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Managing innovation processes in eldercare:

Lessons from Norwegian municipalities

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Doctoral Thesis

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Executive summary

Eldercare policies are being dramatically reshaped due to demographic shifts worldwide. The elderly are living longer and healthier, and their infrastructural impacts on society are well known amongst researchers in eldercare (Kulik, Ryan, Harper, & George, 2014; Schultz, André, & Sjøvold, 2015, 2016). It is known that most developed countries will be experiencing unprecedented growths in their elder population (Aging, 2014; Kulik et al., 2014; Nations, 2013), but what is less known is what and how public-entities that are responsible for providing these services are going to meet these upcoming challenges. This thesis will address what and how Norwegian municipalities are innovating in eldercare; and suggestions will be offered about how these innovation processes can be improved upon. The articles in this thesis take varying perspectives. They start wide, having an international perspective (Article 1), then narrow down to eldercare innovation in Norway (Article 2), and lastly test group- and organizational-level innovativeness at a Norwegian municipality (Article 3 & 4).

1. Article 1 is a literature review of innovation in eldercare, which explains developments occurring in the field (Schultz et al., 2015);
2. Article 2 discusses how Norwegian municipalities are innovating or managing the innovation process from the theory that emerged in Article 1 (Schultz, André, et al., 2016);
3. Article 3 targets formal innovative training as an area for Norwegian municipalities to improve their innovativeness (Article 2), but a precursor to formal training is determining innovative readiness for change (Schultz, Sjøvold, & André, 2016b);
4. Article 4 explores the impact that formal innovation training, by means of an intervention study, has on group- and organizational-level innovativeness (Schultz, Sjøvold, & André, 2016a).

This thesis originates from a literature review (Article 1). The literature review was conducted to determine what sort of eldercare innovations were being developed. The aim of the literature review was to help managers in public positions make better sense out of the exponential developments currently surfacing in eldercare. This industry has been blessed and cursed by its rapid development; blessed as there is a plethora of both technological and service type innovations, but cursed because there is so much development that trying to understand, organize, and stay updated with it all becomes nearly impossible. This article demystifies these innovations; making it easier for public organizations to manage this process. After reviewing the relevant eldercare articles, from the lens of a public-entity, eldercare theory emerged (Article 1). When viewing eldercare from this framework, suddenly managing eldercare innovation becomes simpler as one can understand where existing and new developments fit within the overall system. The core of this theory is contingent on each public-entity maintaining their appropriate balance between three facets; the quality of care (for the elderly), the working environment (for employees and volunteers), and societal efficiency (national and local policy) (Article 1). This balance is important, as these three facets can be inversely proportional to each other. In using this theory, when a problem or opportunity emerges within a municipality, managers can predetermine the impact that the proposed solution will have on the overall system, and likely make better decisions on what to invest in (Article 1). Additionally, eldercare theory aids public-entities in having more strategic direction

or more targeted aim when deciding which projects they should or should not explore, by predetermining if the new proposed project meets their eldercare theory need.

The aim of Article 2 was to analyze eldercare innovations in light of the increasing number of elderly people, with the support of eldercare theory, which emerged from Article 1. This empirical study deepened the understanding of eldercare theory by showing the strategic direction of leaders in this field. The findings showed that Norwegian municipalities were prioritizing improving the quality of care for the elderly by building smart in-home technology (Article 2). However, there were concerns as to the lack of knowledge sharing channels for these technologies between municipalities, the lack of formal innovation processes, the need for utilizing eldercare theory, and a lack of recruitment (Article 2). In concluding, it was clear that Norway's innovation strategy was to facilitate healthy aging for the elderly in their own homes as long as possible. Most developments had been in the form of smart in-home technology, which generally addressed the young-elderly needs. Accordingly, eldercare theory would urge Norwegian municipalities to strive for more balance in their eldercare system, *inter alia*, by developing innovation processes or improving recruitment (increasing working environment), or reshaping social responsibility (increasing societal efficiency). A list was enumerated, in the conclusion of Article 2 about how Norwegian municipalities and other public organizations can learn from this study.

The aim of Article 3 was to determine to what extent innovative readiness could be used to predetermine the success of innovative initiatives merely by looking to group climate. Article 2 mentioned that Norwegian municipalities know they need to be more innovative to meet future demands, but they do not have much formal competence in innovation. Article 2 suggested that Norwegian municipalities should provide their employees with innovation training to fill this knowledge gap. Accordingly, Article 3 targets formal innovative training as an area of innovative improvement for Norwegian municipalities, but a precursor to formal training is determining innovative readiness for change by looking to group climate. This study explored the differences between two groups; those that voluntarily participated (the participant group) in formal innovation training and those that chose not to participate (the nonparticipant group). Both groups were from the same department and from the same organization. The differences in each group's climate was explored using a t-test. The findings showed that each group's level of innovation understanding was relatively similar prior to any formal training. More importantly, the findings showed that there were two identifiable and distinguishable group climates. Based on the findings and related theory a prediction could be made, that the participant group was ready for innovative change as they were task-oriented, engaged, and have an overall positive attitude towards innovation. Additionally, it was predicted that the nonparticipant group was not ready for innovative change as their dominant characteristic was acceptance. For theory, this article built upon the body of organizational literature and call for additional research that states group climate that embraces innovation and positive group climate supports group readiness for change. This was tested, and using group climate to determine readiness for change was a new contribution to theory. For practitioners, this is a tool that could be used to better understand group dynamics, this may explain which members will optimize innovative output if a formal innovation training is implemented.

The aim of Article 4 was to test the impact of formalization, by means of formal innovation training, on group- and organizational-level innovativeness. An

intervention study was conducted. Four training sessions were offered, two hours each session, over a period of six months. Measurements were taken both before any training session begun and after the last training was completed. There was a participant group and a nonparticipant group. The intervention's express aim was to improve group- and organizational-level innovativeness. Both quantitative and qualitative measures in this study showed that formalized innovation training was positively related to innovativeness. This improvement in innovativeness was measured both at the group-level and the organizational-level. At the group-level, formal innovation training had a strong positive impact for both the participant group and nonparticipant group. The participant group's innovativeness improved significantly ($p<0.001$) in the phase they were formally trained in, innovation strategy. This improvement in innovation strategy was contrary to current theory. Equally as interesting, the nonparticipant group did not participate in any training, but they had nevertheless improved significantly ($p<0.05$) in innovation strategy as well. The results from the study indicate that the participant group's positive attitude towards innovation was contagious for the nonparticipant group. The nonparticipant group did not participate in the formal innovation training, however they learned from it anyways. At the organizational-level, Table 3 illustrates the extent to which formalization is positively related to innovation. Eight ideas emerged from the formal training, three of which were implemented by the organization. This is a study that has been called for in prior research, addressing innovation questions that have remained relatively untouched. Formal innovation training, in this case, had a significant impact on the innovativeness at both the group- and organizational-level.

This thesis was first initiated with an interest in the baby-boomers' phenomenon (eldrebølgen). Particularly, what developments were evolving (Article 1), how the processes were being locally managed (Article 2), and lastly, how these processes can be improved (Article 3 & 4). In this thesis and the collection of articles that follow, these issues and interests will be addressed. The message should become clear, something must to be done; either reducing our standards for providing for the elderly, or to innovate to maintain or increase the current level of care. Through innovation, municipalities need to not only cut labor costs and relieve demand on current facilities by increasing efficiency. Additionally, municipalities need to increase the quality of eldercare. In this case, that will mean through the innovative solutions the elderly will feel more self-reliant and thus decrease atrophy and increase their quality of life.

Acknowledgements

1. Introduction

1.1 Rationale for innovation in eldercare

Everyone has an aging elder, a sister or brother, mother or father, aunt or uncle, or grandmother or grandfather. As the elderly age, there eventually comes a point where they need additional help. This generally occurs as the elderly approach 80 years or older (A nursing science researcher, 2014). At 80 years' old something happens inside the body that makes the elderly more prone to mental and physical related issues. Try to imagine or understand the following situation:

> Margot Paulsen is 84 years old. Her husband Bjarne died eleven years ago, since that time Margot has lived alone in their home. Margot wants to live at her and Bjarne's home as long as she possibly can, preferably until she dies. Margot does not want to go to a hospital, "that is only for old and fragile people". However, Margot has become more and more forgetful. Doctors have told Margot that she has a less severe form of dementia. Margot has problems remembering if it is daytime or nighttime, if her husband is still with her, and her appointments at the elder center. Since Margot was diagnosed with dementia, the worst experience she had was when she forgot a birthday to one of her children. Margot cried the entire day when she realized she forgot. Additionally, Margot often forgets that her husband Bjarne is dead, and she starts looking for him throughout the house. After a while, she realizes that he is gone. This makes her really sad. One time, in the middle of winter, Margot went out looking for Bjarne in her pajamas. She almost froze. Luckily, there was kids on their way home from a party that called the police when they saw her. She was thankful for that. (Haugan, 2011)

This story is far from uncommon. Most families have or know a Margot Paulsen, an aging elder that comes to a point where they will need additional assistance (e.g., grocery shopping, remembering medication or doctors' appointments, or needing dementia related warnings to nearest family members). Today, most families have private or public nursing assistance to help them in caring for their elderly. Generally, these services are provided for either at the elderly's home, a retirement home, or a hospital, but what are families to do when these services are in so high demand that they may no longer available, or become so costly they can't afford additional assistance? In Germany and Switzerland, the cost of care has already become so expensive that some young-families are "exporting Grandma abroad" to places like Poland or Thailand (Kresge, 2013; Lacey & Foulkes, 2014).

The demand for elderly services in Norway could reach such drastic measures. In Norway, the elderly infrastructure –including nursing homes, hospitals, health care employees, health care costs, elderly pension, etc. – will experience a large influx of elderly. From 2010 to 2030-50, the elderly population in Norway is expected to nearly double (Statistics-Norway, 2012, 2014). This could account for approximately 25% of the population, compared to 14% in 2010 (Statistics-Norway, 2012, 2014). While the elderly population is growing at unprecedented rates, the work force is also expected to decrease by four percent during the same period from 2010 to 2050 (Statistics-Norway, 2012). Additionally, amongst the decreasing working force, there is less and less interest among newly educated nurses to pursue careers in municipal-nursing or caring for the elderly at their homes (Mæle, 2014a, 2014b; Nordberg, 2013; Sundberg & Samdal, 2013; Ulstein, 2006). Furthermore, most municipalities in Norway already have full capacity in their nursing homes and hospitals (Schultz,

André, & Sjøvold, 2016). Moreover, the government (national and local) in Norway is expected to provide the elderly's pension. The elderly are living longer and healthier lifestyles, so the actual impact on eldercare and pension is quite uncertain. Will the elderly that are living longer, live healthily longer, or will they be fragile (e.g., dement) longer? Much concern surrounds this uncertainty.

"Innovation in the healthcare sector is one of the most important things any modern society can undertake" (Christensen, Grossman, & Hwang, 2009). The message is clear, something has to be done; either reducing standards for providing for the elderly, or innovate to maintain or increase the current level of care. Through innovation, the eldercare sector needs to not only cut labor costs and relieve demand on current facilities by increasing efficiency. Additionally, they need to increase the quality of care for the elderly and improve the working environment for hospital and home-care employees. In this case, that will mean through innovative solutions, the eldercare infrastructure will become more sustainable.

Norway is generally going to be at the focus of the thesis. Norway is where my doctorate degree is being conducted and where my advisors are located. The appropriateness of studying Norway as a context will be discussed in more detail in section 3.2.

1.2 Research goals and questions

The goal of this thesis was to determine what and how Norwegian municipalities are innovating to mitigate infrastructure impacts due to the upcoming baby-boomers (eldrebølgen). The focus of this research was on the how, or the innovation processes. The ultimate goal of this research was to identify and explain how Norwegian municipalities could improve on their innovation processes. Accordingly, this thesis poses the following questions:

1. What is currently happening in eldercare? (Article 1)
2. What and how are Norwegian municipalities innovating? (Article 2)
3. How can Norwegian municipalities improve upon their existing innovation processes? (Article 3 and 4)

Article 1 derived from the first research question. In investigating the developments of innovation in eldercare, it was overwhelming how many different, segmented types of innovation research existed. There were many different innovations from many different actors. This made understanding what was happening in the field more difficult. A literature review was conducted, which not only showed the developments that were occurring in eldercare, but also classified these innovations in a simpler typology called eldercare theory. Eldercare theory should assist those who are struggling to understand what type of innovations are actually being developed and how they fit into the overall eldercare infrastructure.

Article 2 addresses the second research question of what and how Norwegian municipalities were innovating for their elderly. Article 2 empirically tested the eldercare theory that emerged from Article 1. The results from this study made it easier to understand Norwegian municipalities' innovation strategy.

Article 3 and 4 derived from article 2. Article 2 explored what and how Norwegian municipalities were innovating. Article 2's exploration revealed areas for improvement in the innovation processes for Norwegian municipalities. Article 2's

findings showed that no municipality interviewed had formal innovation processes or formal innovation training. Accordingly, Article 3 and 4 explored precisely that, whether formal innovation training improves group- and organizational-level innovativeness. Additionally, Article 3 and 4 will explore what role work climate plays in this process. Article 3 attempts to understand how group climate can be used to determine a group's innovative readiness for change. This is a precursor to conducting formal training, determining whether the group is ready for such training. Article 4 will than test whether formal training had a positive relationship to innovativeness. This will be done by comparing innovation understand, both before and after the formal innovation training is completed. If the relationship shows to be positive. This will empirically show one way in which Norwegian municipalities can improve their innovativeness. Furthermore, if proven true, this formal training would improve Norwegian municipalities working environmental aspect of eldercare theory, which would provide them with better eldercare theory balance.

2. Literature review

2.1 Eldercare developments

Nearly every developed country will be facing impacts on their healthcare system due to the rapidly aging elder populations in the coming decades (Kulik, Ryan, Harper, & George, 2014). The elderly are living longer and healthier, as a result global elder populations are currently rising at unprecedented rates (Schultz, André, et al., 2016). "Globally, the number of older persons is expected to more than double, from 841 million people in 2013 to more than 2 billion in 2050" (Kulik et al., 2014, pp. 929). Many developed countries are expected to be impacted; the majority of Europe, the United States, Australia, Japan, and Korea (Kulik et al., 2014; Schultz, André, et al., 2016). For example, in England, their elder population (aged 65+) is expected to nearly double from 10 million elderly in 2013 to nearly 20 million elderly in 2050 (Kulik et al., 2014; Schultz, André, et al., 2016). For England, it is expected that 25% of their population is expected to be aged 65 or older (Kulik et al., 2014; Schultz, André, et al., 2016). Similarly, the United States is expected to experience increases in their elder population from 2009 to 2030 (Aging, 2014; Schultz, André, et al., 2016).

These shifts in social demographics has forced policy-makers, healthcare professionals, healthcare administrators, innovation scholars, and entrepreneurs alike to rethink how they are going to deliver their future eldercare service (Schultz, André, et al., 2016). Consequently, there has been an explosion of developments in eldercare, most of which are segmented: *hospitals* are looking to improving medical treatment for elderly in acute situations (Bradley, Webster, Baker, Schlesinger, & Inouye, 2005; Krall et al., 2012; Meyer, 2011; Sandhaus et al., 2010; Shekelle et al., 2005); *medical and nursing schools* are focusing on the quality and happiness of their newly educated students (Bennett, Moore, & Wenham, 2016; Davis, Beel-Bates, & Jensen, 2008; Goldenhar, Margolin, & Warshaw, 2008; Katz, Conant, Inui, Baron, & Bor, 2000; LeCount, 2004; Lowenstein, 2005; Smith & Barry, 2013; Snoeren, Volbeda, Nieesen, & Abma, 2016), and *entrepreneurs* are developing solutions of their own (Behr, Sciegaj, Walters, Bertoty, & Dungan, 2011; Hayakawa et al., 2013; Hung, Chiang, Hsu, & Chan, 2010; Iannuzzi, Grant, Corriveau, Bioissy, & Michaud, 2016; Kurnianingsih, Nugroho, Widyawan, & Lazuardi, 2015; Malanowski, Özcivelek, & Cabrera, 2008; Obi, Ishmatova, & Iwasaki, 2013; Rocha et al., 2013). The sheer number of developments and segmentation makes managing these innovations difficult. Fortunately, there are literature reviews that make managing this process a bit more simple (George, Elliott, & Stewart, 2008; Schultz et al., 2015). Schultz et al., (2015) is most pertinent to this research as it discusses ideas developed to mitigate impacts cause by the baby-boomers from a municipal perspective.

However, the literature review only includes developments from 2000-2014. For that reason, an update was needed to account for 2015-2016. The updated review was conducted in a similar fashion as outlined in Schultz et al., (2015). The search yielded 129 relevant articles, which required closer examination. After a closer examination, 10 of those articles were included in the new review.

Additionally, there were a few modifications made to the updated literature review. The updated review varies from the original format by: 1) 10 new articles were added from the period 2015-2016, 2) the innovation type column was simplified and

improved, 3) the column methodology was removed, and 4) a new column was added for the development of eldercare theory, which was a result of article 1 (see Table 1).

Table 1: Literature review of eldercare innovations from 2000-2016

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Anttila, S. K., et al. (2000)	Finland	Scandinavian Journal of Public Health	Process innovation	Societal efficiency	Evaluate cost-effectiveness of a post-discharge program	Elderly who have been discharged from the geriatric hospital to their home. 204 elderly participated, 89% were women.	The cost of university hospital care decreased by 52% in the intervention group, and 24% in the control group.	
Behr, R. et al. (2011)	USA	Journal of Architectural Engineering	Product (user) innovation	Quality of care	To find innovative solutions to housing challenges of an aging population.	1 municipality; model home was built for showing by nonprofit org.	A Smart Cottage can be constructed for $150,000 USD (approx. $10,000 USD for tech).	Hung, Y. X., et al. (2010); Andersson, J.E. & Ronn, M (2015) (Swedish context).
Bergman, M. A. et al (2016)	Sweden	Journal of Health Economics	Policy and strategy	Societal efficiency	Benefits to privatizing elder care services, effects of competition and innovation.	Literature review based on large data from elder care services between 1990-2009.	Indications that privatization and increased competition significantly improved non-contractible quality.	
Bielaszka-DuVernay, C. (2011)	USA	Health Affairs	Process innovation	Quality of care	The 'GRACE' model: To improve quality of care for low-income seniors by integrating healthcare services.	951 adults aged 65+, with incomes below 200% of federal poverty level.	1) 1st year, dramatic improvement in quality of care, but neutral no impact on cost of care. 2) 2nd year, clear cost savings of care, and improvement in quality of care.	de stampa, M., et al. (2013) (relationships within IC).

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Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Bradley, E. H., et al. (2005)	USA	Journal of the American Geriatrics Society	Process innovations	Quality of care	Hospital Elder Life Program (HELP) to optimize patient-care for older persons in the hospital.	13 hospitals implementing HELP, 42 hospital staff members conducted 102 interviews.	Critical factors were identified: 1) presence of clinical leadership, 2) ability and willingness to adapt 3) obtaining long-term funding.	Sandhaus, S., et al. (2010) (to reduce delirium); Steelfisher, G. K., et al. (2011) and (2013); Krall, E., et al. (2012).
Bruce, M., et al. (2002)	USA	American Journal of Psychiatry	Policy or strategy	Quality of care	To determine the psychological status of elderly who are receiving geriatric home health services.	539 elderly between ages 65-102 were reviewed weekly, over a two-year period.	Geriatric major depression is twice as common in patients receiving home care (which continues untreated) as in those receiving primary care.	Depla, M., et al. (2005).
Cates, N. (1994)	Denmark	Home Health Care Services Quarterly	Process innovation	Societal efficiency	Develop innovative programs to help the elderly stay at home as long as possible.	One municipality.	Reduction in fragmentation and duplication of elderly services.	
Dackert, I. (2010)	Sweden	Journal of Nursing Management	Policy or strategy	Working environment	To determine the impact that "team climate" has on the well-being of nurses.	The study consisted of 580 employees, 329 of which completed follow up questionnaires.	A better "team climate" providing support for innovation *may* increase well-being and decrease stress among nursing staff.	Heponiemi, T., et al. (2012).
Davis, R. L. et al. (2008)	USA	Journal of Nursing Education	Educational innovation	Working environment	To improve students' knowledge about the health needs and nursing care of older adults.	There were 260 students matched with 260 community-dwelling older adults.	The review showed that the program helped students understand critical competencies in caring for the elderly.	Goldenhar, L. M. et al. (2008); Schoenfelder, N. E., et al. (2005) (home-based care program).

