of need frustration (Vansteenkiste & Ryan, 20213, p. 269).

## **2.4 Claims made by Innocom AS**

Berntsen is designed to make the user stronger, safer, and more autonomous, which will help unburden the health services of Norway. The device is supposed to motivate more activity through a video-based exercise routine that is made according to an agreed schedule. Support and safety are secured through the involvement of relatives and healthcare professionals. Berntsen is said to make the user experience competence, become more secure, and increase their well-being. This will lead the user to be able to stay longer at home (Innocom AS, n.d.).

Key functions of Berntsen are a calendar that keeps track of the schedule and reminds the user of different activities. It will automatically play videos used for exercise, and it has a simple-to-use function to start a video call to either a health professional or a next of kin. It is integrated with the Norwegian health platform PatientSky, as a precaution to secure private information. It has a simple user interface which makes it simple to use even for those not technically gifted. It has full customer support if problems arise (Innocom AS, n.d.).

## **2.5 Hypothesis**

The theory would suggest that the use of Berntsen is beneficial in the realms of autonomy support and competence support. This would also coincide with the claims made by Innocom about the functions of Berntsen, but the absence of relatedness satisfaction is noted both in theory and in the sales pitch of Innocom. The need for relatedness is relegated to a video call function, which means relatedness satisfaction would need to be fulfilled outside of what Berntsen can provide. From a traditional stay at a care home where human contact is provided no matter the circumstance, although the quality of such connection might be variable, it is still present.

This makes me believe that Berntsen will be able to provide support for the user's autonomy- and competence needs but would deprive the user of the human connection it might previously have had before digitalization. This might lead to higher intrinsic motivation but a general decline in well-being. This means that the resources saved by utilizing Berntsen would be undercut by the decline in the wellness of the user.



## 3 Method

The creation of Berntsen was a cooperative development between Innocom AS and Stavanger County. The process started in 2017 with the creation of the innovation partnership program, which Innocom AS, together with Torpo Industri AS, was the first to receive. The grant was Kr 12 million from Innovasjon Norge, split between the two companies to develop their solution (Olsen, 2018). I find the whole process fascinating, and I think doing a small case study on this government program would be the best way to study digitalization within care for senior citizens.

### 3.1 Gathering of information

There is a lot of information available online about the government program called the innovation partnership program that funded Berntsen. Among the information is the need for description in both PowerPoints (Stavanger Kommune, 2017a) and pure text form (Stavanger Kommune, 2017b). In addition, there is a document that describes three users of the short-term accommodations and their daily schedule (Stavanger Kommune, 2017c). These documents are important to understand the situation Stavanger County was facing at the time and the solution they were seeking.

In order to get information about the current use of Berntsen, I sent out an email (*Annex 1: Email sent to care homes.*) to care homes. However, one thing that became clear during my research is that Berntsen is not a well-known digital innovation within Stavanger County. I received an answer from eight of nineteen care homes, and none of them utilized Berntsen, with one of them admitting to not having heard of it, to begin with. However, I knew that Haugåstunet was one of the nursing homes that did a trial of it in 2019, as it was written in the newspaper Dagsavisen (Gilje, 2019). They were not one of the ones that answered my email, so I called instead.

During my call, it became clear that most people at Haugåstunet nursing home had not heard about Berntsen. It was not until my second call that they managed to find someone who was aware of Berntsen, which was the operational manager of Line Ekker. I was supposed to get a call after the line operator had consulted with her, but this was delayed for an unknown reason. I was able to get information regarding Berntsen by going in person to Haugåstunet and asking Line Ekker directly. The information was rather limited due to Berntsen being taken out of use at the nursing home and the care workers that used it having ended their employment since that time.

## 4 Data Analysis

Berntsen was first funded by Stavanger County in 2018 through its innovation partnership program as a way to help senior citizens be able to stay home as long as possible. It was created by Innocom AS in cooperation with Contango Consulting AS, Safemate AS, and Norwegian Smart Care Lab (NSCL). It was also developed alongside the smart walker created by TORPO Industri AS in cooperation with Universidad Politécnic de Catalunya (UPC) in Barcelona, EGG Design, and Vangen & Plotz (Olsen, 2018). As an innovation partner of Stavanger County, Innocom's Berntsen was developed along with the innovation partnership program that started in 2017 (Schwerdt, 2017).