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
de Veer, A. J. et al. (2011)	Netherlands	BMC Medical Informatics and Decision Making	Process innovation	Working environment	To gain a better understanding of determinants influencing successful introduction of new technologies as perceived by nurses.	National research sample, 685 (67%) registered nurses completed a survey questionnaire.	1) Only 50% experienced intro of new tech; 2) Only 50% of them had a positive experience with it; 3) Attention needs to be given to potential users of new tech that may hinder or promote new tech.	Saborowski, M. & Kollak, I. (2015) (negative perceptions of technology by nurses)
Depla, M. et al. (2005)	USA	The American Journal of Geriatric Psychiatry	Policy or strategy	Quality of care	To determine if the quality of eldercare improves at home for those elderly with severe mental illness.	18 supported living programs (with 96 elderly) and 8 psychiatric hospitals (with 78 elderly).	The elderly at home experienced significantly lower quality of life than the elderly in the hospital did.	Bhattacharyya, S., & Benbow, S. M. (2013).
Dimitrova, R. (2013)	Europe	Technology and Health Care	Policy or strategy	Societal efficiency	The role that eHealth plays in eldercare.	No sample, case study implemented.	Currently under review, but the goal is to provide the same or better quality of care at lower costs.	Juell-Skielse, G., et al. (2010); Niehaves, B., et al. (2010); Obi, T., et al. (2013); Arduini, D., et al. (2013).
Eng, C. et al. (1997)	USA	Journal of the American Geriatrics Society	Process Innovation (also see 'GRACE')	Quality of care	The 'PACE' model: a program of all-inclusive care for the elderly.	Operational in 11 cities, accounting for nine states.	Elderly satisfaction, reduction in use of institutional care, and cost savings. However, initial start-up is demanding.	Mui, A.C. (2001); Madden, K. A., et al. (2014) (defining the role of RN).

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
George, J. et al. (2008)	N/A	Drugs and Aging	Policy or strategy	Quality of care (or working environment)	To improve medication taking for elderly.	Literature review, no empirical study.	Need for innovative strategies to enhance medication adherence.	Kapborg, I. et al (1999).
Grabowski, D. C., et al. (2014)	USA	The Gerontologist	Process Innovation	Working environment	To determine what factors influence the implementation of culture change in nursing homes.	With help of experts; identified 17,031 nursing homes without cultural change, and 291 with cultural change.	Nursing homes were more likely to implement cultural changes if they are: (1) a non-profit org or faith-based, (2) in a competitive market, (3) have governmental incentives.	Dyck, D., et al (2013) (successfully implementing change).
Hannou, S. et al. (2014)	France	SpringerPlus|	Policy and strategy	Quality of care	To develop a preferential list of drugs adapted to the elderly in nursing homes.	Alsace, in France, with 1.8 million inhabitants.	252 of 338 drugs made the list of appropriate drugs to elderly in nursing homes.	
Hayakawa, M., et al. (2013)	Japan	Applied Clinical Informatics	Product (user) innovation	Quality of care	To determine effectiveness of a smartphone-based medication self-management system.	Development based on 116 elderly interviews. Tested 10 elderly, with a total of 133 dose timings.	8 of 10 elderly reported that the smart-phone reminders were helpful and were satisfied. 7 of 10 elderly said they wanted to continue using the system	

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Iannuzzi, D. et al. (2016)	Canada	Informatics for Health and Social Care	Product (user) innovation	Quality of care	To design effective integrated information for a mobile tele-operated robot in remote assistance to the delivery of home health care.	Product development, an integrated information architecture for a mobile tele-operated robot	Enables continuing evolution of robot and novel health information design in the same integrated architecture.	
Johri, M., et al. (2003)	Canada	International Journal of Geriatric Psychiatry	Process Innovation	Quality of care & societal efficiency	The importance of integrated eldercare services.	OECD countries testing innovative "comprehensively integrated" models of care for elderly.	Comprehensive approaches to program restructuring are necessary.	Stoesz, D. (2002); Glover, C., et al. (2007).
Josefsson, K. et al. (2007)	Sweden	International Journal of Nursing Studies	Policy and strategy	Working environment	Compare the working environment for nurses working in dementia care and general care.	60 specialty-housing units, in one municipality. 213 registered nurses (RNs) responded.	1) It's important to decrease RNs' time pressure for both groups; 2) Dementia care demands more knowledge and emotions from RNs.	
Kapborg, I. et al. (1999)	Sweden	Journal of Advanced Nursing	Policy and strategy	Working environment	Deeper understanding of the cause of improper drug administration to the elderly.	Based on 3-year public health reports and 8 RNs working in nursing homes and home services.	1) Administering wrong drug is most common error, most frequent when RNs delegate this to subordinates 2) Not all nurses report errors made to the physician in charge immediately on discovery.	George, J. et al. (2008).

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Katz, A. M. et al (2000)	USA	Social Science and Medicine	Educational Innovation	Working environment	To determine the impact of having elderly hold a crucial role in developmental processes.	4 elderly were given the role as "Senior Faculty" in a geriatrics residency program.	The program helped young residence gain a better sense of the elder's experience and what mattered most to them.	
Kerschner, H. et al. (2008)	USA	Gerontology and Geriatrics Education	Policy and strategy	Working environment	To gain a better understanding of volunteer drivers, how and why they decide to volunteer.	714 volunteer drivers, from 367 communities, representing 40 US states.	1) 63% of volunteers were 65+, and 23% were between the ages of 56-64; 2) 80% of transportation was for medical services; 3) Majority of volunteers volunteer "to help others".	Scharlach, A., et al. (2012) (The "Village" model); Berg-Warman, A., & Brodsky, J. (2006).
Kulik, C. T., et al. (2014)	USA	Academy of Management Journal	Policy and strategy	Working environment and societal efficiency	Emphasized the need for management research on the aging population.	Global review; emphasis given to USA, UK, and Australia.	There is a need for management research given upcoming elderly challenges.	
LeCount, J. (2004)	USA	Journal of Gerontological Nursing	Educational Innovation	Working environment	To try to encourage those nurses interested in gerontology to pursue their interest.	16 of 20 RNs responded to satisfaction of gerontology program.	16 of 20 (80%) RNs would recommend this program to other RNs, indicating their level of satisfaction.	Snoeren, M., Volbeda, P., Niessen, T.J. H., & Abma, T. A. (2016)
Lowenstein, A. (2005)	Israel	The Gerontologist	Educational Innovation	Working environment	To develop a Master's program in Gerontology.	2 new distinctive master's programs; University of Haifa and Ben-Gurion University.	The recognition of this need by the Council of Higher Education (allowing master's program) has significantly affected the attitudes and learning experiences of the students.	

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Malanowski, R. O. et al. (2008)	Europe	JRC Scientific and Technical Reports	Product (user) innovation	Quality of care	To explore the role of information and communication technology (ICT) for ageing elderly.	No case study, more of an exploration of the literature.	Elderly have 5 specific higher-level needs (based on WHO research) Health, safety, independence, mobility, and participation.	Obi, T., et al. (2013); HelpAge International (2013).
Marklinder, I. et al. (2013)	Sweden	British Food Journal	Policy and strategy	Quality of care and societal efficiency	Identifying knowledge gaps in food handling and hygiene among the elderly.	1 municipality; a questionnaire for 251 elderly, and 123 interviews were conducted.	The study suggests a lack of knowledge in food handling and hygiene of the elderly.	Educating the elderly: Day, L., Trotter, M. J., Donaldson, A., Hill, K. D., & Finch, C. F. (2016). Activity: Robson, J. P. & Troutman-Jordan, M. L. (2015).
Melkas, H. (2013)	Finland	Work: A Journal of Prevention, Assessment and Rehabilitation	Product (user) innovation	Quality of care	Find ways in which technology can be used to improve eldercare services.	4 housing service units, with over 60 assistive devices.	Need long-term patience to introduce technology to produce positive impacts on productivity.	Wearables: Kurnianingsih, Nugroho, L. E., Widyawan, Lazuardi, L. (2015).
Meyer, H. (2011)	USA	Health Affairs	Process Innovation	Quality of care	To improve care for hospitalized elderly patients.	15 hospitals, 155 clinics, and 1600 employed physicians in eastern Wisconsin.	1) eGeriatrician makes geriatricians available through teleconferencing to consult with hospitals lacking competence. 2) No reported cost saving yet.	

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Pugh, M. J. V. et al. (2008)	USA	Medical Care	Policy and strategy	Quality of care	Examine association between geriatric care and potentially inappropriate medication for the elderly (PIPE).	Veterans over 65 years, who received health care in the VA system. From 124 facilities, comprising 850,154 individuals.	Patients receiving geriatric care were less likely to have PIPE exposure.	
Rocha, A. et al. (2013)	Europe	International Journal of Medical Informatics	Product (user) innovation	Quality of care	Develop a comprehensive smart-living system for the elderly to live at home as long as they would like.	Case study review of a developed system, no testing of the system was discussed in this review.	CAALYX can have a clear impact in increasing elder autonomy, by allowing elderly to be monitored and cared for regardless of where they are.	
Ryu, M. H. et al. (2009)	South Korea	Computers in Human Behavior	Product (user) innovation	Quality of care	To determine factors that influence computer anxiety.	290 of 2000 elder Koreans responded.	1) The elderlies perceived "ease, benefit, and enjoyment" had a significant impact on their acceptance of technology. 2) While their existing values, needs, and lifestyle had no significant impact.	
Schoenberg, N.E. et al. (2009)	USA	Journal of Health Care for the Poor and Underserved	Policy and strategy	Quality of care	Raise awareness and need for innovation to manage multiple morbidities (MM).	41 elderly, with MM, low income, aged 55+|	Increased understanding and technological developments are needed to improve quality of care for those with MM.	

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Schultz, J. S. et al. (2016)	Norway	International Journal of Healthcare Management	Policy and strategy	Working environment and societal efficiency.	A case study on the strategic direction of Norwegian municipalities managing eldercare.	Six municipalities were interviewed; two large, and 4 small.	There is a clear strategy to provide services so that the elderly can live in their own homes as long as possible. Much focus has been on in-home (smart) technological developments.	
Shay, K. et al. (2008)	USA	Journal of the American Geriatrics Society	Policy and strategy	Societal efficiency	Raising awareness of aging population challenges.	The Department of Veterans Affairs (VA) Office of Geriatrics and Extended Care.	Need for new strategy given: Increasing aging population among VA, increase in young veterans, more with dementia, serious undersupply of caregivers.	Kurek, S., & Rachwal, T. (2011).
Shekelle, P. G. et al. (2005)	USA	Health Affairs	Policy and strategy	Societal efficiency	Improve disease prevention, detection of subclinical diseases, and treatments for established diseases.	3 expert panels; ranging from six leading geriatricians to technical experts.	1) Clean typology broken-down by condition/treatment 2) Many innovations have potential to greatly affect cost and outcomes of elderly care.	
Smith, S. et al. (2013)	USA	Geriatric Nursing	Educational Innovation	Working environment	Improving the eldercare experience amongst nursing students.	36 of 48 nursing students agreed to participate.	The geriatric simulation experience can prepare students for what to expect in home care.	Bennett, P., Moore, M. & Wenham, J. (2016).

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Soini, H., et al. (2004)	Finland	European Journal of Clinical Nutrition	Process Innovation	Working environment	Whether Mini-Nutritional Assessment (MNA) is a useful tool for measuring the elderlies, living at home, nutrition levels.	178 of 272 eligible elderly aged 75-94 participated, comprising 3 rural municipalities.	That MNA is a useful tool for identifying elderly that are receiving home-care and at risk of malnutrition.	Kraft, M, et al. (2012); Paquet, C., et al. (2003).
Steultjens, E. M. J. et al. (2004)	International	Age and Ageing	Policy and strategy	Quality of care	To determine if occupational therapy (OT) benefits are as beneficial in elderly's homes as they are in institutions.	No sample. 17 studies were included, 10 of which were randomized clinical reviews.	OT interventions for the elderly's homes/community dwellings resulted in positive outcomes.	
Tracy, C. S., et al (2013)	Canada	Canadian Family Physician	Process Innovation	Quality of care	Integrated elderly care to community-dwelling seniors with multiple chronic conditions.	Pilot-tested in 1 family practice unit and modeled at 3 other cities.	Currently being tested.	Pho, A. T., et al. (2012); Kyriacou, C., et al (2011); Panek, P., et al. (2008); Carretero, L., Navarro-Pardo, E. & Cano, A. (2015).
Tse, M. M. Y., et al. (2013)	China	Pain Management Nursing	Policy and strategy	Quality of care	To determine the extent that pain influences the elderly's happiness.	10 nursing homes were approached, 535 elderly were invited to participate from 2009-2011.	1) Location of pain was mainly in the knees, back, and shoulders. 2) Pain affected both psychological health (including happiness, life satisfaction and depression) and physical health. 3) Pain management is a high priority.	

Author(s)	Country	Journal	Innovation type	Eldercare theory classification	Purpose of study	Sample	Key findings	Related articles
Watson, R (2011)	Europe	British Medical Journal	Policy and strategy	Societal efficiency	To determine EU's strategy for combatting the increasing elder population	No sample.	The EU's 3 focus areas are: (1) prevention, (2) care and cure, and (3) independent living.	Kurek, S., et al. (2011) (Employment rate and retirement age)
Weinberger, B. et al. (2012)	N/A	Clinical Microbiology and Infection	Policy and strategy	Societal efficiency	To raise awareness of potential benefits for the elderly by using vaccines.	No sample.	The elderly have immune systems that are more vulnerable and vaccination is the most efficient strategy to prevent infectious diseases.	

(Schultz, André, & Sjøvold, 2015)

2.2 Eldercare theory

The additional column for eldercare theory (in Table 1), is a helpful feature for those managers that understand and are using eldercare theory. If a manager is using eldercare theory (see Figure 1), that manager is evaluating what their organization is currently investing in and predetermining the impact that future investments will have on their overall system to be sure their organization has their appropriate balance between the Level 2 factors (Schultz et al., 2015).

Figure 1: Eldercare theory (Schultz et al., 2015)
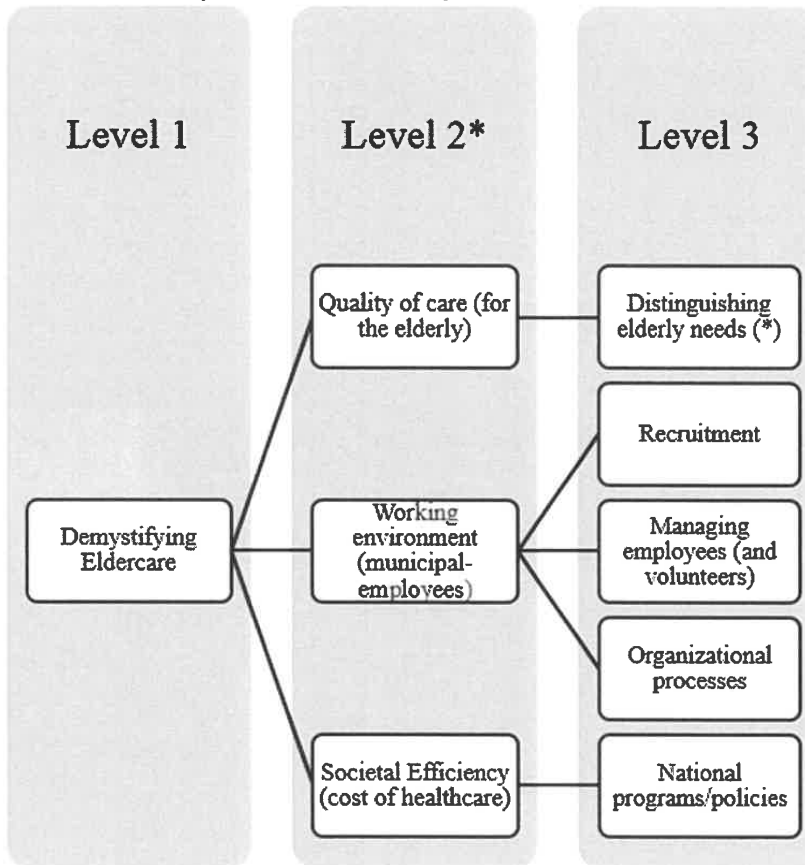
*, must evaluate appropriate balance; (*), priorities vary substantially

For example, if a manager determines that they have been developing many new ideas that have been improving the elderly's quality of life, then eldercare theory would recommend they invest in the work environment or social efficiency. If that manager is unsure how they can improve in these other areas, they can look to this new feature, *eldercare theory classification* in the updated literature review (see Table 1). If that manager wanted to improve in areas other than quality of care for the elderly, the manager could merely look to the ideas classified as working environment or social efficiency for inspiration. The Level 2 phases are broken down into more detail in Level 3 of Eldercare theory (Schultz et al., 2015).

Quality of care

The quality of care for the elderly is broken into two groups; the young-elderly and elder-elderly (see Figure 2).

Figure 2: The quality of care (for the elderly) (Schultz et al., 2015)

Young-elderly (generally are):
1. Age: 67-79 years old
2. Treatment type: universal
3. Help: non-professional
4. Condition type: acute
5. Treatment focus:
   a. Disease prevention
   b. Detecting subclinical diseases quicker
6. Costs: mostly private (*)
7. Living: mostly at home
8. Health: self-sufficient
9. Needs: prioritize 3, 4, & 5 *

Distinguishing elderly needs:
1) Health, 2) Safety, 3) Independence, 4) Mobility, and 5) Participation.

Elder-elderly (generally are):
1. Age: 80+ years old
2. Treatment type: specialized
3. Help: need professionals
4. Condition type: chronic
5. Treatment focus:
   a. Established diseases
6. Costs: mostly public (*)
7. Living: at home and in institutions
8. Health: dependent on help
9. Needs: prioritize 1 and 2 *

Innovative solutions being developed:
1. *Technology at home*
   a. Smart-homes or Smart-living
   b. Dispensing of medication
   c. Adherence to medication
2. *Council for the elderly*
   a. Being sure the elderly have a voice, or advice on the development and implementation process.
3. *Continuing elder education courses*
   a. Computer anxiety
   b. Food handling and hygiene
   c. Internet help|
   d. Nutrition
   e. Exercise courses
   f. Planning trips and activities
   g. Improving medication adherence
4. *User-driven*
   a. Collective housing
   b. Collective communities

*, needs to be continually evaluated; (*), depends on social welfare structure

These two groups of elderly have two different set of needs. The young-elderly (67-79 years old), are generally healthy, have good mobility, and are self-sufficient. The most common problems that arise within this class are general concerns of safety (e.g., falling at home or in public), having social activities, access to transportation, and remembering important events (e.g., birthdays or graduations) and medication. While the elderly (80+), generally need quite a bit more help. This is the period where dementia is most likely to be present or most severe. In simple terms, dementia causes long-term loss in one's ability to think, reason, and remember. It most commonly affects a person's memory, vision, speech, attention, and/or general problem-solving ability. Dementia tends to be treated for on a case-by-case basis. This makes treating it difficult and costly because families and nurses caring for the elderly prefer treatment that is more universal (easier to learn and use), while the elderly with dementia need treatment that is more individual or specialized treatment, and costlier. Based on an interview (Anonymous nursing professor, 2014):
- Young-elderly (aged 67-79):

- Approximately 85% of the Norwegian elderly population are healthy, generally needing very little assistance;
- Approximately 3% in this group have dementia.
- Elderly (aged 80 and older):
  - Approximately 15% of the Norwegian elderly population are frail that need a lot of assistance;
  - Approximately 47% in this group have dementia.

Once this distinction between the two groups is clear, it is necessary for a municipality to try to determine their expected need for each group. It is essential for each municipality to understand their demographics in relation to both elderly groups so that their intended target group is actually at the focus.

Working environment (for employees and volunteers)

There are three challenges within the working environment that are particularly prevalent for municipalities; recruitment, managing the current workforce, and developing innovation processes (see Figure 3).

Figure 3: Working environment (for employees and volunteers) (Schultz et al., 2015)

Recruitment

1. Geriatric simulators
2. Increase integrated care (IC)
3. Pair students with elderly
4. Recognition for geriatric specializations
5. Improve internship and job placement
6. Improve marketing

Managing employees and volunteers

1. Distinguishing type of RN work (dementia care and general care)
2. Improve the administration of drugs
3. Increase IC
4. Improve innovative cultural
5. Post-discharge programs
6. Incorporating volunteers into system
7. Technology

Organizational processes

Creating a culture open to innovation:

1. Having processes for searching or finding, selecting, and managing the development of ideas
2. Having processes for continual learning or improvement of processes
   a. Academic theories
   b. Research institutions

With respect to recruitment, there is a basic problem of supply and demand of municipal-nurses. The municipalities are increasingly being held responsible for improving both their quantity (e.g., increasing elder population) and quality (e.g., impacts of the Coordination Reform) of nursing services, thus reinforcing their need for more high educated nurses and nursing assistants. Unfortunately, a survey conducted by the Norwegian Nursing Association showed that newly educated nurses preferred to work in hospitals rather than in nursing homes due to poor working conditions at the municipalities (Mæle, 2014a, 2014b; Sundberg & Samdal, 2013). Innovation in this category represent new ideas that make the working environment more attractive for newly educated nurses.

In managing employees and volunteers, this category represents innovations that affect the management of current employees or volunteers. These innovations range from managing and improving absenteeism of current employees to allowing for more integrated care. The typical development occurring here is improving efficiency in the management of employees. The focus here is improving the management of current employees and their overall happiness with their employer.

Organizational processes speak to having an organization that embraces innovation as a part of its culture. How much an organization embraces innovation can be determined by how much time they allocate for it. Is the organization allocating time daily, weekly, monthly, or merely annually towards innovation? The amount of time devoted towards innovation tends to illustrate how rich of an innovative culture an organization has.

Societal efficiency (affordable care)

This category speaks mostly towards national programs or policies that affect eldercare services (see Figure 4). A good example is the Coordination Reform. This decentralized eldercare, by shifting nearly all eldercare responsibility onto the municipalities. The Coordination Reform has informed municipalities that innovation must be a priority in the future if upcoming demands are to be met (Omsorgsdepartement, 2009).

Figure 4: Societal efficiency (affordable care) (Schultz et al., 2015)
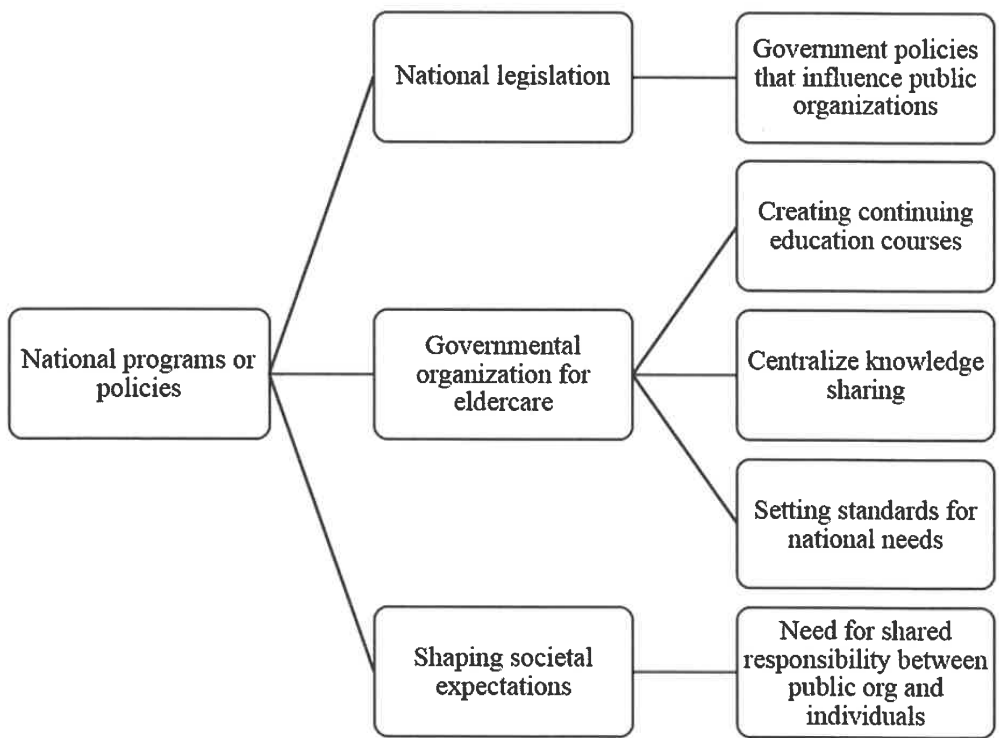
Eldercare theory evolved from the exhaustive, updated literature review. When this issue was first investigated, the literature review found that there was a vast range of developments, from homecare to institutional use. Understanding and

managing the exponential development was quite difficult. Consequently, this study attempted to simply this process. The goals were to look at eldercare from a public-entities perspective, and determine how to organize all the developments into intuitive categories that will make it easier for practitioners and researchers alike. In viewing eldercare from this perspective, eldercare theory emerged (see Figure 1). Eldercare theory states that each municipality should maintain their appropriate balance in three main categories: 1. Quality of care (for the elderly), 2. Work environment (for employees and volunteers), and 3. Societal efficiency (national policy making healthcare more affordable) (Schultz et al., 2015). More details on eldercare theory are provided in article 1 (Schultz et al., 2015).

3. Research Methods

3.1 Design of the thesis
This thesis stemmed from interest in a particular phenomenon. How is Norway's healthcare system going to endure the upcoming infrastructural impacts caused by the unprecedented increase in the elderly population and decrease in workforce (Statistics-Norway, 1999, 2014)? At the start of this project, the original plan was to conduct a literature review to identify what was happening in this field. This would explain what the international community was doing. Then, qualitative data would be gathered from Norwegian municipalities to determine what and how Norwegian municipalities are innovating. Ultimately, this thesis would provide insights as to how Norwegian municipalities could improve upon their innovation processes. It was not until after Article 2 that it became clear that the Norwegian municipalities could benefit from formal innovation training. The last two articles in this thesis were based on a formal innovation intervention that was conducted at a Norwegian hospital for the elderly.

3.2 The Norwegian context
With the exception of the literature review, the entirety of the thesis had Norway as the context. Norway was the focus of this thesis for a number of reasons. First, Norway was chosen due to logistical reasons for the authors and accessibility to data. All of the authors in the collection of articles live and work in Norway. This made understanding cultural norms, the healthcare infrastructure, language, and establishing good contacts much easier. Second, Norway is experiencing similar infrastructural issues due to the baby-boomers as many other developed countries; increased elder population and a decreasing workforce. However, what differentiates Norway from other countries is their motivation to innovate given the comprehensiveness of their welfare system. Norwegians receive both comprehensive eldercare and generous pensions from public service providers, comprehensiveness that many countries do not have. Thus, Norway is more motivated to innovate than many countries experiencing similar issues. Lastly, Norway was a contextual fit for this thesis as they have been considered a global leader in providing care for their elderly (International, 2013, 2014, 2015).

3.3 Methodological considerations
At the outset of this thesis, I had a personal goal of using multiple methods. A scholar in the field of innovation stated that if researchers were basing their research on qualitative data, specifically interviews, to publish better quality research it was recommended to supplement the qualitative data with some type of quantitative data (Edmondson, 2014). Our PhD program is in *Innovation Management and Innovation Strategy*. The aspects of the doctoral candidate's PhD program that appealed most to this thesis focused predominately on the why and how. In other words, the innovation processes. These sorts of research questions tend to be qualitative in nature. These questions explore decision-making processes from managers of organizations, explaining why they make the decisions they do. This information is difficult to ascertain from quantitative data. Given the nature of my research interest (qualitative) and the recommendation from an academic scholar (Edmondson, 2014), the goal at the start of this thesis was to start with qualitative methods, and eventually incorporate quantitative methods. The thought was if multiple methods were used, it would strengthen the quality of this thesis (Creswell,

2009; B. Johnson & Turner, 2003). Following, will be a discussion about how both qualitative and quantitative methods were viewed and used in this thesis.

Qualitative research seeks to explain social phenomena derived from understanding and interpreting personal experiences, attitudes and behaviors (Denzin & Lincoln, 2005). This means studying phenomena in their natural settings, and attempting to understand the phenomena in terms of the meanings people bring to them (Denzin & Lincoln, 2005). In conducting qualitative research, it is important to identify and be consistent in which theoretical paradigm and research design is utilized.

Each qualitative researcher has a theoretical paradigm. In other words, the way in which they researcher sees and interprets their research. These interpretations are based on a set of beliefs and feelings about the world and how it should be understood and studied (Denzin & Lincoln, 2005). A researcher's paradigm is a basic set of beliefs that guides action (Guba, 1990). Included in a researcher's paradigm is their epistemological, ontological, and methodological premise. There are four overarching paradigms: positivism, post-positivism, critical theory/realism, and constructionism (Alvesson & Skoldberg, 2009; Denzin & Lincoln, 2005). For *positivists*, the truth lies only in physical, quantitative data that can be obtained and verified (Alvesson & Skoldberg, 2009; Denzin & Lincoln, 2005). For modern positivists, the truth could be extended to qualitative data that could be measureable or possible to register through some kind of instrument (Alvesson & Skoldberg, 2009; Denzin & Lincoln, 2005). *Critical theorist's* reality is shaped by history, their main role is to identify status quo in society historically, and oppose or contradict these status quos (Alvesson & Skoldberg, 2009; Denzin & Lincoln, 2005; Myers, 1997). *Constructionists* believe that reality is socially constructed in terms of the meaning the people they study or observe give to them (Alvesson & Skoldberg, 2009; Britten, Jones, Murphy, & Stacy, 1996; Denzin & Lincoln, 2005). Thus, constructionists do not interpret data based on their own experience or intuition, rather they assign the meaning the people they study or observe give to them.

This thesis has adopted a constructionist's perspective or paradigm in interpreting the meaning of the data. The constructionist paradigm was determined most appropriate due to the complexity of the context. The complexity derives from the variability in innovation from municipality to municipality. There are approximately 430 municipalities in Norway. Each municipality having its own unique set of challenges (e.g., geographic and social-economic challenges). For the aforementioned reasons, the constructionist paradigm was used in developing the interview guide and in interpreting data obtained from interviews.

Initially, the motivation to include quantitative data in this thesis was to strengthen the qualitative data. For quite some time, multiple methods have grown in popularity. This method has gained popularity for a number of reasons; it combines the strengths of both qualitative and quantitative methods (Johnson & Turner, 2003), is necessary to address complex issues (Creswell, 2009; Onwuegbuzie & Leech, 2004), and provides more insight and an expanded understanding of the research issues (Creswell, 2009; Madey, 1982; Onwuegbuzie & Leech, 2004). Some researchers have taken this position even further by claiming that multiple methods research should be viewed as the real gold standard for studying phenomena (Johnson, Onwuegbuzie, & Turner, 2007; Onwuegbuzie & Leech, 2004). "In fact, most textbooks underscore the desirability of mixing methods given the strengths and weaknesses found in single method designs" (Jick, 1979). For these reasons, it became essential to infuse quantitative methods in some part of the qualitative data in this thesis.

Each article in this thesis takes a different perspective. Article 1 was a literature review that started wide, having an international perspective about what innovations were occurring in eldercare (Schultz et al., 2015). Article 2 was more narrow, having a national focus, looking to what and how Norwegian municipalities were innovating in eldercare (Schultz, André, et al., 2016). Article 3 and 4 had the most narrow perspective, testing group- and organizational-level innovativeness in a Norwegian elderly hospital (Schultz, Sjøvold, & André, 2016a, 2016b).

3.4 Article 1: Literature review

In order to have inspirational and useful research, a thorough and sophisticated literature review is necessary (Boote & Beile, 2005; Webster & Watson, 2002). In conducting research in a particular field or context, it's important to first understand what is happening in that field or context. Accordingly, the first article written for this thesis was a literature review. This literature emphasized two concepts, innovation and eldercare.

At the onset of the literature review, the search was to be broad, wide-ranging and inclusive. The typical search included "elder* AND innov*" and/or "geriatric*/nurs*/aging/ageing/senior*/assisted living/assisted-living/municipalit*/administration*" (Schultz et al., 2015). The databases that were used in conducting the search were SCOPUS, ISI Web of Science, PubMed, Cinahl, and Medline (Schultz et al., 2015). These keywords were too broad as they yielded 1384 relevant hits. To make this search more manageable, restrictions were added to the search. The amended search was limited to research that had been published, on or after January 2000 (but on three cases, an exception was made due to the impact of the earlier publication), and published in the English language. Additionally, Publications were excluded if they were too regional. For example, if there was a case study that discussed the impact that a particular subsidy for Veteran Care had in the United States; if the study was too hospital based, or focused on a specific treatment to a specific condition (e.g., Temozolomide and methotrexate for primary central nervous system lymphoma in the elderly) (Schultz et al., 2015). With the additional restrictions, the search yielded 207 articles that were relevant, which needed a closer examination. Upon closer examination, 67 of those articles were identified as relevant.

In reviewing the 67 relevant articles, it was continually discussed how to make understanding these developments easier for practitioners. There were so many developments in many different fields; it was difficult making sense of it all. As a result, eldercare theory emerged, as a typology that could be used by practitioners to help them understand the exponential developments occurring in eldercare more easily (Schultz et al., 2015).

3.5 Article 2: Eldercare in Norway

Article 2 is purely a qualitative study. After Article 1 explored the developments that were occurring internationally, the goal of Article 2 was to get a better idea of what was happening locally, in Norway. To do this, qualitative data needed to be gathered. A semi-structured interview guide was developed (see Supplement 1) and contacts were established with different municipalities that were identified as innovative. The interview guide was structured around what and how municipalities were innovating, to better understand their innovation processes. Lastly, the data gathered will be viewed from the lens of eldercare theory to try and better understand the innovation strategy of Norwegian municipalities'.

The participants. The level of analysis for this article was the municipality. The study included 14 interviews with healthcare practitioners; 9 municipal-managers, 4 academic or research institutions, and 1 an influential governmental organization (Schultz, André, et al., 2016). The roles of the respondents varied from special innovation advisor to project or department managers.

It was difficult in determining which municipalities to interview. Each municipality had their own unique challenges, and the type of innovative solutions varied between the municipalities. After discussing with my advisors, we determined that the inclusion criterion should be limited to managers of Norwegian municipalities that work at a municipality that were identified as being innovative in eldercare. Consistent with our philosophical paradigm, a municipality was classified as innovative based on their peer's views. If a municipality was referred to, more than once, as being innovative by their peers, than they were included in the initial inclusion criteria. Self-perceptions of being innovative were excluded from the inclusion criteria due to bias. The inclusion criteria were further limited by how many innovative projects the municipality was working on and had completed, that were public or otherwise available. These innovations needed to be developed to address infrastructural impacts caused by the baby-boomers. Furthermore, to be included, these projects needed to change the way that the technology or services were currently being provided for in the considered municipality. However, this inclusion criterion was expanded upon, when another organization's input was deemed necessary. One government agency's input was deemed necessary, after it was named several times during our correspondence or interviews. With that said, we still needed a starting point or the first municipality to interview before we received peer-reviews. For the first municipality, we had a list of municipalities that we read about quite a bit as being innovative in eldercare, this was based on the literature review and my advisors. Than after reviewing this list with my advisors, we came up with the first two municipalities to start with.

Consideration was also given to the size of the municipality, due to potential bias in funding. In general, the larger municipalities are given more resources by the government, than the smaller municipalities. Additionally, after conducting the literature review and discussing issues with my advisors, we believed that municipal-needs varied substantially based on size. In conducting our interviews, it was a goal to meet with both large and small municipalities to get a more comprehensive understanding of municipalities innovation strategy, taking into account size. We defined a large municipality as having 120,000 residents or more. Only five Norwegian municipalities fit within the definition of a large municipality. A small municipality was defined as having less than 120,000 residents. We were only able to interview two large municipalities and four small municipalities. The sample size is quite small, but it's worth noting that we gathered all the data ourselves. Since the data was gathered and interpreted only by us, we could insure the quality of the data.

Qualitative research interview. A semi-structured interview guide was used in conducting the qualitative interviews. Developing this interview guide was a joint collaboration between my advisors and I. The overarching research question for Article 2 was what are Norwegian municipalities doing, and how are they doing it. In developing the interview guide, we wanted to find out what sort of projects each municipality was working on, so that we could see where they fit within eldercare theory. Additionally, we wanted to know how they were developing these projects, so that we could identify areas for improvement. This second question relates to the how or innovation processes. After having finished PhD courses on innovation, reviewing different innovation process literature (Hansen & Birkinshaw, 2007; Thompson,

1965), and many discussions with my advisors. We eventually developed the semi-structured interview guide (see Supplement 1).

The interviews were held at the interviewees' place of employment and we used the interview guide when conducting the interview. For each interview, we attempted to have two researchers present at the interview to ensure quality of the data. This was possible for a couple of the interviews, but we quickly realized that this wasn't possible for all interviews. Each interview was generally one hour in length, with one interviewee at a time, and each interview was recorded. Each interview started with an introduction of the participants in the interview (both the researcher(s) and interviewee), an introduction of the purpose for the interview, a general overview of the main themes to be discussed. We were sure to receive confirmation from the interviewee that they understood that their responses would be anonymous and the interview would be recorded, but deleted as soon as it was transcribed. Each interview was conducted with two goals in mind: what are current solutions the municipalities have developed (to identify where the development fits within eldercare), and how were these solutions developed to better understand municipalities innovation processes.

Analysis of the data. After each interview the interviewer would transcribe the interview within one week of the interview (word for word). The transcription was then reviewed by the transcriber at least two, but sometimes three times. As soon as the transcription was completed and reviewed, the recorded conversation was deleted. Additionally, at least two, but sometimes three researchers reviewed the interview data in relation to the research interpretations. Transcription of the interviews was conducted with a great deal of attention given to preserving the meaning of the text (Kvale, 1996; Riessman, 1993). To secure the validity of the material, at least two perspectives of each interview were made (Kvale, 1996). Reliability and validity are major factors in understanding the implications of the study, and a large part of the effort was to examine these issues (Kvale, 1996). Five approaches were used for this purpose: categorization of meaning, condensation of meaning, structuring of meaning through narratives, interpretation of meaning, and ad hoc methods for generating meaning (Kvale, 1996).

Lastly, once the meaning and validity of the material was preserved, we needed to classify each municipalities responses into the eldercare theory to eventually determine what the innovation strategy was for Norwegian municipalities. In classifying the responses, we adopted a previously used and recommended method, called the predominant purpose test (Schultz et al., 2015). This test is generally used in a legal setting, when two bodies of law (goods and services) are so similar that it becomes difficult to distinguish which body of law should apply. The test seemed appropriate as its helping distinguish between overlapping variables or categories (in eldercare theory). The test prompts a series of questions: (a) what is the nature of the solutions (what is its purpose), (b) what was the reasoning for exploring the solutions, (c) what is the intrinsic value to one category, irrespective of the others, and (d) after one year of implementation, who bears the majority of the burden, with respect to time and money, in using the proposed solution (Schultz et al., 2015).

After the data was gathered, transcribed, analyzed, and viewed from the lens of eldercare theory, the innovation strategy for Norwegian municipalities became more clear (see Table 3).

3.6 Article 3: Can work climate explain innovative readiness for change?

Article 2 identified formal innovation as an area that Norwegian municipalities could improve upon. This was a research question that needed to be further explored.

A municipality was identified as being willing to participate in our study. However, prior to conducting and measuring the formal innovation training, it was important to first determine what cultural characteristics distinguished this group, that was willing to participate in formal training, from those that did not want to participate in formal training. The ultimate goal was to determine if work climate could be used to explain a group's innovative readiness for change.

Subjects and data collection. The municipality that was identified as willing to participate in the study was quite random. At the conclusion of Article 2, formal innovation training was an area identified as needing improvement, and at that same time my main advisor informed me that he was conducting a project at a Norwegian municipality. If I wanted to, my advisor said he would introduce me to the municipality's mayor to pitch the idea of conducting an intervention on formal innovation training. After I met with the mayor, and eventually local managers, the project was in full swing. It was determined that the most appropriate department to work with was the Health and Welfare department. Within this department there were two types of employees, home-care nurses and hospital (or nursing home) nurses. Home-care nursing was characterized as quite individual, they worked all over the place, and it was difficult bringing them together. For those reasons, management, my advisors, and I decided the group we would work with would be the hospital (or nursing home) nurses.

When the study was conducted there were 40 health care practitioners working at the nursing home. Management at the municipality decided that it was economically feasible to offer the course to 20 employees. Management than solicited interest in the course amongst their 40 employees. Only 15 employees expressed interest in the training. Accordingly, the nursing home was divided into two groups, the participating group (N=15) and the nonparticipating group (N=25). The participating group included those employees that volunteered to participate in the study, while the nonparticipating group included those that chose not to participate. The members of the participant group had an average age of 43 years old, their ages ranged from 19-61 years old. The members of the nonparticipant group had an average age of 44 years old, their ages ranged from 27-69 years old. Both groups were comprised of a unit leader, registered nurses, and nursing assistants. The nonparticipant group was not a control group, they did not know the content of the formal innovation training, but they knew of the trainings existence, and willingly chose not to participate. This indicated that prior to the study, both groups had shaped their attitude about the formal innovation training. In actuality, we had two participating groups, which is why the groups had been named the participating group and the nonparticipating group.

The questionnaire was originally in English. First, the questionnaire was translated from English to Norwegian by both native English and Norwegian speakers. After the Norwegian participants completed their questionnaires, the questionnaire was translated a second time, but now from Norwegian back to English. This process was done by native English and Norwegian speakers both before and after the training was completed. The questionnaires were completed by both groups. From the participant group,
15 of 15 (100%) completed the SPGR and Innovation questionnaire sufficiently. From the nonparticipant group, only 19 of 25 (76%) of the SPGR questionnaires were completed sufficiently, and 22 of 25 (88%) of the Innovation questionnaires were sufficiently completed. The data responses were analyzed to determine whether the questionnaires were filled out adequately. The participants needed to show that they read and understood each question. If a questionnaire was received and the

respondent had marked one box with a line from that box through the entire questionnaire, that questionnaire was not included because it was unclear from this response if the respondent actually read and responded to each question. However, if a respondent filled in the same response for every question throughout the survey, that questionnaire was included, as the response indicated that the respondent read and understood each question.

Measurement tools. This study used two scales for gathering data, both SPGR and an innovation questionnaire. Initially, we only started with one scale, the innovation questionnaire. When reviewing the innovation process literature, we identified a previously developed questionnaire that seemed relevant (Hansen & Birkinshaw, 2007). This Innovation questionnaire could measure improvements in different phases in the innovation process. That was very interesting to us. The other scaled that surfaced was Systematizing Person-Group Relations (SPGR), which measures team development (Sjøvold, 2007). The SPGR analysis was used to display the typical work climate in a team or organizational unit. Given both of our interests, in team development and innovation processes, we believed that it would be interesting to measure how group dynamics influence innovation within an organization. That was how we decided to use the two different scales.