Berntsen is based on the robot Double 2 developed by Double Robotics, which is identical in form but serves a different purpose. While Berntsen is meant to support the health sector, Double 2 is supposed to be used in business environments. Pepper and Nao from Softbank Robotics were used to develop a user-friendly application for Berntsen's software (Innocom AS, 2019).

This innovation partnership program relates to activation and self-mastery for users of short-term accommodations that can also be used in the user's own home. Short-term accommodation is an offer to those that have been released from the hospital and need rehabilitation and training in order to be able to live at home as long as possible. It is a time-limited offer from one to twelve weeks, with the stay being either fixed or alternating between home and the accommodations.

There are several reasons for utilizing short-term accommodations (Stavanger Kommune, 2017c):

- Acute functional decline.
- Determine the need for wider health services.
- released from the hospital.
- Prevent further hospital stays.
- Delay needs for long-term accommodation.
- Stay over vacation.
- Permanent alternating stay.

Testimony from Peder (72 years old in 2017), who was utilizing the alternating stay between short-term accommodations and his communal home in 2017. He uses an electric wheelchair and is not motivated to exercise at home after his stay at the short-term accommodations. He lives alone and takes care of himself as he stakes his honor on being self-sufficient and making his own decisions. However, he is often hospitalized, he is lonely, and he is not able to motivate himself to train after leaving the short-term accommodations. He would like to have more social contact, have better stamina, and not get hospitalized again (Stavanger Kommune, 2017c).

Testimony from Ingrid (84 years old in 2017), who was staying at the short-term accommodations at the time but usually stays at home with her family. She often goes for walks with her husband and friends, but after a hip fracture, she has had compromised functionality, which she is active in trying to restore. She is cognitively well, good at doing chores around the home and motivated to train. However, she is in some pain after the hip fracture and misses her family at the short-term accommodations. She would like to get back to her previous state before the hip fracture and reunite with her family, and she would like to be self-sufficient (Stavanger Kommune, 2017c).

Testimony from Ola (80 years old in 2017), who is a resident of the short-term accommodations and is lonely and bitter, as his wife died eight years prior to the testimony, and he does not have contact with his family. He is inactive, as he has never exercised, but he has been used to hard physical labor. He eats well, although not healthily. However, he has given up on life, with a poor economy and early symptoms of dementia, and he has trouble using his hand because of gout. He would like to be healthy, have someone to care for, and be at peace in his own home (Stavanger Kommune, 2017c).

These testimonies are part of the information given to the potential partners in the innovation partnership program. In addition to the testimonies, there is the daily schedule of the three that gave their testimony and the testimonies of related workers and associates. This is the material that was given to all the potential suppliers as part of the innovation partnership program, which is a five-step program created by Stavanger County to drive innovation for public sectors that need digital innovations to meet demand.

The first phase is to determine a need, which is, in this case, the need is for activation and self-mastery for seniors that are staying in short-term accommodations was determined in workshops done in February and March of 2017. The second phase is to make the need public so that Stavanger County could lead suppliers into a dialogue about how to solve this need. The third phase is a competition between suppliers about who has the best solution to the need. The fourth phase is to develop the solution in cooperation with the county, which also will test the solution. The fifth phase is to buy the finished product and spread it in order to create a market for it (Schwerdt, 2017).

The challenge faced by Stavanger County is a demographic shift, where the amount of 80 years old is expected to more than double in oncoming years from 10 000 to 26 000. This shift, alongside an increasing difficulty in recruiting enough health personnel, will put a lot of pressure on the health service provided by Stavanger County (Stavanger Kommune, 2017b). This challenge presented the need to keep those that have stayed in short-term accommodations at care homes in activity both at the care home and when they get home.

There are 214 short-term accommodations in Stavanger, and the average stay is about 26 days. This constitutes a Kr 200 million yearly expenditure for Stavanger County, which means that only a 10 % reduction in costs could save Kr 20 million yearly. Also, even though the average stay is over three weeks, after only one week in bed, it is expected a 10% reduction in endurance and a 20% reduction in muscle mass (Stavanger Kommune, 2017a). This will make it harder for the seniors to return home after a short-term stay at a care home. The ones that are responsible for the testing and implementation of digital innovations are Helsehuset's Department for welfare technology and the operational manager of individual care homes (Stavanger Kommune, 2019).