Originally, the Innovation scale was a 13-item scale, but we modified it to better fit our context (eldercare in Norway). After the modification the questionnaire became a 25-item questionnaire (see Supplement 2), using a 5-point Likert scale. Each question that is asked is assigned to a specific phase in the innovation process. If a group of respondents score low on a specific phase, this questionnaire will indicate that the lowly scored phase is a phase that can be improved. There are four overall innovation phases that are measured (see Table 9), these overall innovation phases are broken further down into innovation activities.

SPGR is a 24-item questionnaire, in our setting it was used to explore the relationship between group climate and innovative readiness for change. Each item asks the participants to evaluate whether they perception of certain work culture attributes occurred: (a) seldom, (b) occasionally, or (c) often. SPGR in our context prompted the participants to evaluate two scenarios. First, how they perceive their work culture to be as of today, and how they perceive their ideal organizational work culture to be. Used in our context, SPGR will allow us to identify if two different group climates existed between two groups (the participant group and nonparticipant group) within the same department and same organization, which may impact either group's innovative ability. The theoretical and psychometric foundations of SPGR have been detailed elaborately in prior studies (André, Sjøvold, Holmemo, Rannestad, & Ringdal, 2013; Sjøvold, 2007, 2014).

SPGR was at the core of the measurements for Article 3. Here, we were exploring the relationship between group climate and innovative readiness, using SPGR to identify each group's climate. We had predicted that work culture or climate had a significant impact on a group's ability to innovate. Before the intervention was conducted, the Innovation scale was merely used as an anchor to determine if there were any unfair advantages between either group, and to identify which innovation phase was understood least by the participant group.

Statistical analysis. Based on the data that was collected and the aim of this study, a t-test was conducted. My advisor suggested that a t-test is an appropriate measure to use as we are looking for group and organizational climate distinctions between two groups, and SPGR has established comparison studies as the norm (Sjøvold, 2007). The comparison data will explore how each group perceives their actual and ideal work culture. Thus, one t-test will compare how the participant

group respondents perceive their work culture against how the same group perceives their ideal work culture. The other t-test will compare how the nonparticipant group perceives their actual work culture to their ideal work culture. Thus, in analyzing the SPGR data, no cross-group analysis of the data was made. The statistical significance of each group's self-perception will be tested, and identifying statistical significance within each respective group will be explored. Lastly, a comparison of each group's climate will be made. This should explain if there are dominant characteristics that differentiate the two groups.

A second t-test will be conducted using the innovation data. This comparison will be used merely as an anchor point, for later testing the changes or impact that an innovation can have on group- or organizational-level innovativeness. However, this t-test will be conducted across groups. It will compare the statistically significant changes in the average response to innovation knowledge questions between the participant group and nonparticipant group. This will determine if either group had a better perceived understanding of innovation prior to the intervention. Additionally, this questionnaire will serve as an anchor point, to more accurately measure the positive or negative impact that our intervention may have on the organization's innovativeness.

Participation in the study was voluntary and the participants could withdraw from the study at any point. All the participants were informed about the aim and purpose of the study. All data was registered anonymously to preserve confidentiality. Management from both the unit and the municipality approved the study.

3.7 Article 4: Can formal innovation training improve group- and organizational-level innovativeness in a healthcare setting?

Multiple methods were used in conducting the formal innovation intervention. Quantitative methods were used for gathering data relating to the relationship between formalization and innovation. This data was gathered twice; once prior the innovation intervention, and again after the intervention was completed. Lastly, qualitative data was gathered from management to more objectively determine if the formalization of innovation processes improved group- or organizational-level innovativeness.

Subjects, data collection, and measurement tools. Article 4 is a continuation of Article 3, thus the subjects, data collection, and measurement tools are the same. We had the same municipality, with the same groups, completing the same questionnaires. The difference between the two studies is in the data and analysis. Article 3 focused on group climate data (the SPGR data), while Article 4 was most interested in the effect that the formal intervention had on group- or organizational-level innovativeness (the innovation data). Additionally, Article 4 does include important methodological distinctions from Article 3. In Article 4 we conducted all of the formal innovation training, then tested the impact that the training had on each group levels innovativeness using multiple methods. Both quantitative methods (which are the same as explained in Article 3) and qualitative methods. Since the sample size, data collection, and quantitative methods are elaborated on in section 3.6, they will not be repeated. The new methods will be discussed, namely how the training sessions were conducted, the analysis of the before and after data, and an explanation of the qualitative data gathered.

Design of training. The participant group was exposed to four, two-hour formal training sessions over a period of six months. All four training sessions had a similar format. The participant group received training in their weakest evaluated innovation phase. Article 3 identified innovation strategy as the participant group's

least understood phase (Schultz, Sjøvold, et al., 2016b). Each session alternated approximately every 20 minutes, between lecturing and group work. The lecturing was based on theory tied to the participant group's weakest innovation phase, which in this case was innovation strategy. In the group work, the participating group was broken down further into small-groups. Each small-group usually contained 2-3 members. These groups were asked to apply the theories they learned from that day's lecture to different work-life scenarios. Each small-group would come up with a list of ideas, they would discuss their ideas with their small-group members. Eventually each small-group would need to decide on one or two ideas they wanted to present to the whole participant group (N=15). After all the ideas were discussed, the group as a whole would decide on which idea(s) should be further developed.

The formalization of the innovation training lies in the structure, the process of conducting and measuring the study:

> First, prior to any innovation training, we identified the participants level of innovation competence in four separate phases, based on a previously validated questionnaire (Hansen & Birkinshaw, 2007). This provided the anchor or reference points for later measuring the impact that the four training sessions had on innovative outcomes. Second, we identified the weakest innovation phase, based on the participants' evaluation. The weakest phase for this group of participants was previously identified as the innovation strategy phase (Schultz, Sjøvold, et al., 2016). This will aid in determining which academic theories the participant group will benefit most from. Third, the formal innovation training conducted, incorporating the academic theories that should improve the previously identified, weakest phase. Fourth, after the training was completed, the impact of the training was measured using the same questionnaire as mentioned in step 1. Fifth, the results from before and after the training were compared using t-tests to identify significant changes. Sixth, gather qualitative data from management to more objectively determine if an innovation has occurred. Lastly, repeat the aforementioned steps as frequently as desired or needed, there should always be a phase in the process that can be improved. This structure needs to be strictly adhered to or this formalization will not have occurred properly. (Schultz, Sjøvold, et al., 2016a, pp. 7)

Data analysis. T-tests were used to compare each group's correlation significance. We considered conducting a factor analysis, but this did not seem appropriate for our study. There is an issue that the data is self-reported data (or self-perceptions), this affects the validity of factor analysis negatively. We have a rather small sample size, and we're not testing tradition factor analysis type variables. There are not a lot of different variables varying from one another, contrarily the variables we're testing (innovation phases) can overlap into each of the other phases. There is also possible issue of structural differences across groups given their choice of participation in the training, thus shaping their attitudes and beliefs prior to the study. For the reasons mentioned above, t-tests were conducted. Article 3 conducted a t-test between both groups, prior to any formal training. This correlation did not find any significant understanding of one group over the other in any innovation phase. This study conducted the training session, then had both the participant group and the nonparticipant group complete the same questionnaire, only after the training was completed. This questionnaire was completed both before and after the intervention to try and determine if the formal innovation training had an impact on

either group's innovativeness. In Article 4 no cross-group t-tests were conducted. The only t-tests that were conducted were within each respective group. One t-test for the participant group, both before and after the intervention. And another t-test for the nonparticipant group, both before and after the participant group completed their intervention. Lastly, the statistical significance of each group's t-test was compared to the other group to see if either group learned (or learned more) than the other group as a result of the participating group's training.

Qualitative data. Two different types of qualitative data were gathered. First, data was collected based on the ideas that surfaced during the group work part of the training sessions. During each training session, the participants applied the theory they learned for that day to work-life scenarios. When these ideas were discussed to the group as a whole, these ideas were recorded. The second form of qualitative data that was gathered was from an interview with management about the ideas that surfaced during the training sessions. After all the formal training was completed by the participant group, I met with management to ask them if the ideas that emerged were actually new ideas, and to what extent they have been developed within the organization since the start of this project (see Table 8). Management was asked to what extent was each idea developed: 1) only discussed, 2) discussed, selected, and development in progress, or 3) discussed, selected, developed, implemented, and diffused within the organization. The inspiration for conducting the post-intervention interview was an attempt to gather more objective data. Data that was more free from participant self-efficacy.

3.8 Overview of methods (Table 2)

	Article 1	Article 2	Article 3	Article 4
Title	Demystifying eldercare: Managing and innovating from a public-entity's perspective.	Managing innovation in eldercare: A glimpse into what and how public organizations are planning to deliver healthcare services for their future elderly.	Can work culture explain innovative readiness for change?	Can formal innovation training improve group- and organizational-level innovativeness?
Unit of analysis	Focus on innovative developments in eldercare, internationally.	Norwegian municipalities.	One municipality: group- and organizational-level.	One municipality: group- and organizational-level.
Sample size	From 2000-2014, our search yielded 1384 hits, 207 articles were relevant, and 67 of those articles were included in our literature review.	14 interviews were conducted with healthcare practitioners; 9 municipal managers, 4 academic institutions, and 1 influential governmental organization).	40 health care practitioners; 15 participating in the formal innovation intervention, and 25 chose not to participate.	40 health care practitioners; 15 participating in the formal innovation intervention, and 25 chose not to participate.
Method	Literature review: International perspective.	Qualitative: interviews.	Quantitative: questionnaire.	Mixed methods: both qualitative and quantitative.
Conclusion	An overview of innovative solutions was provided, and Eldercare Theory emerged (see Table 1).	An overview of Norwegian municipalities' innovation strategy was provided (see Table 3).	Stresses the importance of the relationship between work culture and innovative readiness (see Tables 4 - 6).	Formal innovation training had a positive relationship to innovation at both the group- and organiz'al-level (Table 7).
Status	Published in the Int'l Journal of Healthcare Management.	Published in the Int'l Journal of Healthcare Management.	Published early in the proof format. The final version is *In press*, in the Journal of Organizational Change Management.	Revised and resubmitted in the Journal of Innovation and Entrepreneurship.

4. Eldercare in Norway

4.1 Norwegian conditions

Norway was chosen as the context for studying eldercare for a couple reasons. The most important reason was because all of the authors live and work there. Researching the region where one lives and works, has given access to substantial data which otherwise would not have been available. The authors already understood the culture, healthcare system (welfare and pension), spoke the language, and had contacts in many different areas of eldercare. Second, for the last 2 years Norway has been considered a global leader in providing eldercare services (International, 2013, 2014, 2015). Lastly, Norway is extremely motivated to innovate in eldercare given their generous eldercare pension and their universal healthcare. Norway is experiencing similar infrastructural issues as most developed countries; unprecedented growth in the elder population, decreasing workforce, decreasing interest amongst newly educated nurses to provide home-care for the elderly, and too few eldercare institutions. However, unlike most countries, Norwegians receive free healthcare and a generous elderly pension. Thus, Norway is quite motivated to innovate, and this has been a clear policy since 2009 (Aging, 2014; Helse-og-Omsorgsdepartement, 2013; Offentlige-Utredninger, 2011; Omsorgsdepartement, 2009).

4.2 Infrastructural impacts

Increasing elder population

The elderly population in Norway is expected to nearly double from 2010 to 2050 (Statistics-Norway, 1999, 2012, 2014). To truly understand the impact that the increase in the elder population will have, it is necessary to distinguish between two groups, the young-elderly and the elder-elderly. The young-elderly represent the ages 67-79, and the elder-elderly represent ages 80+ (Figure 2 & 5). The young-elderly are generally healthy and need very little help, while the elder-elderly generally require the most nursing assistance (A nursing professor, 2014; Statistics-Norway, 1999).

Figure 5 (below) is a graphic representation of the elder population in Norway (Statistics-Norway, 1999). The *young-elderly* represent the first three columns within each period, while the *elder-elderly* represent the last three columns.

Figure 5: The elder, by age. 1980-2050 (Statistics-Norway, 1999, pp. 25)
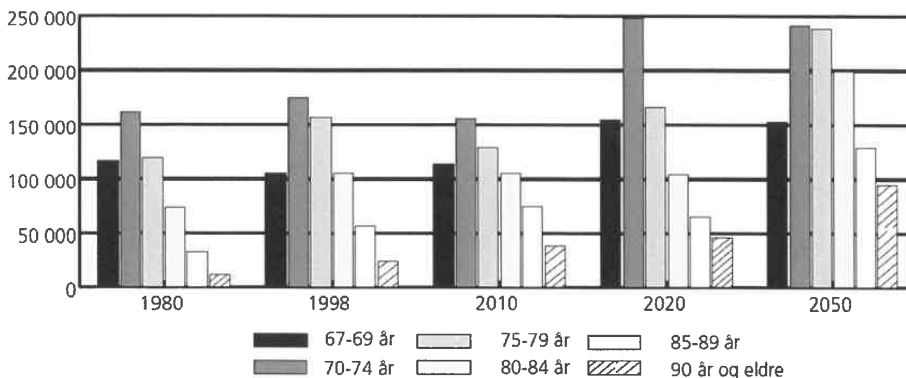
According to Figure 5, it is quite clear that in Norway, the *young-elderly* will represent the largest portion of the elderly in 2020. In 2020, the young-elderly are expected to represent 72% of the elderly population, while the elder-elderly represent 28% (Figure 5). Comparatively, in 2050, the elder demographics are expected to shift; the young-elderly representing 60% and the elderly representing a significant 40% (Figure 5).

In 2010, the Norwegian population was approximately 4.9 million; the young-elderly represented approximately 8% and the elder-elderly represented approximately 5% (Statistics-Norway, 2012). In 2050, the population growth is expected to reach 6.7 million people. During this time, the young-elderly are expected to represent 12.3% and the elder-elderly are expected to represent 11.2% (Statistics-Norway, 2012). Consequently, the elderly as a whole would account for approximately 23,5% of the population (nearly 25%), compared to their 13% in 2010 (Statistics-Norway, 2012, 2014). However, it is important to note that these elderly populations vary from municipality to municipality. For example, in 2010, a report found that small municipalities, with fewer than 5000 inhabitants, had the highest proportion of elderly as compared to larger municipalities (Statistics-Norway, 2012). Therefore, the actual proportions vary.

Many factors have contributed to this increase. High birth rates just after the Second World War, an increase in life expectancy (from 81 in 2010 to 86 in 2050), population projections, and a decrease in the labor force.

Life expectancy has increased; this is much credited to advances in medicine. Over the last 100 years, there has been a medical shift from treating epidemics and infectious diseases, to now, treating predominately non-communicable diseases. Non-communicable diseases are not passed from person to person, but are conditions that progress slowly over a long period. These conditions are most often caused by smoking (impacting lung cancer and COPD), not exercising and obesity (affecting cardiovascular diseases and diabetes type II), and drinking (affecting the liver, neurological, and the immune system). In 2010, the average life expectancy was 81, while in 2050, the average life expectancy was projected to be 86 (Statistics-Norway, 2012, 2014). This means that the average elderly person will live long into the *elder class* (80+). The same age class that requires the most elderly services.

Figure 6: The number of people, by age. 1970-2010 (observed) and 2020-2050 (projected) (Statistics-Norway, 2012)
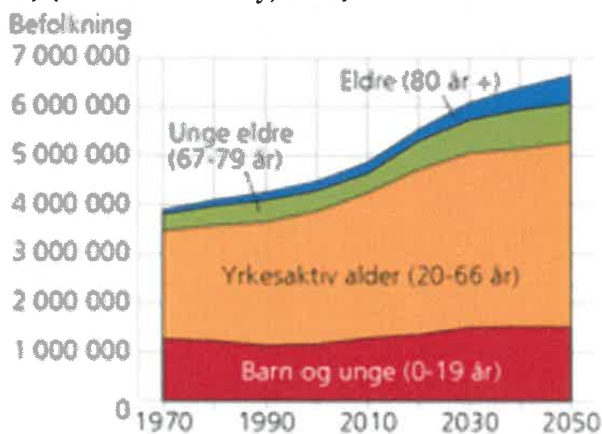
Population projections

The population projections are quite troublesome. From 1970 to 2010, there has been a steady increase in the population of approximately 23% over those forty years (Figure 6) (Statistics-Norway, 2012). However, recently, Statistics Norway has projected that from 2010 to 2050, the Norwegian population will increase upwards near 40% (Statistics-Norway, 2012). The projected growth over the upcoming 40 years (2010-2050) would be almost double the growth, as compared to the prior 40 years (1970-2010) of Norwegian population growth. Even after taking into account those elderly living longer, this growth is unusually large. Where are these people coming from? In 2010, the population increased by about 62,000 people, and 70% of this growth was from net immigration (Statistics-Norway, 2012). Thus, it is fair to assume that Statistics Norway has based their 2050 population projections on the same 70% growth in net immigration. If a similar increase in the population that occurred in 2010, occurs through 2050, then the population may reach 6,5 million. However, if the population increases similarly to how it did over the last 40 years (from 1970-2010), there will be a 23% increase. This would result in a population being approximately 6 million. If the overall population is 6 million (not 6,7), this would reduce the size of the working class population, while the elderly projections will likely remain the same. If that occurs, this could mean the elderly would represent nearly 28% of the population (rather than the projected 23%).

Decreasing labor force

The size of the labor force is a difficult variable to account for accurately, as it is contingent upon many varying factors –working preferences, educational preferences, military duties, granted permission away from work, mental and physical conditions preventing one's ability to work, immigration, and many other factors. With that said, the labor force is expected to decrease over the next forty years (Statistics-Norway, 1999, 2012). In 2010, the workforce represented approximately 61%, while in 2050, the workforce is expected to represent 56% of the population (Statistics-Norway, 2012). If these projections are correct, this in-flow and out-flow of labor can be a bit concerning. If the elderly population increases to the extent predicted and the workforce decreases as projected, uncertainty will surround how their will be an adequate supply of labor, and how all of the elderly's benefits will be provided (both healthcare and pension).

Recruitment issues

"In Norway and Sweden, the elder care sector is characterized by insecure terms of employment, part-time work (often unwanted) and a high percentage of care workers who lack formal training" (Ulstein, 2006, pp. 1). Municipalities in Norway have long been plagued by bad reputations amongst newly educated nurses (Mæle, 2014a, 2014b; Nordberg, 2013; Sundberg & Samdal, 2013). Consequently, as long as many municipality-nurses can remember, they have always struggled to fill their nursing vacancies within the municipality (Mæle, 2014a).

Regardless of whether the overall working population will represent 56% or 61% of the overall population, there is a clear trend among newly college-educated nurses; they have less and less of an interest in working for a municipality. This January, the Norwegian Nursing Association conducted a survey to determine where nursing students preferred to work. The survey included 3,600 newly graduated nursing students. The results showed that only 7% of the nursing students said that

they could see themselves working for municipalities (e.g., in a nursing home) after they completed their education (Mæle, 2014a). The majority of the students preferred to work in hospitals (Mæle, 2014a). The newly-educated nursing students mention *poor working conditions* as a leading cause for their lack of interest (Mæle, 2014a, 2014b). In the students' opinion, poor working conditions often meant municipalities were understaffed, often performing helping-assistant work, stressful working days, and often working alone (Mæle, 2014a, 2014b). Poor working conditions can often result in absenteeism from work. Not surprisingly, absenteeism remains quite high among Norwegian homecare-nurses (Sundberg & Myhr, 2016). "On average absenteeism in 2014 was 9.6%. Within the Health and Welfare department absenteeism was 12,3%" (Sundberg & Myhr, 2016, pp. 3). In 2015, Dragvoll Health and Welfare Center reported absenteeism as high as 22% (Sundberg & Myhr, 2016)".

The lack of interest in municipal-nursing amongst newly educated nurses is evident in Trondheim. A survey, which included 20 leaders from Trondheim municipality's Health and Welfare Division, was conducted to determine the level of education that nurses had. The results showed that only 1 in 4 nurses had a college education (Sundberg & Samdal, 2013). Trondheim has 1,500 nursing home beds, divided into 29 health and welfare centers (Sundberg & Samdal, 2013). Of these centers, there are a total of 2091 employees, and only 538 of them have a college education (Sundberg & Samdal, 2013). Of the others, 1139 are nurse helpers, and 414 are assistants. The results suggest two possible explanations; educated nurses prefer to seek employment elsewhere than in nursing homes, or municipalities are more focused on filling job vacancies rather than the importance of expertise. In Trondheim absenteeism has been between 10-14% the last ten years, which has resulted in about 500 million kroner loss each year (Sundberg & Myhr, 2016).

Moreover, the Coordination Reform (Samhandlingsreformen) has shifted more responsibility from the hospitals to the municipalities for specialized treatment (mental health, substance abuse rehabilitation, discharging of patients, and other activities) (Omsorgsdepartement, 2009). The focus of this reform, for the municipalities, was on prevention of health problems. Additionally, it is well documented that nurses, physicians, occupational and physical therapists with expertise in geriatrics, have beneficial effects on the survival and quality of life in sick elderly (Nordberg, 2013). These new duties imposed by the Coordination Reform are going to increase the demand for more expertise in geriatrics if municipalities are to prevent and promote elderly health effectively. This type of education focuses on how to age well; identifying, solving, and preventing common elder health related problems.