The operational manager of Haugåstunet nursing homes is Line Ekker, and she could only provide a limited amount of information related to Berntsen. Haugåstunet nursing home is a relatively large care home with short-term accommodations for 70 (33% of the total) and 33 spaces at the day center. It trialed Berntsen for use by its residents to keep them in activity. However, it was taken out of use by the care home as the residents found it to be too complicated to use, despite its advertised simplicity. This meant that it was not able to help those that stayed at the short-term accommodations, but the care home advised that it may be used in the home services.

## 5 Discussion

The current problem of taking care of senior citizens seems to not be able to be solved purely by increasing funding and having more care workers. This is both due to the already mentioned shortage of workers, but also there has been a decline of 30% in applicants to nurse and care worker studies in the last three years (Samordan opptak, 2023). There must either be created a situation where there is an increase in workers or a decrease in the need for workers to solve this crisis. Berntsen does help with allowing the current workers to spend their time more effectively, but Berntsen is limited in its application, so no matter how extensively they are implemented, it will not fix the problem.

Berntsen is also not suitable in all situations, which is what Haugåstunet nursing home found to be the case. This is due to the perceived complicated nature of Berntsen, which is likely due to cognitive impairment or technostress related to the use of Berntsen. The user would need to have a positive attitude both to self-improvement and the use of modern technology for Berntsen to be of use. This would describe Ingrid as the best among the three examples of senior citizens that use short-term accommodation. Ingrid is both willing and able to train while only being afraid of doing something wrong and hurting herself, which Berntsen would be able to help with. Ingrid also has a wide social circle, including family and friends, so the need for relatedness is already met, so Berntsen would likely only be a boon for Ingrid. However, would Berntsen help Peder and Ole in the same ways?

Peder already stays home for certain periods, where he is able to take care of most of his own needs. He does not have the motivation to continue training at home after leaving the short-term accommodations, which is something Berntsen is designed to help with. By following up on his training at home, he would feel a stronger sense of autonomy, as he may be able to do all of his own self-care, and continuing the training at home will give him a feeling of competence. However, one of the major problems faced by Peder is a small social circle, which Berntsen will do nothing about. In this case, Berntsen would provide some increase in well-being, but as long as the need for relatedness is unmet, Peder will still feel unwell.

Ole stays at the short-term accommodations but would like to live at home. He lacks motivation generally, so Berntsen is unlikely to convince Ole to start training since the health personnel was not able to convince him either. He has no one to talk to over video call or that visits him while he actively tries to avoid the other residents of the nursing home, so Berntsen would be of little use to Ole in terms of relatedness. The only way that Berntsen would be of use to Ole is if he reignites his will to live a fulfilling life, which requires something else than what Berntsen is able to provide.

By looking through the examples provided by Stavanger County, it can be understood why Haugåstunet nursing home stopped using Berntsen as a digital tool at their facility. This is due to the use of Berntsen being a bit niche, as it requires a certain willingness from the user in order to gain the best results. This means that it is likely better to have it on hand centrally within Stavanger County and provide it when requested by a user or physiotherapist on behalf of a user instead of having Berntsen as part of the regular equipment, which might be expensive if no one is using it.

### **5.1 Possible Solutions**

One solution to this problem could be to abandon it and just accept that there will not be enough space for seniors at care homes. This would push the responsibility of taking care of the senior citizens on their younger family members, while those without family would take up the few spots left at care homes. This would likely be unpopular among the younger generations who would get this responsibility, as it has been uncommon for a long time to have extended family living together in Norway (Sogner, 2009). To fundamentally change the structure of the family unit would be a large change, and it is uncertain whether it would work out, so it should only be considered if there are large-scale failures within the sector for the care of senior citizens.

Another solution that could be considered is to make use of the current systems in place to raise more workers. The Norwegian national service model could be expanded, and those not serving in the military could serve in other sectors of Norwegian society. These would not have the same education as many care workers or nurses have today. However, they could be trained in a short boot camp to do the more basic jobs associated with the care of senior citizens or even other parts of the public sector that would need them.

A solution that I would not want to suggest myself but that I believe will be suggested within certain countries is the introduction of a modern *ættestup*<sup>1</sup>. The euthanasia of retirees is a very morbid concept, but with Medical Assistance in Dying (MAID) being introduced for those suffering from mental illness (Amendment to the Criminal Code, 2023), they may expand it later. However, in Norway, assisted death is illegal, and there is no push from any medical institution for its legalization or adoption (Ursin, 2023). This means that it is highly unlikely that the Norwegian government would adopt assisted death for retirees, but for those countries that have already adopted assisted death, the same cannot be said.

Another solution would be to improve the functionality of Berntsen in order for it to be able to satisfy the need for relatedness. This might be possible through artificial intelligence (AI), which is set to talk with the user and provide comfort. There exists AI that is able to chat and mimic human emotive language (Replika AI), which could be “spoken” through a text-to-speech AI (Voice.ai). However, this might just trade one problem for another, as the user might get unnaturally attached to the AI or get detached from reality. This solution likely would not be popular with senior users, who already are skeptical of using modern technology and likely would not want to talk to a robot as if it was a person.

Lastly, a solution that is often brought up when it comes to the lack of personnel in important public sector jobs is immigration. This is something I do not view as a viable solution since I view it as merely delaying the problem, as every immigrant will also need various social services, including places at nursing homes. In addition, any problem that can be “solved” through immigration should also be able to be solved through natural population growth. However, if the problem is not solved through the population naturally growing, then it won’t be solved through immigration, and the solution needs to be found somewhere else.

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<sup>1</sup> *Ættestup* is the act of the frail and elderly committing suicide by leaping off a cliff, mentioned in several of the Icelandic sagas (Dybdahl, 2021).

## 6 Conclusion

The sector for the care of senior citizens will be under more pressure year by year unless some action is taken. As an initiative, Berntsen is a good step forward to try and alleviate some of the pressure placed on the sector. However, Berntsen is not enough both due to its limited functions and that many senior citizens will be unwilling to use it. Other solutions need to be made, but whether they should be digital innovation is the bigger question.

The current digitalization efforts seem to not have much negative impact on the sector for the care of senior citizens. This is due to the current technology, Berntsen and similar, being limited in its functions and an unwillingness from the older user to use modern technology. However, when the older generations get more tech-savvy with age, this might change, and more digital innovations may be adopted. However, even if Berntsen was more widely used, I do not think it would negatively affect the users, as there are mostly beneficial effects, with the potential negatives being possible to negate through proper socialization.

Although the negative aspect of digitalization is currently minuscule, the benefits are also not massive due to restricted use. The implementation of Berntsen has not been particularly wide, which is likely due to it being seen as not relevant to the work done at Haugåstunet nursing home and similar institutions. However, it has received publicity since its debut in Stavanger, and several other counties are using it in their own social services. Until Berntsen and similar digital innovations are more widely in use, their effect of them is going to be severely limited.



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## List of tables and charts

Table 1. Description of Basic and associated criteria within BPNT copied from (Vansteenkiste, Ryan, & Soenens, 2020, p. 4).

Figure 1. Graphic overview of self-determination theory's view of the role of need satisfaction and need frustration (Vansteenkiste & Ryan, 2013, p. 265).

Figure 2 Graphical representation of the circumplex model (Aelterman et al. 2019)

Figure 3. Graphic overview of the consequences related to the experience of need frustration (Vansteenkiste & Ryan, 20213, p. 269).

# Annexes

## ***Annex 1: Email sent to care homes.***

Hei, jeg heter Magnus Gjøse Vatsvåg og er masterstudent ved Universitetet i Sørøst-Norge. Jeg holder på med å skrive en masteroppgave om roboten Berntsen, som jeg har lest brukes på visse sykehjem i Stavanger kommune. Jeg lurte på om Berntsen brukes på deres sykehjem og hvis dette er saken, om jeg kunne gjøre intervju med sykepleiere som har kjennskap til Berntsen om dens bruk og om vi burde satse mer på lignende teknologi.

Min kontaktinformasjon er:

Tlf. nmr.: 47523717

Email: [magnus.vatsvag@gmail.com](mailto:magnus.vatsvag@gmail.com)

Hvis det er noen som er interesserte i å ta del i studien, ville jeg vært høyst takknemlig.

Mvh, Magnus G. Vatsvåg.

## ***Annex 2: Email sent to care homes. (Translated)***

Hei, my name is Magnus Gjøse Vatsvåg and I am a master's student at University of Southeastern Norway. I am writing a master's thesis about the robot Berntsen, that I have read is used in nursing homes around Stavanger County. I was wondering if Berntsen is used at your nursing home and if it is, if a social worker that has knowledge of Berntsen was willing to give an interview about its use and if we should invest in similar technology.

My contact information is:

Tlf. nr.: 47523717

Email: [magnus.vatsvag@gmail.com](mailto:magnus.vatsvag@gmail.com)

If anyone is interested in participating, then I would be most thankful.

Kind Regards, Magnus G. Vatsvåg.