In 2035, it was estimated that 30-35% of all the students that graduate from high school will need to be recruited into health services to be able to deliver the same type of service with the same standard today (Mæle, 2014b). Currently, 10% are being recruited (Mæle, 2014b).

The historical and current supply of municipal-nurses compared to the demand of today and future needs paints a relatively dim picture. On the supply side, there is clear evidence that newly educated nurses are not interested in becoming a municipal-nurse due to the poor working conditions. It is unclear whether the main cause of this is due to disinterest among nursing students, bias impact the academic institutions have on students, or if municipalities are so focused on filling vacancies rather than on filling vacancies with expertise. On the demand side, it is also clear that the elderly population is only growing, and their need for assistance is only going to increase. Additionally, the trend in political reform (the Coordination Reform) is to

expect the municipalities to take on more and more responsibility. Thus, the municipalities are expected to increase their capacity and competency, while improving their quality.

4.3 Eldercare within Norwegian municipalities

1. Unit of analysis

This research has looked to eldercare innovations at the municipal-level. Traditionally, municipalities in Norway had been responsible for primary care, while the Regional Health Authorities have been responsible for specialty care, and the Norwegian government responsible for retirement pension (Ringard, Sagan, Sperre Saunes, & Lindahl, 2013). Thus, municipalities and hospitals had more of a shared responsibility for the elderly. However, in 2012, the Norwegian government transferred nearly all eldercare services to the municipalities (Omsorgsdepartement, 2009). For these reasons, it was most appropriate to conduct our study at the municipal-level. Thus, our research questions became what and how Norwegian municipalities are innovating to mitigate infrastructural impacts for their future elderly.

2. Choosing between municipalities

It was a difficult process in determining which municipalities should be included in the study, and which should not. Norway has 428 municipalities. The range of inhabitant within each municipality varies substantially. There are as few as 200 inhabitants in the smallest municipality (Utsira) and 658,000 inhabitants in the largest (Oslo) (Statistics-Norway, 1999). The size has a significant impact on the funding or resources a municipality receives. The larger the municipality the more resources or funding they receive (e.g., institutions, doctors, nurses, and equipment). With this in mind, it was important to include both large and small municipalities. A large municipality has been defined as a municipality having 120,000 inhabitants or more, while a small municipality is comprised of less than 120,000 inhabitants (Schultz, André, et al., 2016). Accordingly, only five municipalities in Norway are large municipalities, while the other 423 are small municipalities. Given this imbalance in resources, it was important to include both small and large municipalities. If this study just looked to the most innovative municipalities, it would have been likely that the study would have merely met with the largest municipalities. But, the large municipalities only comprise 1.2% (5 of 428) of the Norwegian municipalities, while 98.8% are small municipalities. Thus, to get an overview of what Norwegian municipalities are doing, not just what the largest municipalities are doing, it is important to keep both groups at the focus of the study.

3. What are Norwegian municipalities doing?

This study gathered information that was publically available, contacted 33 practitioners, and conducted 12 interviews using a semi-structured interview guide (see Supplement 1). Of those 12 interviews; 9 were municipal (representing six municipalities; three large and three small), 2 academic/research institutions, and 1 an influential governmental organization. The roles of the interviewees ranged from special innovation advisors, to department leaders, project leaders, researchers, and professors in the school of nursing. All of these interviews were conducted with two goals in mind: what are current solutions the municipalities have developed (to identify focus areas), and how were these solutions developed (to understand the

municipalities innovation processes). These results are illustrated in Table 3 (below), viewed from the lens of eldercare theory (Schultz et al., 2015).

Table 3: Norwegian municipalities' innovation strategy (Schultz, André, et al., 2016)

Municipality Size (to maintain anonymity)	Quality of care (for the elderly)		Working environment of the municipality				Societal efficiency	
	Young-elderly	Elder-elderly	Recruit-ment	Manage-ment	Organiz. Processes	Perceived Rate of Change	Shaping Views	Political Reform
Large Municipality (LM) 1	X	X		X		Slow		X
LM 2	X	X		X		Slow		X
LM 3	X	X				Fast		X
Small Municipality (SM) 1	X					Fast		X
SM 2	X			X		Moderate		X
SM 3	X	X				Fast		X

Table 3 shows that there is a clear strategy among Norwegian municipalities to improve the quality of care, especially for the *young-elderly* by developing smart, in-home technology. Some municipalities have focused on their working environment by improving the management of their employees. Unanimous agreement amongst all the municipalities that the national government influences their innovation strategy significantly (Helse-og-Omsorgsdepartement, 2013; Offentlige-Utredninger, 2011; Omsorgsdepartement, 2009). To our knowledge, no municipalities has developed programs to improve recruitment or innovation processes within their municipality. A short review will follow, describing the actual innovations that some of the municipalities have developed. These innovations were categorized using eldercare theory. Thus, these innovations will be presented in the three main eldercare theory categories; quality of care, working environment, and societal efficiency.

Municipal-innovations improving the quality of care
The most common technology that nearly every municipality has invested in is *smart in-home technology*. However, the extent of technology each municipality has explored varies dramatically. Some municipalities merely offer safety alarms, while others are exploring systems that are more comprehensive.
The most basic of these technologies is the *safety alarm*, this device is a button the elderly push if they fall or are in need of emergency services. If the alarm is activated, a nurse will respond. Municipalities generally have a response time of

within 30 minutes, but the response time varies based on the provider (Anonymous interview, 2013-2014). The elderly wear nearly all of these as a wristband or a necklace (see Figure 7). These safety alarms have become quite popular, but they have their limitations. One serious limitation is that most of these devices must be

Figure 7- Safety alarm(s)

connected to a house's telephone line. This limits the range of the safety alarms to within the house. This is a major problem for those elderly that like being outdoors. Consequently, other municipalities have been exploring the use of safety alarms with built-in GPS (Figure 7). It is unclear whether the system will work when traveling throughout Norway (within different municipalities) or the extent that it could work outside of Norway (e.g., in Scandinavia or other European countries). As of now, these devices use either Wi-Fi or telephone data, meaning their range is more expansive than traditional devices. A distinct advantage of this developing technology is that the GPS will allow the elderly, especially those with dementia, to be more self-reliant. There are two products currently being tested; a small device that acts in a similar fashion to a cell phone (but can only receive calls from a nursing station), and different Apps for current and future smartphone users. These services are already provided for by private companies but now, municipalities are in the process of developing these technologies.

The more advanced technologies that have emerged are the *complete smart in-home technology* (see www.smartly.no/smarthjem/velferd, www.smart-control.no, www.moeller.no, www.xcomfort.no, and www.verisure.no). These types of systems tend to have a starter (or basic) package, and additions for individual preferences. The starter packages tend to include: eLocks on the doors (facilitating ease of entry for emergency nurses); sensors on doors and windows (to protect against intruder or elderly with dementia wandering from home at the wrong times); controls in the kitchen (turning off ovens or stovetops after an extended periods of use); and smoke alarms (connected to the local fire department) (see Figure 8).

Figure 8 – An example of a complete smart smart-home solution
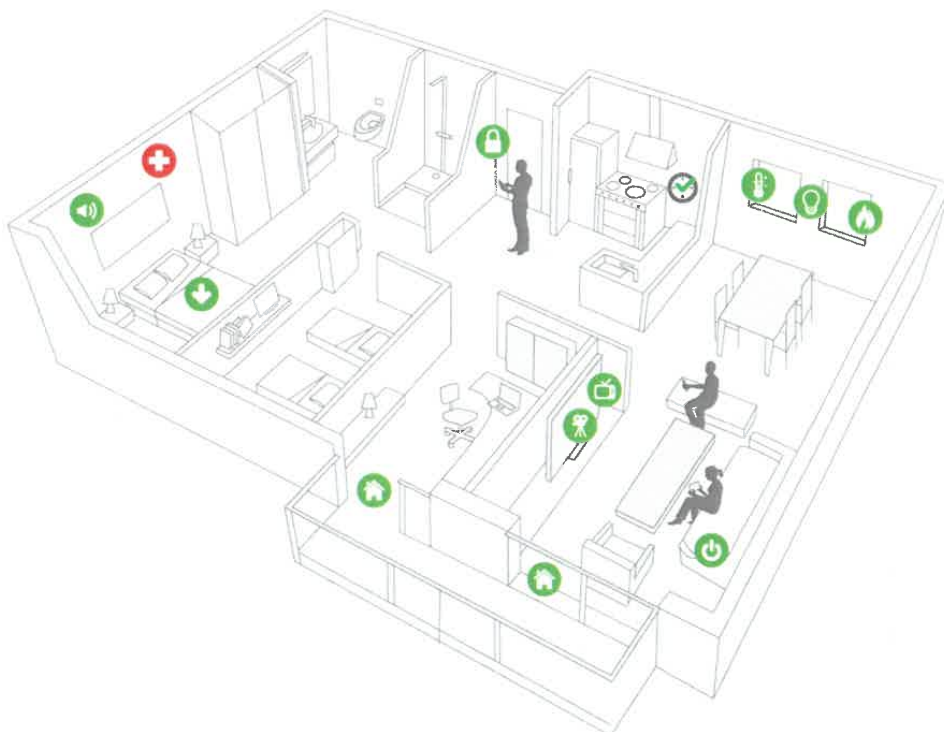
In addition to the start package, private companies tend to offer add-ons like: communication (e.g., daily nursing calls, family member calls, or combined conference with nurses and family members, live video feed of visitors at their door); safety sensors (e.g., fall sensors, sensors for additional appliances, extra fire sensors, gas leak sensors, water leak sensors); lighting; and heating. All of the sensors are controlled from an IPad or similar device. The fire alarms are connected to the local fire department. If a fire alarm goes off, the sensor alerts the fire department and relatives. The sensor takes a picture of the room and informs the fire department which room the fire is coming from. This allows the fire department to assess the seriousness of the fire. This type of system is unique because individuals can build these systems based on their need. Thus, the more assistance a person needs the more technology that can be added onto the central system. To my knowledge, Stavanger is the only municipality to require all of their inhabitants to buy the central system (see www.smartfly.no/smarthjem/velferd). An issue municipalities have been struggling with is how to have a response center that can monitor and respond to all the different devices day and night. Due to these challenges, private companies tend to provide the majority of these services.

The *MEMOplanner*, has become a popular technological device among the elderly to help them stay more organized. It essentially keeps track of activities and appointments; reminding the user of upcoming, birthdays, medication that needs to be taken, and clothes to have one. This is a nice, comfort device. It does not address the issues of safety or social activities, but it does help minimize forgetfulness (see www.abilia.no).

This next innovation is more of a *service-type or process innovation*, rather than a technological development. Recently, some municipalities have begun offering *everyday rehabilitation* programs. These programs are unique because they are voluntary and offered to the healthy, instead of only being provided only to those who are recovering from an injury. The goal of this program is to increase endurance, flexibility, and overall physical activity, which has proven to have a positive impact on overall health. Each rehabilitation program has a rehabilitation team. These teams are generally comprised of a geriatric specialist, physical therapist, nurse, and/or nutritionists, all of who educate the elderly on how to live a healthier life through eating and exercising correctly. The comprehensiveness of each program (nutrition and exercise) and composition of the team varies between municipalities. Nevertheless, the overall impact has been incredible. Some elderly have gone from needing 11.5 hours a week of home care to needing only 10 minutes a month (Landstad, 2012)! The elderly felt so empowered after the program. They went from feeling helpless, to now being able to shower, get dressed, wash clothes, cook, take out the trash, and visit neighbors all on their own (before needing assistance). However, those success stories have had one complaint. The elderly have stated that they do miss talking to the nurses as often as they did before (Landstad, 2012).

The last innovation that will be discussed is a user-driven innovation, called "collective living" (Figure 9). Collective living is essentially a fraternity house for the elderly. The concept is simple, getting a group of friends together to live in a large house that they all share together. The only private room is an individual apartment - with a bathroom- that ranges in size from 50 to 70 square meters (540 to 760 square feet). There are a couple of case studies on collective living in Norway (Dommerud & Westerveld, 2012a, 2012b, 2012c). One in particular was a private development in Eidsvoll, where a group of 30 seniors invested together in an old educational facility they have converted into their living space (see Figure 9). The large old school building was renovated so that each couple will have their own 70 square meter apartment, but the rest of the building will be communal. They will share the 30-acre yard, hobby rooms, entertainment rooms, a luxurious spa, dining room, exercise room, and kitchen. Amongst young-elderly, their most common

Figure 9: A collective living community (Dommerud & Westerveld, 2012a, 2012b, 2012c)

needs are related to independence, mobility, and participation (Schultz et al., 2015). This type of idea mitigates and potentially eliminates these concerns. They will share

the 30-acre yard, hobby rooms, entertainment rooms, a luxurious spa, dining room, exercise room, and kitchen. There is much comfort in knowing you have many friends living around you, especially if something happens and someone needs a little help. Equally as important, there is very little concern of loneliness or depression when you live in an open community. The most difficult adjustment the elderly from Eidsvoll had was getting rid of everything they had accumulated throughout a lifetime (Dommerud & Westerveld, 2012a). This whole project was initiated and financed on the elderly's own budget. One could imagine the impact this type of housing could have if municipalities or the national government supported this idea. For example, municipalities could help with planning and implementation:

- Developing architectural drawings if elderly want to build a new facility, or have drawings for renovating existing buildings;
- Cost estimates the elderly should expect to pay;
- Necessary components of communal living;
- Supportive technology –like smart solutions- to include in the building;
- Different types of municipal-services, based on the number of elderly and their needs (larger living communities receive better offers);
- Locating property, they could help identify current facilities that are becoming less used, as potential properties for elderly;
- Financial support for this investment, maybe match dollar for dollar up to the first 5% of the cost;
- Give incentives to those that live together (tax incentives, maybe daily/weekly nursing visit, help getting financing with banks or state-owned institutions;

The potential effects of this type of living are substantial. This would ease demand on current nursing homes and make home nursing care much more efficient if one nurse is visiting 15 healthy elderly couples, rather than traveling across town to 15 different houses. For many of the elderly the private investment is not the issue, its more coordination, planning, and execution. The elderly would likely finance these ventures themselves as it creates an optimal living arrangement. If the municipalities did invest in this system, develop drawings, determine cost estimates for elderly, have regular nurses for these buildings once build or create smart solutions (smart-homes) within these facilities, this elderly wave could go from being a potential economic problem to being a social welfare success story. If you look at the impact that tax incentives have had on Norwegians (e.g., electric cars or the savings account for first time buyers -BSU-), then you can imagine the impact such an incentive would have. This area of innovation has much potential.

Municipal-innovations improving the quality of care all have one thing in common, they have improving the quality of life for the elderly at the core of the innovation. Improving the elderly's quality of life usually has the effect of providing the elderly with more self-reliance, independence, and self-worth (Schultz et al., 2015). Most of the innovative ideas above that fit into "quality of care" are linked to the other two-eldercare theories (working environment and societal efficiency). The technologies will likely cause initial strain on the working environment as all the current practitioners will need to learn how to use them correctly. These technologies may also have an initial cost on societal efficiency, but may have a long-term cost savings. However, in appropriately categorizing innovations using elder care theory, the predominant purpose test prompts a series of questions, first and foremost, what is the nature or purpose of the solution (Schultz et al., 2015). The nature or purpose of the solutions above are to improve the quality of care for the elderly. These

solutions are linked to the other eldercare categories, but those other categories are not at the core of the idea. For managers of innovation in eldercare, it is important to continuously evaluate the implications that innovations have on the three main categories of eldercare. That is how current and future strategy is determined. By using eldercare, a manager can more quickly determine where they should focus their innovation strategy, whether it be the quality of care, working environment, or societal efficiency. When managing this process, using eldercare theory, a couple different methods can be used to determine which strategy is most appropriate. These methods are discussed in Article 1 and 2 (Schultz et al., 2015; Schultz, André, et al., 2016).

Municipal-innovations improving the working environment

These innovations have improving the work environment at the core (Schultz et al., 2015). No innovations improved recruitment, but a couple improved the management of current employees using technology (Schultz, André, et al., 2016). There are currently three different types of management developments; logistics planning of home nurses, improved communication within the municipality, and safely dispensing medication at home.

The development for the *logistics planning of home nurses* is Norway is called Gerica; the alternative Swedish version is called Laps Care (Eveborn, Flisberg, & Ronnqvist, 2006). This technological development improves logistical planning and efficiency for home-nurses (Figure 10) (Eveborn et al., 2006; Schultz, André, et al., 2016). The software first needs a municipality to register the relevant data (about employees, clients, and performance to be completed). The software than suggests the best route using navigation technology (based on geographic proximity, number of visits, and planned time for each visit). The municipality can then follow up on this plan or manipulate the suggested plan (e.g., if it planned too much or too little work, or if a nurse calls in sick the morning of work).

A common problem that municipalities face is that nurses often call in sick, go on holiday, or do not want to work weekends, thus there tends to be quite a bit of temporary nurses that fill-in this gap. This technology speeds up that learning curve, by centralizing all keys electronically on handheld PDA's. Additionally, this PDA clearly states each patient to visit, where they live, what tasks to perform, and what the elderly like to [discuss]. One small municipality with approximately 14 500 residents is saving approximately 1.5 million NOK annually. However, there is more potential for cost saving the larger and denser the city. In a large municipality with approximately 800 000 residents [] had an estimated savings of 165-250 million NOK annually. As of [June] 2014, only 140 of 430 Norwegian municipalities are using this technology. (Schultz, André, et al., 2016, pp. 176)

Figure 10: An illustration of Laps Care (Gerica) (Eveborn et al., 2006)
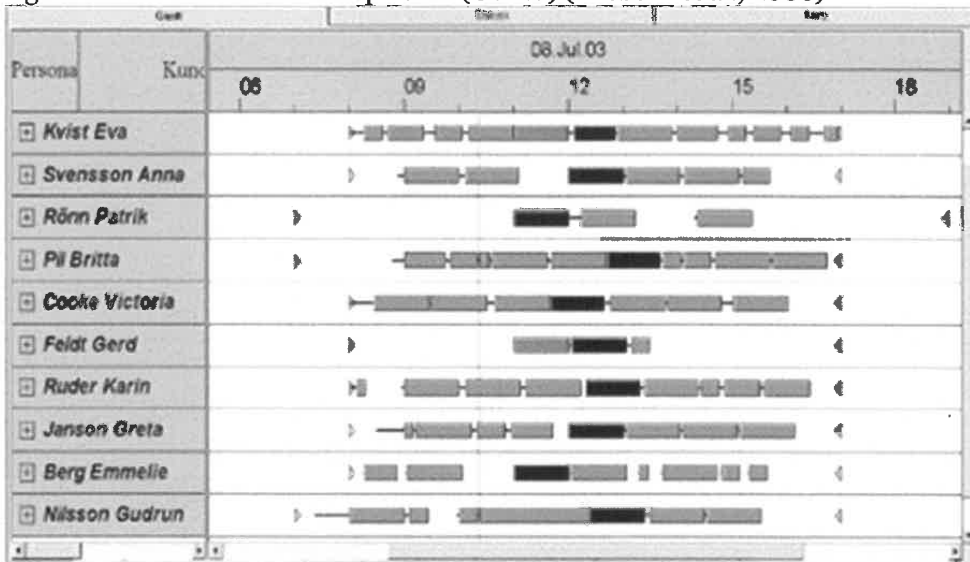
One known municipality is testing *improved communication technology* using a touch-screen (Dragland, 2013a). Developed by Imatis, this software provides instantaneous updated information for all departments that are on the system. It allows multiple people (e.g., doctors and nurses), from multiple departments to have access to the same information at the same time. It was developed to eliminate wasted time and lost information when a patient goes from department to department (or hospital to home services). This management software streamlines the process of transmitting information. This is management software, on a large touch screen, that shows information about the status of every room, who should be evaluated for discharge, and who is expected to arrive that day. The program requires the operator to input the information correctly, but if that is done, it allows the hospital to have current status of available beds. This software provides the ability to share updated information at any time between different actors or departments within the municipality (e.g., hospital, emergency room, and/or home-services). The software has not been expanded into all departments of this municipality yet, as it is being tested in one department first (Dragland, 2013a).

Another working environmental innovation was developed by a municipal-research institution in Oslo that has been testing a touch-screen technology (Enge, 2014). This elderly technology monitors the elderly's current condition instantaneously (Figure 11). This transforms home or institutional nursing electronic. A nurse no longer needs to travel to a patient's room or home,

Figure 11: eNursing, elderly-based input

the nurse merely calls or video conferences on a monitor when needed. Additionally, multiple times a day, the elderly are asked to evaluate their condition -e.g., green= doing well, yellow= need assistance, and red = emergency (see Figure 11). Thus, if the yellow button is pushed a nurse will likely call or video conference to determine what type of assistance is needed.

The last working environmental innovation is the *safe medication dispenser* (Dragland, 2013b). This development came from a couple different problematic areas; forgetfulness in taking medication and nurses administering the wrong medicine. There are going to be an increasingly large amount of elderly that are healthy, and when the elderly need to take two or more pills more than once a day, forgetfulness of taking medication becomes a serious issue (An interview with a nursing professor, 2014). Previously, nurses have administered this medication, but this method has had its drawbacks. As demands on doctors and nurses has increased so has the likelihood that the elderly will be administered the wrong drug. At one Norwegian elderly hospitals (sykehjem) 1 in 3 elderly were administered the wrong drug (Jakobsen, 2012; Prestegård, 2015). This safe medication dispenser will eliminate the potential for more human error. The medication will be pre-packed by the local pharmacy, and the machine will dispense the medication at the right time (Figure 11). If the medication is not taken, a text message will be sent to relatives and/or home nursing services.

All of the aforementioned innovations have had the working environment at the core. There were no known developments in recruitment or innovation process, but some municipalities have been developing new, innovative ideas about how to improve the management of the services they deliver. Most of these innovations address improving the efficiency of their current employees.

Innovations improving the societal efficiency

These are innovations that have come about due to national programs or policies, rather than municipal-initiated (Schultz, André, et al., 2016). In Table 3, all the municipalities interviewed unanimously agreed that innovation is essential in

addressing upcoming demands. Additionally, they agreed that their strong support for innovation derives from national policies or programs (Helse-og-Omsorgsdepartement, 2013; Offentlige-Utredninger, 2011; Omsorgsdepartement, 2009; Schultz, André, et al., 2016). A national issue that surfaced, that has yet to be addressed is how the national government is going to reshape individual attitudes. According to a municipal-manager:

> As of now, all young-adults (those younger than 67) do not feel a sense of accountability for their elderly, they think, when my parents get old, the municipality will take care of them. This is an attitude that needs to be reshaped through policy because our infrastructure is not adequate to handle future demands. The demand from elderly is going to be higher, and policymakers are continually giving us [municipalities] more responsibility rather than transferring some from us to the individuals or families. This is an important attitude that needs to be reshaped. (Schultz, André, et al., 2016, pp. 176)

All six municipalities agreed, to some extent, that it is important to reshape individual attitudes so that there is a more shared responsibility, and that this cannot be done without national policy.

4. Implications of these innovations

Based on these findings the research shows that Norway, through its National policy, has been building a culture of innovation in eldercare at the municipal-level since 2009 (Omsorgsdepartement, 2009). Every municipality interviewed was aware of the baby-boomers (eldrebølgen), and every municipality agreed that innovation is going to be an important element in meeting those upcoming challenges. Additionally, each municipality interviewed had developed some sort of innovation related to eldercare. This is an important finding. It illustrates the value that the Norwegian healthcare system puts on innovation. This raised the question what are Norwegian municipalities' innovation strategy for innovating in eldercare. What are the most important issues in mitigating upcoming infrastructural issues?

Table 3 illustrates the current innovation strategy for Norwegian municipalities providing eldercare services. There is a clear innovation strategy for developing smart in-home technology. The goal of this technology is to allow the elderly to live in their homes as long as possible. The majority of these municipalities are developing technology to accommodate for their young-elderly, while some municipalities are developing the technology for both young-elderly and elder-elderly. However, there seems to be little technology transfer or knowledge sharing between the municipalities in developing these smart in-home technologies. Every municipality interviewed was developing some sort of smart in-home technology, but each technology was different from municipality to municipality. Whether it be a different standard package, a different supplier, more focused for the young-elderly, or it being based on a different system. With 428 municipalities, all developing their own smart in-home technologies, you essentially have 428 municipalities re-inventing their version of the wheel.

It is unclear why most municipalities have not focused on improving the working environment. According to eldercare theory, each municipality should be evaluating their current system to determine where they may have a deficiency of innovations. According to Table 3, there is a lack of innovations in the working environment; eldercare theory would encourage municipalities to invest more time and energy into this category of eldercare theory. Table 3 does show that three of the six municipalities have developed a tool to improve the management of their

employees, but no municipality interviewed had a new innovative idea to improve recruitment or improve innovation processes. The latter was surprising, that no municipality had a formal process for developing or managing innovation. After each municipality was interviewed, there was unanimous agreement that "we know we need to be innovative to meet upcoming demands" (Schultz, André, et al., 2016, pp. 176), however no municipality had formal innovation training or formal innovation processes. According to eldercare theory, it is likely a good idea for these municipalities to have improving their working environment as a new innovation strategy. There should be an emphasis on improving recruitment and innovation competences.

Being researchers in the field of innovation scholars, the research question that was naturally pursued was how to improve municipalities' innovation competence. If innovation was a necessary component for delivering satisfactory healthcare services to our future elderly, why didn't any municipality have a formal innovation program or process?

5. Formal innovation training

5.1 Formal innovation education at the municipal-level
When Norwegian municipalities were asked about their innovation processes, the majority responded with, "you mean something formally written down that we use when we innovate?" (A municipal-manager, 2014). We do not have anything like that (A municipal-manager, 2014). It was further explained to them that it does not necessarily need to be written down, but could be a process that everyone knows exists. For example, if an employee has a new, great idea, they know most of the avenues they can take their idea to without needing to ask anyone. One municipal-manager responded that:

> Innovation is about creativeness and creating an atmosphere of openness, and fewer boundaries is an important aspect of our innovativeness, which is why we decide not to have formal processes of innovation. The more formal processes and more boundaries, the more it will inhibit innovation. (Schultz, André, et al., 2016, pp. 176)

Some municipal-managers believe that formal processes hinders innovators from coming forward with their new ideas (Schultz, André, et al., 2016). This municipal-response needed to be further explored. The authors believed that without having a formal process for innovation, you cannot measure progress in each of the innovation phases. If you cannot measure the phases accurately, how can you improve on them? If an innovation goes well or poorly, you will not know where in the process things went right or wrong, unless you measure these phases. After this municipal-phenomenon was identified, this study looked to organizational and innovation literature to determine to what extent this research question has been explored.

5.2 Formalization and its effects
The literature that spoke most closely to this issue was formalization. Formalization "refers to the degree to which a codified body of rules, procedures or behavior prescriptions is developed to handle decisions and work processing" (Pierce & Delbecq, 1977, pp. 31) In theory, the more formalized the organization, the stricter adherence to behavioral codes or processes, the more predictable the organizational performance (Pierce & Delbecq, 1977). The negative association between formalization and innovation has been around for more than half of a century (Thompson, 1965). Recent empirical studies have further affirmed this relationship that flexibility and low emphasis on work rules facilitate innovation, rather than formalization (Hage & Aiken, 1967; Kaluzny, Veney, & Gentry, 1974). Moreover, low formalization permits openness, which fosters and encourages new ideas (Knight, 1967; Pierce & Delbecq, 1977; Shepard, 1967).

A comprehensive review of innovation processes suggested that the relationship between formalization and innovation is best described in terms of Thompson's innovation process; initiation, adoption and implementation (Pierce & Delbecq, 1977). In this review, a proposition was formulated related to formalization at each stage of the innovation process; "formalization will be negatively related to initiations, but will have a modest positive relationship to adoption and implementation" (Pierce & Delbecq, 1977, pp. 31). This was contrary this study's belief. The authors believed that formal innovation training would be positively related to innovativeness.

This theory needed to be tested. As a result, contact was established with a small Norwegian municipality, located in Trøndelag, to determine if they would

participate in this study. The municipality was informed that this study was going to test the impact that formal innovation training had on their innovativeness. Accordingly, data would be collected, and would likely be used for future publication. This small municipality was interested in the idea and willing to participate. Their interest raised two questions. First, why is this municipality so interested in learning about innovation or change, when the other six municipalities have not been focusing on it and when the issue is so distant (approximately 15 years away)? Second, will formal innovation training have a positive impact on innovativeness? In the two following sections, these two questions will be further explored.

5.3 Innovative readiness for change

Most municipalities are facing unprecedented challenges in resolving how to provide for their future elderly (Kulik et al., 2014; Schultz et al., 2015; Schultz, André, et al., 2016). The elder populations will be growing at unprecedented rates, but those affects are not expected to be felt before 2030 (Kulik et al., 2014; Statistics-Norway, 1999, 2012, 2014). Most municipalities have agreed that they need to be innovative to meet upcoming demands, but no known municipality has received formal innovation training (Schultz, André, et al., 2016). When the impact is not expected for approximately 15 years, when is the right time to innovate?

Organizational readiness for change

Organizational readiness for change is considered a necessary component to the implementation of complex change in healthcare environments (Armenakis, Harris, & Mossholder, 1993; Richards & Hallberg, 2015; Weiner, 2009). Organizational readiness is referred to as a shared psychological state, where an organization attempts to influence attitudes, opinions, and ultimately the behavior of their organizational members (Armenakis & Bedeian, 1999; Armenakis et al., 1993; Walker, Armenakis, & Bernerth, 2007; Weiner, 2009; Weiner, Amick, & Lee, 2008). The readiness for change message is two-part: (a) the need for the change, which explains the discrepancy between the current state and the desired end-state; and (b) the individual and collective efficacy of the parties affected by the change (Armenakis et al., 1993).

This study located a municipality in Trøndelag that has acknowledge (a) the need for change, and (b) they has expressed their individual and collective efficacy from the parties affected by the change. As organizational readiness is established for this municipality, this section hopes to spread light onto how this municipality become organizational ready to change by looking to their work climate. By looking to these municipalities work climate, other municipalities or organizations that are resistant to change should be able to learn from those work climates that are ready for change.

The municipality located agreed to allow all of their 40 employees providing eldercare services, to participate in the study. It was determined that a maximum of 20 employees could participate in the formal innovation training. The formal innovation training included four, two-hour sessions, on various innovation topics. The managers solicited volunteers to join, 15 of 40 volunteered to participate in the study. The study included two groups, 15 employees participating in the formal innovation training (the participant group), and 25 employees that knew of the study's existence, but chose not to participate (the nonparticipant group).

Using work climate to explain organization readiness is common (Caliskan & Isik, 2016; Eby, Adams, Russell, & Gaby, 2000; Ingersoll, Kirsch, Merk, & Lightfoot, 2000; Jones, Jimmieson, & Griffiths, 2005). Prior empirical studies show that

"organizational culture that embraces innovation, flexible organizational policies, and positive organizational climate supports organizational readiness for change" (Schultz, Sjøvold, et al., 2016b, pp. 2).

Work climate explaining organizational readiness

Exploring work climate is important in better understanding positive and negative experiences that employees face at the workplace (André, Frigstad, Nøst, & Sjøvold, 2015; André et al., 2013). Additionally, it appears that organizational climate influences the degree to which creativity and innovation are stimulated in the organization (Ahmed, 1998; Frohman, 1998; Martins & Terblanche, 2003). Thus, a better understanding of work climate could have a significant impact on the innovative outcome of a project (Ahmed, 1998; Frohman, 1998).

Data will be collected from two groups. One group (the participant group) has chosen to participate in the formal training, and the other group (the nonparticipant group) willingly chose not to participate. This study will look to the work climate of both of these groups, to determine if individual self-efficacy that makes up either group has an impact on a group's innovative readiness. Alternatively, there will not be a difference in work climate between the two groups, meaning both groups will have the same work climate. Most focus will be given to identifying dominant group characteristics between the participating and nonparticipating group. This will shed light onto work climates that promote (or negatively affect) organizational readiness.

Tables 4, 5, and 6 illustrate the dominant group climate characteristics that were present within each group, prior to any formal innovation training.

Table 4- The participant group's work climate

Factors	Code	Typical behavior	Actual	Ideal	Statistical Significance
Ruling	C1	Controlling, autocratic, attentive to rules and procedures	4,36	4,52	
Task-orientation	C2	Analytical, task-oriented, conforming	5,65	7,75	**
Caring	N1	Taking care of others, attentive to relations	7,75	8,56	
Creativity	N2	Creative, spontaneous	1,45	0,65	
Criticism	O1	Critical, opposing	2,10	2,10	
Assertiveness	O2	Assertive, self-sufficient	2,74	2,26	
Loyalty	D1	Obedient, conforming	7,10	8,56	*
Acceptance	D2	Passive, accepting	7,43	8,56	
Resignation	W1	Sad appearance, showing lack of self-confidence	1,94	0,32	**
Self-sacrifice	W2	Passive, reluctant to contribute	1,94	0,65	*
Engagement	S1	Engaged, inviting others to contribute	6,94	9,04	***
Empathy	S2	Showing empathy and interest in others	7,91	8,72	*

* p < 0.05 ** p < 0.01 *** p <.001

Table 5- The nonparticipant group's work climate

Factors	Code	Typical behavior	Actual	Ideal	Statistical Significance
Ruling	C1	Controlling, autocratic, attentive to rules and procedures	3,33	4,39	
Task-orientation	C2	Analytical, task-oriented, conforming	5,95	7,44	*
Caring	N1	Taking care of others, attentive to relations	6,54	7,98	*
Creativity	N2	Creative, spontaneous	1,07	0,40	
Criticism	O1	Critical, opposing	2,26	2,66	
Assertiveness	O2	Assertive, self-sufficient	2,97	2,92	
Loyalty	D1	Obedient, conforming	6,30	7,58	*
Acceptance	D2	Passive, accepting	6,90	8,64	**
Resignation	W1	Sad appearance, showing lack of self-confidence	0,95	0,27	
Self-sacrifice	W2	Passive, reluctant to contribute	1,31	0,40	*
Engagement	S1	Engaged, inviting others to contribute	6,78	8,24	*
Empathy	S2	Showing empathy and interest in others	7,02	8,38	*

$* p < 0.05$ $** p < 0.01$ $*** p < .001$

Table 6- Innovation understanding for both groups, prior to any training (this table has been enlarged, see Supplement 3)

Innovation Phase	Code	The focus of each question	Participant Group	Nonparticipant Group	T-test	Statistical Significance
Innovation strategy	S1	Understanding of current organizations strategy	2,20	2,10	0,376	
	S2	Long-term strategy	2,60	2,52	0,415	
	S3	Time allocated towards thinking differently	2,47	2,45	0,485	
Idea generation (IG)	IG1	Internally, the openness of the working environment	2,93	3,50	0,030	*
	IG2	Internally, extent the organization can think differently	2,93	3,24	0,180	
	IG3	Internally, quality of the organizations ideas	2,40	2,73	0,113	
	IG4	Internally, the extent we partner with other departments	2,73	2,81	0,390	
	IG5	or other firms on normal and innovative projects	3,29	2,95	0,136	
External IG	eIG1	Importance of external ideas	3,00	3,05	0,390	
	eIG2	Value given to ideas that come from outside the firm	2,64	2,86	0,172	
Selection	Sel1	How easy it is to bring an idea forward to the org	2,53	2,57	0,450	
	Sel2	The importance of each individual's opinion in selection	3,40	3,18	0,246	
	Sel3	The importance of the group's opinion in selection	3,50	3,45	0,433	
	Sel4	The org understands why a particular idea is chosen	3,21	3,41	0,273	
	Sel5	Is the more conservative or risky idea more often chosen	2,13	2,48	0,131	
Development	D1	Using formal innovation processes to measure progress	3,00	3,05	0,433	
	D2	Ideas are generally developed on time, without delays	3,07	2,81	0,123	
	D3	Management generally has strong support in developing	3,21	3,10	0,350	
Diffusion	Diff1	How fast the org is at bringing idea to the market	3,20	2,95	0,169	
	Diff2	How quickly our ideas are copied (e.g., by competitors)	2,92	2,73	0,245	
	Diff3	Extent maximizing value (e.g., markets, customers, etc.)	2,67	2,70	0,447	
	Diff4	Extent org discusses lessons learned with develop team.	2,57	2,57	0,500	
	Diff5	Extent org discusses lessons learned with entire org	3,20	3,19	0,488	
Innovation attitude	A1	Personal enthusiasm towards innovation	4,07	3,45	0,029	*
	A2	Optimistic attitude towards innovation education course	3,75	2,75	0,004	**

$* p < 0.05$ $** p < 0.01$ $*** p < .001$

An additional filter was used to better identify the distinguishing characteristics between both groups (see Article 3 for more information on the filter used) (Schultz, Sjøvold, et al., 2016b). Applying the additional filter shows that the participant group had significance in Table 4's task-orientation (C2) and resignation (W1) ($p<0.01$); and Table 4's engagement (S1) ($p<0.001$), while the nonparticipant group had significance in Table 5's caring (N1) ($p<0.05$) and acceptance (D2) ($p<0.01$) (Schultz, Sjøvold, et al., 2016b).

These results have significant meaning when looking to Tables 4, 5, and 6, as a whole. First, they show that even though employees come from the same department

within the same organization, the two groups have two different climates in how they view innovation. Additionally, they show why the participant group was much more willing or ready to innovate. They had a group climate that was statistically significant in categories that represented enthusiasm for innovation; task-orientation (C2, Table 4), engagement (S1, Table 4) resignation (W1, Table 4), and innovation attitude (A1 & A2, Table 6). While their counter-part (the nonparticipant group) had a climate that was comprised of caring (N1, Table 5) and acceptance (D2, Table 5). However, acceptance was a more dominant factor representing this group's climate. This is not that strange. This is a group that was given the option to participate in an innovation training, but chose not to. Most people can relate to these members in a meeting. They attend the meeting because they have to, they contribute when they are called upon, they more or less do what they must. The factors need to be looked at as whole to determine how ready a group is for innovation (Schultz, Sjøvold, et al., 2016b). The participant group had an overall positive attitude towards innovation (see A1 & A2, Table 6), approximately 4 (on a scale of 1-5), compared to the nonparticipant group's evaluation of approximately 3 (see A1 & A2, Table 6).

Identifying these two different work group climates was important, prior to conducting a formal innovation training. It will likely explain how formal innovation training influences each of the two groups.

5.4 Formal innovation training
After prior research had identified distinctions between each group's work climate characteristics, and determined each group's level of innovation understanding (Schultz, Sjøvold, et al., 2016b), it was than time to conduct the formal innovation training. The aim of this study was to determine if formalization, by means of an innovation intervention, was positively or negatively related to innovation. Section 4.2 of this thesis discusses formalization from a literature standpoint. That section includes a comprehensive review of innovation process as they relate to formalization (Pierce & Delbecq, 1977). The review suggested that the relationship between formalization and innovation was best described in terms of Thompson's innovation process; initiation, adoption and implementation (Pierce & Delbecq, 1977). Pierce and Delbecq (1997) also formulated a proposition related to formalization at each stage of the innovation process, they posited, "formalization will be negatively related to initiations, but will have a modest positive relationship to adoption and implementation" (Pierce & Delbecq, 1977, pp. 31). This was contrary the authors beliefs, and needed to be tested.

Measuring innovativeness
These main concepts (initiations, adoption, and implementation) as described by Pierce and Delbecq (1977) had their shortfalls. These terms have become too traditional. As organizational and innovation literature has been developing, this has made applying these concepts all the more difficult. These terms do not clearly distinguish between the selection and development phases of an idea; they merely speak to the selection or financial support from the organization (Schultz, Sjøvold, et al., 2016a). Since 1977, organizational and innovation literature has grown in both the development (Christensen & Raynor, 2003), and the selection phase (Alexiev, Jansen, Van den Bosch, & Volberda, 2010; W. K. Smith & Tushman, 2005; West &

Anderson, 1996), which has made distinguishing and measuring accurately between these phases all the more important (Schultz, Sjøvold, et al., 2016a). Hansen and Birkinshaw have developed a modernized conceptualization of Thompson's innovation process (2007). The innovation value chain measures innovation in three phases; idea generation (replaces initiations), idea conversion (replaces adoption), and idea diffusion (replaces adoption and implementation). For more information on these concepts see Article 4 (Schultz, Sjøvold, et al., 2016a).

Given literature developments in measuring innovation processes, this modern conceptualization more clearly distinguishes between these three phases, which allows for a more accurate measurement of innovation processes (Hansen & Birkinshaw, 2007). Additionally, the innovation value chain (Hansen & Birkinshaw, 2007), uses more modern termed phases, making the application of the process more intuitive (Schultz, Sjøvold, et al., 2016a). Unfortunately, there is a certain inflexibility in applying certain types of organizational and innovation theory. For example, if an organization is having difficulties generating new, good ideas, creativity literature will likely shed light on this issue. Creativity literature would most likely fit within the idea generation phase. However, what if the issue was more systematic and a change was needed throughout the entire organization? Many different strategies or cultural theories could be relevant. For example, organizational culture, (Christensen, 2000; Edmondson, 1999; Harrison & Carroll, 1991; Sørensen, 2002), organizational identity (Hannan & Freeman, 1984; Oliver, 1991), or strategic direction in specific industries (Schultz et al., 2015). It is difficult to determine where these different theories or strategies fit within Hansen and Birkenshaw's innovation value chain model (Schultz, Sjøvold, et al., 2016a). Additionally, prior studies have indicated that having leaders or teams positive, engaged, and optimistic attitude towards innovation can be contagious to the rest of the organization (Barrick, Thurgood, Smith, & Courtright, 2015; Schultz, André, et al., 2016). This attitude was difficult to account for in the prior model.

As a result, a hybrid model was adopted for measuring innovation. This hybrid model, adds two phases, innovation strategy and innovation attitude, to the innovation value chain model. Thus, the innovation process will be measured at five phases: innovation strategy, idea generation, conversion (including both selection and development), diffusion, and innovation attitude. Improvements in the municipality's innovation performance will be measured by using a previously developed questionnaire (Hansen & Birkinshaw, 2007), but this questionnaire was modified to account for the additional categories (see Supplement 2).

This questionnaire measures each participants' self-perception of their organizations innovation performance. Each group's scores will be averaged amongst the members within each group. Then, the two group's scores will be compared.

Due to potential for individual bias, there will be a second, more objective measure for innovation. This measure defines innovation as, the development and implementation of a new idea within the organization (Daft, 1982; Damanpour, 1991; Damanpour & Evan, 1984; Van de Ven, 1986). This measure looks to what ideas the municipality actually developed as a result of the formal innovation training.

Results from formal innovation training
    Table 7 illustrates the results from the formal innovation training.

Table 7: The participant and nonparticipant group's innovation understanding, before and after the formal innovation training (this table has been enlarged, see Supplement 4)

Innovation Phase	Code	The focus of each question	Part. Before	Part. After	T-test	Statistical Significance	Nonpart. Before	Nonpart. After	T-test	Statistical Significance
Innovation strategy (S1-S3)	S1	Understanding of current organizations strategy.	2,20	3,78	0,0001	***	2,10	2,91	0,0194	*
	S2	Long-term strategy.	2,60	3,11	0,0414	*	2,52	3,33	0,0230	*
	S3	Time allocated towards thinking differently.	2,47	3,33	0,0045	**	2,45	3,25	0,0165	*
Idea generation (IG1-eIG2)	IG1	Internally, the openness of the working environment.	2,93	3,89	0,0099	**	3,50	3,92	0,0574	
	IG2	Internally, extent the organization can think differently.	2,93	3,89	0,0201	*	3,24	3,67	0,0870	
	IG3	Internally, quality of the organizations ideas.	2,40	3,44	0,0001	***	2,73	3,00	0,1846	
	IG4	Internally, the extent we partner with other departments-	2,73	3,22	0,1078		2,81	3,18	0,0535	
	IG5	or other firms on normal and innovative projects.	3,29	4,11	0,0062	**	2,95	3,33	0,0904	
	eIG1	Importance of external ideas.	3,00	2,44	0,0592		3,05	3,33	0,0903	
	eIG2	Value given to ideas that come from outside the firm.	2,64	2,67	0,4169		2,86	2,50	0,0581	
Conversion (Sel1-D3)	Sel1	How easy it is to bring an idea forward to the org.	2,53	3,44	0,0020	**	2,57	2,75	0,3079	
	Sel2	The importance of each individual's opinion in selection.	3,40	4,11	0,0715		3,18	3,50	0,1113	
	Sel3	The importance of the group's opinion in selection.	3,50	4,00	0,1708		3,45	3,75	0,0723	
	Sel4	The org understands why a particular idea is chosen.	3,21	3,78	0,1290		3,41	3,75	0,1045	
	Sel5	Is the more conservative or risky idea more often chosen.	2,13	2,00	0,2760		2,48	2,33	0,2643	
	D1	Using formal innovation processes to measure progress.	3,00	3,00	0,4032		3,05	3,18	0,2828	
	D2	Ideas are generally developed on time, without delays.	3,07	3,00	0,3638		2,81	3,00	0,2292	
	D3	Management generally has strong support in developing.	3,21	3,78	0,1068		3,10	3,33	0,1868	
Diffusion (Diff1-Diff5)	Diff1	How fast the org is at bringing idea to the market.	3,20	3,22	0,5000		2,95	3,33	0,0740	
	Diff2	How quickly our ideas are copied (e.g., by competitors).	2,92	2,89	0,3417		2,73	2,83	0,3291	
	Diff3	Extent maximizing value (e.g., markets, customers, etc.).	2,67	2,67	0,2873		2,70	2,91	0,2232	
	Diff4	Extent org discusses lessons learned with develop team.	2,57	3,11	0,2292		2,57	2,92	0,1103	
	Diff5	Extent org discusses lessons learned with entire org.	3,20	3,33	0,3802		3,19	3,42	0,2220	
Innovation attitude (A1-A2)	A1	Personal enthusiasm towards innovation	4,07	4,33	0,4696		3,45	3,17	0,1404	
	A2	Optimistic attitude towards innovation education course	3,75	4,44	0,1087		2,75	2,83	0,3989	
Control question	C	Experim. group has spoken to control group about	2,83	4,33	0,0025	**	2,47	2,00	0,0702	

* p < 0.05 ** p < 0.01 *** p <.001

Due to time and financial limitations, the participant group only received 4, two-hour training sessions on the innovation phase their employees evaluated as the weakest. In Table 7 (under participant and nonparticipant Before), these values represent each groups self-evaluation of their organizations innovation performance, before any training. In reviewing this column, it is clear that the weakest evaluated phase was *innovation strategy*. Accordingly, the participant group received 4, two-hour formal innovation training on innovation strategy. When this training was completed, data was gathered from both groups to see the impact the training had on either the participant or the nonparticipant group. Three different data sets were gathered; the first two were self-perception questionnaires on their organization's innovation performance both before and after the formal training (Table 7), and innovative ideas that derived from the training (Table 8).

Table 7 shows that not only did the participant group perceive an improvement in their organization's innovation strategy (p<0.001), but they also improved significantly in their idea generation (p<0.01). Equally interesting, the nonparticipant group, the group that chose not to participate in the training improved significantly in innovation strategy (p<0.05), the same phase the participant group was trained in. The control question (C), sheds light onto this phenomenon. C prompted the participant group to identify how often they spoke with the nonparticipant group about what they learned (see code C in Table 7). This shows that it is likely that the participant group's excitement or enthusiasm for innovation was contagious to the nonparticipant group. That even though the nonparticipant group chose not to participate in the training, they learned from it anyways.

Table 7 shows the participants belief or perception that their organization improved in their innovation strategy and idea generation. Table 8 reinforces their

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perception with more objective data. Table 8 shows that, regardless of self-efficacy, the municipality developed eight new ideas as a result of their training, and three of those idea were implemented into the organization.

Table 8: Innovative ideas that derived from the formal innovation training

Idea	Description of the idea	Extent implemented
1.	Smaller units for elderly with dementia (with shielding/protection needs) – Units are too large now.	**
2.	Changes in planning daily routines and tasks between day and nighttime nurses.	***
3.	Have open dinner hours for 1-2 hours to improve patients' appetites and less chaos in the dining room.	**
4.	Facilitate the receipt of patients with different backgrounds, today we're not prepared for more.	*
5.	Better estimates of food needs, waste less food.	***
6.	A more active use of PPS	**
7.	Patient summary/overview completed in advance	***
8.	Improve interdisciplinary (across department) collaboration	**

* Discussed ** Selected and development in progress *** Implemented and diffused

6. Discussion

This thesis has posed and attempted to address the following research questions:

1. What is currently happening in eldercare? (Article 1)
2. What and how are Norwegian municipalities innovating? (Article 2)
3. How can Norwegian municipalities improve upon their existing innovation processes? (Article 3 and 4)

The collection of papers that adequately address the, above mentioned, research questions are Articles 1-4:

Article 1: Demystifying eldercare: Managing and innovating from a public-entity's perspective
Article 2: Managing innovation in eldercare: A glimpse into what and how public organizations are planning to deliver healthcare services for their future elderly
Article 3: Can work climate explain innovative readiness for change?
Article 4: Can formal innovation training improve group- and organizational-level innovativeness in a healthcare setting?

Throughout the Discussion and Conclusion section, each implicated article was referred to as Article 1, 2, 3, or 4 (or Research question 1, 2, or 3), rather than the proper APA citation. This format was used in the Discussion section so that it is easier to identify how each of the four articles are all related to the overall theme of this thesis. This will more clearly illustrate the unity of the four articles to the overall theme of the thesis.

This thesis has followed a logistical sequence (see Figure 12). The thesis first started broad, in an attempt to understand what was going on in the field of innovation in eldercare (Research question 1). The focus than became more narrow, looking to the national perspective, to the innovation strategy of Norwegian municipalities (Research question 2). This eventually led to an intervention study that would improve innovation processes at the group- and municipal-level (Article 3 & 4). Figure 12 illustrates how this thesis evolved in terms of its focus, going from broad to narrow.

It is important to have a clear, well-defined structure when discussing innovation and eldercare. Such a broad theme can quickly lead to confusion or a sense of being overwhelmed, as there is so much development occurring (Article 1). There are a number of different actors (e.g., international community, government, municipalities, suppliers, private and public companies, the elderly, the elderly's family), products, and services (Article 1).

For ease of understanding and need for a well-defined structure, the discussion that follows will be structured in a similar format or unit of analysis as Figure 12. This section will discuss the research questions as mentioned in this section, but they will be discussed at different unit levels: individual-level, group-level, organizational-

level, national-level, and international-level. This style creates a well-defined structure, and it presents the findings from this thesis in a new, interesting way.

Figure 12: The evolution of the thesis

ARTICLE 1
INTERNAT'L
PERSPECTIVE

ARTICLE 2
NATIONAL
PERSPECTIVE

ARTICLE 3 & 4
GROUP & ORG'L
PERSPECTIVE
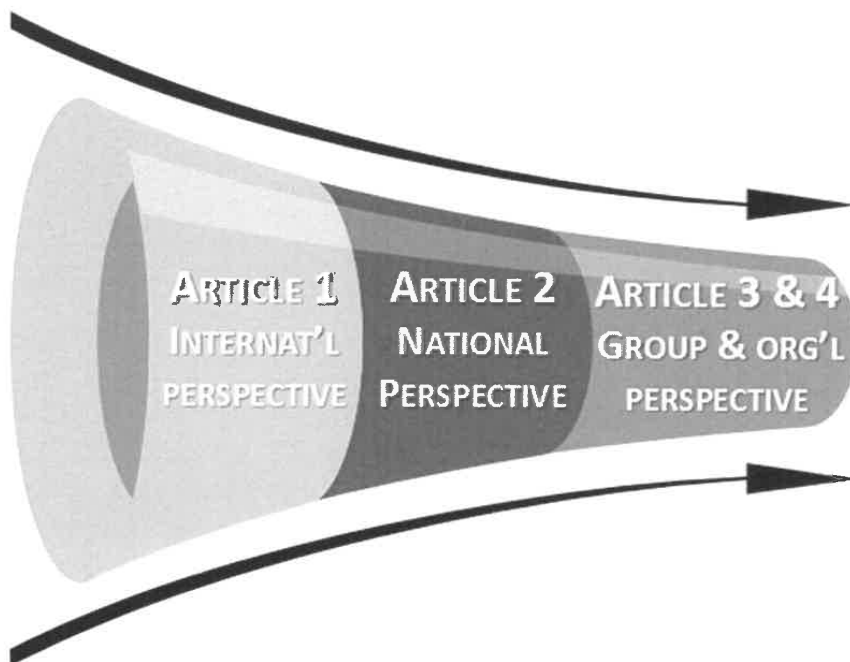
6.1 Contextual considerations

1. Individual-level

Changing individual expectations

It is no longer true that where people are born will likely be the same place they will work and raise their family when they become older. How many people live in the same town that they grew up in? It has become a norm for young-adults to pursue their passion. Wherever the best opportunities are available, at that certain point in their lives (work or study) people tend to follow those opportunities.

One question that most young-adults have not considered, when following their work or study opportunities is "who is going to take care of your parents if you leave your locality?" In Norway, most people assume that their municipality will provide these services for their elderly (A municipal-manager, 2014). However, what happens if municipalities simply put, do not have enough people to provide these services? Empirical evidence shows that most developed countries will be experiencing unprecedented increases in their elder populations and decreases in their workforce (Kulik et al., 2014; Article 2). In Norway, not only is there a decreasing workforce, but only 7% of the newly educated nurses want to work in municipal-care (Article 2).

After meeting and interviewing several Norwegian municipalities, there was unanimous agreement that there needs to be a shift individual expectations of inhabitants within their municipality (Article 2; see also Table 3). Municipal-managers claim that very few people feel a sense of responsibility for their elderly (Article 2). These days people move away from home for work or to study, and don't think twice about who's going to take care of their parents or grandparents, they just assume we (their municipality) will take care of them (A municipal-manager, 2014). Unfortunately, municipal-mangers have stated that their infrastructure today is not equipped to meet upcoming demands (Article 2). Especially when that national government is transferring more and more responsibility from the hospitals onto the municipalities (Article 2; Omsorgsdepartement, 2009).

This thesis has not measured the degree of individual involvement, but the impression that was given from the Norwegian municipalities was that the majority of individuals are dependent on the government for providing their necessary services (Article 2). Notwithstanding, there are some individuals that are accepting this challenge of being more responsible for their care. Our research located a group of friends in Eidsvoll, Norway, that have decided that they want to age together (see Figure 9). This group of friends renovated an old educational facility into a luxurious spa. This movement has been termed elderly collective living (eldrekollektiv). This movement could mitigate infrastructural impacts on municipalities immensely. In general, the young-elderly's most important needs are independence, mobility, and participation (Article 1). Participation or not being lonely has significantly affected the quality of ageing for the young-elderly (Article 1 & 2). This elderly collective eliminates loneliness, and likely improves mobility and independence when you know you have friends nearby that can help you if something goes wrong. Alternatively, the elderly will likely have an adventure-companion. For the municipalities, the quality of ageing will increase dramatically, and for the municipality this will improve efficiency in home care dramatically. The municipalities would only need to visit one renovated school with 15 elderly couples, rather than 15 individual homes spread across the city.

Today, there seems to be too few individuals that are exploring this type of user-driven innovation in eldercare, but this is not too surprising. It is expensive to renovate an old school into a new, luxury spa. To make this movement more widespread, municipalities and the government will need to support individuals so that it is more affordable. To be ready for this elderly-wave, all levels will need to contribute. Individuals (meaning immediate family members and the elderly themselves) will need to take their share of responsibility in caring for their elderly, but that share of responsibility needs to be better defined. Additionally, municipalities and the national government need to be more proactive in managing this process and exploring new opportunities. Furthermore, if the national government is transferring more responsibility unto the municipalities and asking them to be more innovative, the government needs to give these municipalities the resources they need to be more innovative (e.g., knowledge on innovation).

2. Group-level

Formal innovation training

Our research did not locate a municipality or group of municipal-nurses that had formal innovation training (Article 2). This type of training was identified as how Norwegian municipalities can improve their innovation processes (Research question 3). At the group level, the research explored what sort of impact the formal innovation training had, on both the participant group and nonparticipant group (Article 3 & 4).

The findings showed that those municipal-workers that participated in the formal training program (the participant group) improved significantly in innovation strategy and idea generation (Article 4). This was an important finding as prior innovation literature claimed that formalization is negatively related to idea generation (or creativity), and the literature has yet to test the relation between formalization and innovation strategy (Article 4). This finding was contrary to the literature. The finding shows that formal innovation training had a positive impact on the innovation phase (innovation strategy and idea generation) that this particular municipality was trained on (see Table 7; see also Article 4). Additionally, the research showed that the participant group's participation in formal innovation training led to increased innovation in their municipality (see Table 8; see also Article 4). The success of this program was seemingly contingent upon this (participant) group's innovative readiness (Article 3).

An important distinction in this formal innovation training was the fact that participating was voluntary. The participant group included those that wanted to learn about innovation, while the nonparticipant group included those that did not want to participate. Prior to participating in the study, our research measured work climate, which might explain differences in the two group's innovative readiness (Article 3). This study attempted to identify dominating group climates between both the participant and nonparticipant group, which may explain why one group would not want to participate. If that dominant characteristic was known, it would be easier for a manager to identify who should and should not be included in this type of group. Our study found that the participant group's innovative readiness was characterized by task-orientation, engagement, and having an overall positive attitude towards innovation, while the nonparticipant group had a dominant characteristic of acceptance (see Tables 4-6; see also Article 3). This characterization makes sense. The nonparticipant group attitude towards innovation was passive or not engaged. They merely do what they are told and do not offer much more. Contrary to them, the participant group was focused, engaged, and passionate about innovation.

Equally important, this research showed that those that did not participate in the training (the nonparticipant group) also improved significantly in the innovation phase that the participant group was trained in, innovation strategy. Even though they did not participate in any training, they still learned from it. One explanation for this is that the participant group's engagement and positive attitude was contagious to the nonparticipant group (Article 3). Table 7 prompts the participant group to evaluate how often they discuss what they learned from the innovation training with the nonparticipant group. There evaluation was significant, meaning the group as a whole spoke frequently with the nonparticipant group about what they learned (see Table 7; see also Article 3).

It is difficult to conclude for sure why or how the nonparticipant group learned what they did. Whether they were truly inspired by their engaged colleagues, whether they just wanted to learn in their own way (when they were ready), or whether they felt threatened and a sense of over performing the participant group. Regardless, the study shows that this municipality did not have any prior formal innovation processes prior to this formal training. Additionally, prior to the formal training, the participant group had a level 4 (on a Likert scale 1-5) on their innovation attitude. This led to the participant group improving not only their group's innovativeness (Table 7), but also the nonparticipant group's innovativeness (Table 7), which ultimately improved the organization's innovativeness (Table 8).

Composition of the group. It is unclear why or how the nonparticipant group learned the way they did, nor were accurate measures in place to determine how they did. Therefore, our focus shifted towards the participant group. It appeared that the size of the group was not as important as the dominant characteristic of the group. As long as the participant group participating in the study has an overall positive innovation attitude of 4 (on a Likert scale 1-5), then the group should be ready for formal training, and maybe their positive attitude will be contagious for the nonparticipants that previously weren't interested in the training. Thus, it is beneficial to not include everyone into a group. This research showed it may be better to just allow those interested to participate, and build up momentum. The nonparticipant group's participation could be destructive for the group, especially in the earlier stages, if the nonparticipant group's participation brings the groups positive attitude in innovation lower than a 4 (on a Likert scale 1-5).

3. Organizational-level

Eldercare theory

As of now, Norwegian municipalities innovation processes (how they innovate) is best described as random (Article 2). Innovation tends to occur in one of two ways. Either a supplier will approach a municipality with an idea that the municipality will evaluate as useful or not. Alternatively, municipalities may collaborate up on a project funded by the government or a research institution. In either case, the innovation was random in the sense that the idea did not come from within the municipality. This is an important distinction to make because these sorts of ideas lack strategic direction. The ideas that need to be pursued are those ideas that are at the core of the municipalities needs.

Eldercare theory emerged as a tool or lens that managers should use in viewing innovations that are occurring in their municipality (Article 1). Municipalities should be using this tool in their strategic management of both current and future developments. Eldercare theory states that the organization needs to maintain their appropriate balance between three main categories; the quality of care, the working environment, and societal efficiency (Article 1). This is important both on the front- and back-end of each development, to be sure that the category that was intended to improve, actually was improved.

In using this theory, municipal-managers need to first evaluate their current infrastructure, where they are today. This will identify where a municipality has been investing most of their resources, and where they could diversify their investment(s).

When the municipality has chosen an area for improvement (quality of care, the working environment, or social efficiency), that municipality needs to take each idea they come up with and apply it to eldercare theory to pre-determine the impact that the idea will have on their overall system. This will help reassure the municipality that the innovative idea they came up with will actually improve the area that they intended. Than the municipality should compare their actual needs (based on their socio-demographics) to their current infrastructure to determine in which category they should invest.

For example, look at a group of Norwegian municipalities (Article 2). If you view this group of municipalities' innovations, from the lens of eldercare, their innovation strategy becomes quite clear (Table 3; also see Article 2). It shows that every municipality is investing in improving the quality of care for the elderly, especially for the young-elderly (Article 2). Table 3 also shows that little innovation has occurred in the working environment. A couple municipalities have improved the management of employees within their organization, but no municipality has improved recruitment strategy or formal innovation training (Article 2). Lastly, there has been little improvements to societal efficiency sense the implementation of the coordination reform.

In the example above, eldercare theory identifies the working environment and societal efficiency as two potential categories that would improve diversification. The municipalities need to evaluate their actual needs (their infrastructure), and compare that to the recommended areas from eldercare theory. It seems clear that these municipalities need to improve their working environment by improving both their recruitment of newly educated nurses and innovation training. The national government has stated that innovation is necessary (Helse-og-Omsorgsdepartement, 2013; Offentlige-Utredninger, 2011; Omsorgsdepartement, 2009) to meet upcoming demands and the municipalities agree (Article 2). However, no municipalities, to our knowledge have formal innovation training. If these areas have been considered, and the Norwegian municipalities evaluate their biggest need as improving the quality of care, then that fulfills eldercare theory. Eldercare theory emphasizes each organization maintaining "their" appropriate balance between the three main categories. Thus, the evaluation and consideration of the categories is the most important.

Starting or rebuilding an innovation program

Eldercare theory (Article 1) identified the working environment as an area that Norwegian municipalities should improve upon (Article 2). An example of how municipalities can improve their innovation competences (work environment) is by conducting formal innovation training. This is proven to be worthwhile (both time and money) for Norwegian municipalities to invest in. This thesis shows that formal innovation training is positively related to both group- and organizational-level innovativeness (Article 3 & 4). For a municipal-manager wanting to build an innovation program for the first time, or rejuvenate a dying one, the most important element is group-level engagement (see section 6.1.2). The manager needs to identify a group within their organization that has a positive innovation attitude of 4 (on a Likert scale 1-5) (Article 3). This innovation attitude can be determined by using a questionnaire (see Supplement 2). This will ensure that the program will not die out.

Once the participating group has been identified, the training needs to follow the formal structure (Article 4). The formalization lies in the structure (the process and measuring):

> First, identifying levels of competence in each of the five phases [using Supplement 1]. Second, identify the weakest phase [see Table 6]. Third, formal training using theory that improves the weakest phase [see Table 9]. Fourth, measure impact after the training is completed [using Supplement 1]. Fifth, compare results before and after the training [see Table 7]. Lastly, repeat the aforementioned steps as frequently as desired/needed. [Continually improving the then, weakest phase.] This structure (e.g., processes, measures, tables, and figures) needs to be adhered to strictly or this formalization will not have occurred properly. (Schultz, Sjøvold, et al., 2016a, pp. 4)

Table 9: Innovation theories related to each innovation phase (Article 4)

Academic Theory	Activity	Innovation Phase
Introduction (mapping the journey), organizational culture, organizational identity (organizational theory), slack resources, stretch goals, absorptive capacity/vicarious learning, disruptive innovation, transactional cost theory, the end of competitive advantage. *Additional*: Eldercare theory, design thinking, blue ocean strategy.	Firm/individual strategy	Innovation Strategy
Open Innovation, user-driven/lead innovation, service innovation (SDL), motivation (individual, group, and organizational), psychological safety, slack resources, team composition/re-organizing the team, generating movement in discussions, and networks/propinquity (regional and relational).	In-house idea generation	Idea generation
	In-house cross-pollination	
	External sourcing of ideas	
Ambidexterity (exploitation and exploration), impact of management on innovation, and architectural/modular innovation. *Additional*: Eldercare theory	Selection	Conversion
	Development	
Open Innovation, organizational periphery, organizational learning, networks/propinquity (regional and relational), motivation (individual, groups, and organizations), and roles of managers.	Diffusion	Diffusion

If Norwegian municipalities do not use Eldercare theory, and do to improve innovation competences, it makes improving upon innovation quite difficult. This formal innovation training teaches municipalities how to manage the innovation process. It is important to measure innovation phases taught in the formal training so that municipalities know which phases their performing well, and not so well in. This will help them in identifying which phase in the innovation process they can improve. If a municipality is not monitoring or measuring the innovation process, it is difficult in determining what went wrong.

Innovation according to practitioners

In determining, what and how Norwegian municipalities are innovating (Article 1 & 2); a natural question this study explored was how municipalities defined innovation (Article 2). Most municipalities did not define innovation per se; rather

they defined innovation in terms of what they heard about from other municipalities (Article 2). For example, municipality x thinks that municipality y is quite innovative because they have developed product or service z. The municipalities that were referred to the most as being innovative were generally those municipalities with the most resources (Article 2). Those municipalities with the most resources were generally the larger municipalities. According to the municipalities, these larger municipalities have more resources (e.g., expertise, workforce, facilities, and equipment), and the more resources they have, the more innovative they can be (Article 2).

Our research showed that this conceptualization of innovation is true in part. The larger municipalities are in general developing more innovative products or services than the small municipalities (Table 3; see also Article 2). However, the speed of development is much slower for these larger municipalities (Table 3). The smaller municipalities in general developed ideas from conception to implementation quicker than the larger municipalities (Article 2). Smaller municipalities stated that working with large municipalities is exhausting because it takes so much time and energy before there are tangible results (Article 2).

Innovation according to researchers

This definition was a bit troubling. The application of it did not always fit. The general rule was that the larger the municipality, the more resources they had, which meant the more innovative they would likely be. However, a couple of the small municipalities that were interviewed were just as innovative as the larger municipalities. How this could happen, what made this small municipality so special? The findings from our study led to the conclusion that first, there needs to be a better definition for innovation. A definition where the municipality looks to themselves, rather than other municipalities to determine what is or is not innovative. Secondly, the study led to the conclusion that there was a *motivated (innovative) leader exception*. Even if a municipality is smaller, has less resources, they can be just as innovative if they have a leader, working daily with patients and employees, that has a positive and enthusiastic attitude towards innovation (Article 2 and 3). It was not enough to only have a motivated mayor for one municipality (Article 2). The mayor's support was a necessary component, but that alone was not enough. They also needed *a motivated leader* on the ground floor. Someone who is interacting daily with the patients and employees, someone who knows both of their daily struggles. This motivated leader is not merely a leader motivated to do their job, but a leader or driver for innovation within their organization. This leader is open and always pushing to try new things or others ideas.

Some municipalities, especially those that that do not have a motivated innovation leader, struggled to define and measure innovation (Article 2). They evaluate their innovative success by comparing their innovative outcomes to others. Accordingly, this study explored ways that municipalities can improve their innovation management, including defining and measuring innovation (Article 1, 2, 3, and 4). *In the most simple terms*, innovation was defined as "doing something better, or cheaper, or both" (Gertner, 2012). This is an important definition when discussing innovation within an entire organization. In laying the foundation for an innovative culture, it is a good idea to get the whole organization to understand the

same meaning of the word. Accordingly, our research needed a definition that was practical, easily understood, and could be used in daily routines. Many of the practitioners were not researchers, nor did they want to become researchers. For these reasons, when conducting the innovation training this more practical definition, that practitioners would actually use and understand in their daily life needed to be used (Article 3 & 4). *For managers or others that were genuinely interested in innovation*, this definition was re-defined (a bit more theoretically) as "the development and implementation of new ideas within the organization" (Daft, 1982; Damanpour, 1991; Damanpour & Evan, 1984; Van de Ven, 1986). Development referred to inventing a new idea that has not been implemented into the organization before. Implementation means the idea was fully developed and disseminated organization-wide (e.g., now a new work-routine). *For innovation managers*, an innovation program was developed (see Article 3 & 4). This program should aid innovation managers in either starting a new program or building up a dying innovation program. This program defines innovation by looking to individual-firm performance, rather than looking to other firms. Additionally, this program utilizes two innovation measures; a group-level measure (based on a questionnaire) and an organizational-level measure (based on a managerial interview) (Article 4).

    4. National-level

    The national government has successfully instilled the need for innovation within the municipalities through political reform (Helse-og-Omsorgsdepartement, 2013; Offentlige-Utredninger, 2011; Omsorgsdepartement, 2009). All municipalities managers interviewed stated that innovation is a necessary component to meeting future demands, and that political policy has helped them realize this (Article 2). Overall, it appears that Norwegian municipalities' innovation strategy has been to invest in improving the quality of care for the elderly using smart in-home technology. Little attention has been given to improvements in the working environment or to shifting individuals' expectations (as discussed above). This is something the government may want to look into. If for example the lack of recruitment (a working environment issue) is a systemic issue among all Norwegian municipalities, they may want to consider getting more involved in the strategic management of how to make municipal-nursing more attractive across Norway. However, this strategic management may be more of a local issue, local to the municipalities.

    It appears that the national governments recent policy has been to decentralize eldercare, by transferring more responsibility onto the municipalities (Omsorgsdepartement, 2009). This research has explored what innovations are occurring in eldercare, what and how Norwegian municipalities are innovating in eldercare, and how these processes can be improved. In accordance with how these processes can be improved, this research has identified a few eldercare issues that should not be decentralized, and ought to remain the responsibility of the national government. These issues ought to remain the government's responsibility, as they are systemic issues that every municipality is dealing with. Rather than having every municipality re-invent the wheel, it will be more efficient for the social welfare system to develop a plan to address the issues discussed below.

Elder education courses

As the body ages, there are many physical and mental changes that most elderly will experience that they previously were not aware of (e.g., arthritis, fall protection, dementia, diabetes, Vitamin B and D deficiency, reduced mobility, etc.). It is more common to educate or treat these conditions after a disease or accident has occurred. In accordance with the Coordination reform, why not improve preventative care by educating all the elderly on healthy living prior to an accident occurring. These "elder education courses" could range from a healthy diet, training, cleanliness, new medical advances or prevention treatments.

Bodø, a municipality in Norway, has recognized the impact this sort of education can have for both the municipality and the elderly. This municipality decided to develop its own preventative rehabilitation program (Landstad, 2012). Preventative meaning, this program was not for injured elderly, it was a rehabilitation program for the healthy elderly living at home. The rehabilitation team comprised of a geriatric specialist, physical therapist, nurse, and/or nutritionists, all of who educate the elderly on how to live a healthier life through eating and exercising correctly (Landstad, 2012). The results have exceeded the municipalities expectations. One elderly woman went from needing 11,5 hours a week of home care, to needing only 10 minutes a month (Landstad, 2012). The same elderly woman went from feeling helpless, to feeling empowered. Before she was not able to shower, get dressed, wash clothes, cook, take out the trash, or visit neighbors without assistance (Landstad, 2012). These are all things she now does on her own. The only complaint she had was that she missed talking to the nurses as often as she had before the program (Landstad, 2012).

Community or collective elderly living

This idea has been discussed throughout this thesis (see section 4.3.3; see also section 5.1; Article 1; Article 2). The government could influence this movement significantly. There is such a need that a few of the elderly are financing this expensive investment all on their own. However, if the government supported this venture to some extent, the impact could be significant. The impact this venture will have is improving the quality of life so that the elderly live healthier longer. Additionally, municipalities providing home-care services can meet with 15 elderly couples at one time, rather than driving across town to 15 different homes. The government could support this idea by having some sort of tax reduction for those building a collective living facility. The government incentive could be similar to the tax reduction Norway has for first-time homebuyers (BSU), but extended for the elderly who invest in collective elderly living. Alternatively, they could have the elderly living in that sort of living facility paying less taxes, or receiving more retirement due to the savings their creating through their living arrangement. There are many different ways the government could support this idea (Article 2). For example, the government or municipalities could help the elderly with planning and implementation:

- Developing architectural drawings if elderly want to build a new facility, or have drawings for renovating existing buildings;
- Cost estimates the elderly should expect to pay;
- Necessary components of communal living;
- Supportive technology –like smart solutions- to include in the building;

- Different types of municipal-services, based on the number of elderly and their needs (larger living communities receive better offers);
- Locating property, they could help identify current facilities that are becoming less used, as potential properties for elderly;
- Financial support for this investment, maybe match dollar for dollar up to the first 5% of the cost;
- Give incentives to those that live together (tax incentives, maybe daily/weekly nursing visit, help getting financing with banks or state-owned institutions;

Smart in-home technology

The smart in-home technology needs to be standardized. There are approximately 428 municipalities, nearly all of which are developing smart in-home technology that they believe is best for their municipality. The problem with this is that some of the smart in-home technologies are closed systems, meaning different products from different suppliers cannot be used on all systems. At the core of these smart systems is a communications center, this is merely a box that connects to your internet modem. Once this communication center is connected to your modem, you can start connecting devices to the communication center, generally through blue-tooth technology. However, not all communication centers work with all the devices. There should be a standard for the communication center and devices so that devices can be changed or replaced without having to shift out an entire system. You can analogize this to telephone technology. Rather than having each municipality using its own Apple-type, closed system, having apps that only work for their system and their municipality, why not have an Android type system, where all phones work with all Apps, which could be used by all municipalities. An additional issue is the reliability of such technology. With so many different options surfacing, there should be a minimum standard in terms of reliability. The elderly should be reassured that the technology has been tested to a minimum standard of reliability.

This study has found that the Norwegian Health department (Helsedirektoratet) has been working on this issue (Helsedirektoratet, 2014). However, from this thesis, it could not be determined to what extent the government is addressing these issues. The municipalities that were interviewed were aware of this "standardizing of welfare technology", but no municipality interviewed knew more than the title of the government project.

Better networking channels

Our research showed that better networking channels need to be available for municipalities (Article 2). It helps to refer to the size of the municipality (large or small municipality) when discussing municipal-networks (Article 2). Large municipal-networks vary from small municipalities. There are only five large municipalities in Norway. These municipalities receive the most funding, and develop quite a few innovations. Naturally, they tend to know what each other are developing. However, it is a different story for the other 423, small municipalities. Based on our research it seems that the small municipalities are mainly networking geographically. If you look at each small municipalities partners on different innovation projects, the partners tend to be geographic. Innovation tends to occur around the larger municipalities (who receiving more funding because of more inhabitants), and smaller municipalities that are wanting to innovative will often need to team up with

the larger municipalities. The problem with this is that while large and small municipalities have some things in common, the core of their services tend to be different. For example, larger municipalities tend to have a dense population and often work with improving efficiency in providing services, while smaller municipalities have long distances between each elderly's home and can have a shortage of qualified workers. The elderly and municipal-needs can vary substantially from large to small municipalities, which makes it all the more important to get small municipalities networking with other small municipalities that are experience the same or similar issues. What makes this difficult is outside of their geographic network, there are not any real formal channels for knowledge sharing between these small municipalities. This makes it difficult for each small municipality to identify which of the 423 municipalities are experiencing the same issues as they are, or alternatively what solutions have other municipalities developed to address what they are experiencing. The informal knowledge sharing channels are in place for the large municipalities because there is so few of them. However, with the exception of geographic networks, these channels do not exist for smaller municipalities.

6.2 Implications

1. Theoretical

This thesis has made theoretical contributions to eldercare, organizational, and innovation literature (Article 1, 2, 3, and 4). *Eldercare theory* emerged as a tool that researchers and practitioners alike can use to improve the management of innovation in eldercare (Article 1). Eldercare theory has been discussed in great depth in this thesis (see sections 2.2, 3.3, and 5.1). Eldercare theory can be used merely as a lens that researchers use in viewing eldercare to better understand strategic direction (Article 2). Alternatively, eldercare theory can be a strategic management tool that practitioners can use to better diversify their investments.

The thesis also shows explored the concept of *innovation readiness* by means of *group climate* (Article 3). The results contributed to organizational literature by supporting the finding that group climate that embraces innovation and positive group climate supports group readiness for change (Caliskan & Isik, 2016; Eby et al., 2000; Ingersoll et al., 2000; Jones et al., 2005). Moreover, additional research has been called for to clarify how an organizations climate contributes to organizational readiness (Ingersoll et al., 2000), this has been provided for in the context of innovation readiness at both the group- and organizational-level (Article 3).

Lastly, this research explored the relationship between *formalization* and *innovation* by conducting a formal innovation intervention (Article 4). Formalization theory suggests that low formalization permits openness in the system and that this openness is a necessary precondition for idea initiation (also called idea generation or creativity) (Hage & Aiken, 1967; Kaluzny et al., 1974; Knight, 1967; Pierce & Delbecq, 1977; Shepard, 1967). This study *contributed to innovation literature* by developing new measures for measuring innovation (Article 4). Improvements in innovation processes or innovation potential can be measured using a modified, but previously developed questionnaire (see Supplement 2; see also Article 4). Innovation can also be measured more objectively, more free from self-efficacy, by defining innovation strictly and measuring its output (see Table 8; see also Article 4). The findings also

contributed to organizational research by showing that formal innovation training had a positive effect on idea initiation, which was contrary to the literature. Additionally, the findings showed a positive relationship between formal innovation training and innovation strategy. This study (Article 4) contributed to innovation and organizational literature by conducting a study based on nearly the exact question that has been posed and even recommended for further research:

> As regards to intervention studies, our comprehensive review failed to locate a single adequately conducted and reported study that employed a genuine intervention design … Here, we call for fully functional, pre- and postmeasurement designs, preferably with the use of experimental and control group designs in real life organizational interventions with the express aim of improving individual-, team-, or organizational-level innovativeness.
>
> (Anderson, Protocnik, & Zhou, 2014, pp. 1321; see also Pierce & Delbecq, 1977)

This intervention study was conducted. A fully functional, pre- and post-measurement design, with the use of a participant group and a nonparticipant group design in a real life organizational intervention, with the express aim of improving group- and organizational-level innovativeness.

Section 6.1, in the Discussion section of this thesis illustrates the results from this research in a new light. There was a natural progression from Articles 1 to 2, 2 to 3, and 3 to 4. Each preceding article paved the way for the article to come. Each article (1-4) have been written in that natural evolution. Section 6.1 was an attempt to explain the results in a new or different way. The Discussion section offers a new perspective by being broken down into contextual consideration at unit-levels (individual, group, organizational, and national level). This meant looking at the research in a new light. The research as whole (Articles 1-4) needed to be gathered and re-analyzed in this new unit of analysis.

The new presentation of the results provided helpful insight. It allows the reader to review the material that is most relevant to them. Municipal-nurses would likely review the literature at the individual and group level; municipal-managers would likely read the literature at the group and organizational level, while policy-makers would likely review the literature at the national level.

2. Practitioners

For managers in public healthcare, struggling to keep up with the busy workday and build-up an innovation program, or revitalize a dying innovation program, this thesis makes that process easier.

Eldercare theory surfaced as a tool that public healthcare managers could use to better understand all the innovations occurring in eldercare (Article 1). Additionally, this tool can be used internally to determine if an organization's actual innovation strategy in eldercare is the same as their perceived (Article 1). Alternatively, eldercare theory can be used to compare one organization's innovation strategy to another organization's innovation strategy (Article 2). In practice, eldercare theory is big picture, strategic planning tool for both short- and long-term strategy.

The innovation intervention are the *building blocks* for managers wanting to start a new innovation program or revitalize a previously dying program. The research on the intervention study first discussed how to identify innovative readiness in a team, small group, or an organization (Article 3). For the manager this

is speaking to the composition of the innovation group. The results indicated that its beneficial for a manager to look to the genuine level of interest in innovation within their organization (Article 3). It was important for those participating in the innovation training to have a positive attitude towards innovation, at a minimum of 4 (on a Likert scale of 1-5) (Article 3). For managers, this is the determinant of the size of your innovation group. If including the whole organization maintains drops the level of interest in innovation below 4, the size of the innovation training should be scaled back until interest levels are at 4 or higher. This study found it important to gain momentum at the beginning of an innovation program, and maintaining this level of 4, helps maintain that necessary momentum (Articles 3 & 4).

After the size of the innovation training group was determined, this research detailed a step-by-step process of how managers should conduct their innovation training (Article 4). All necessary steps, questionnaires, analysis, and tables are detailed (Article 4).

Accordingly, this thesis has contributed to practice as it provides managers with both big picture, strategic planning (Articles 1-2) and a detailed explanation of how they can start managing their new or revitalized innovation processes (Articles 3-4).

6.3 Limitations

This thesis has some limitations that are important to consider. Notably with respect to the transferability of the findings to other contexts. The theories studied, for example innovation management and innovation strategy, are quite transferrable topics. However, nearly all the empirical evidence gathered was from Norwegian municipalities working with the elderly or eldercare. Most of the theories tested in this thesis are strategy and process based. The strategy theory is tied quite closely to the eldercare context, but the innovation process should be transferable to other contexts or industries. The transferability of the results to other context or industries was not tested in this thesis. Additionally, the innovation intervention was conducted at a municipality that had little to no formal training in innovation. Thus, the measurable impact an organization will receive from such innovation training can vary, especially if the organization has already had formal innovation training.

6.4 Suggestions for future research

Formal innovation training

The formal innovation training seemed to have the most potential for positively affecting both theory and practice. However, it was only tested on one department, within one municipality. The theory, findings, and conclusions would be more interesting if *a more comprehensive study* was conducted. More comprehensive both in terms of duration and sample size. Whether that be several municipalities, or merely several different departments within the same municipality.

Concerning *the design*, attention should be payed to the groups. Whether one is measuring perceived culture and innovativeness of two different groups in the same organization, or comparing two different groups in two different organizations,

one that received formal training and one that did not. The latter was not conducted and could be interesting for future research.

The formal training that was conducted allowed the participants to decide whether they wanted to participate. Thus, there was one group that chose to participate (the participant group) and one group that chose not to participate (the nonparticipant group). It would have been interesting to add a third group, a random-combination of both the participant and nonparticipant group members.

Additionally, the fact that the nonparticipant group that did not participate in any formal innovation training improved in the category innovation strategy, the same phase the participant group was trained on (Article 4), should be further explored. Both groups completed a 25-item survey. The nonparticipant group had statistical significance in only three of the 25-items (Table 7). Those three items where the same phases that the participant group was significant and trained on. None of which the nonparticipant group should have known about. Why and how the nonparticipant group learned should be explored. Our research tended to show that the participant group's positive attitude and engagement in innovation was contagious for them, but a more accurate measure needs to be used.

Comparative study

Eldercare theory used as a tool to better understand strategic direction of municipalities was only tested in the Norwegian context. It would be interesting to see what the innovation strategy is for the international community, especially those countries that will be experiencing similar eldercare issues as Norway. This would mean finding a country with an equally comprehensive health care system. Likely candidates for a comparative study would include other Scandinavian countries, Canada, and other unidentified countries with similar comprehensive public health regimes.

International implications

There are international implications that have emerged during this research that were not explored, as they did not fit well with the research goals or research questions. One controversial topic that has emerged is providing nursing homes for the elderly abroad (Kresge, 2013). The cost of care for institutionalizing elderly has become so expensive in Germany that approximately 20% of the German population has considered sending their elderly to a nursing home abroad (Kresge, 2013). In Germany, insurance pays 1,550 € per month to German citizens that need the highest level of care, but it costs approximately 3,250 € per month to receive necessary care in Germany. That means 1,700 € per month is payed out-of-pocket by the individual (Kresge, 2013).

The German government will pay as much has 700 € per month for German citizen receiving nursing care abroad (Kresge, 2013). The amount the elderly would be receiving abroad is about half of what they would receive if they were being cared for in Germany. However, there are nursing homes in Poland, located on a picturesque ski resort, that claims to provide the same or better quality of care for only 1,200 € per month, which makes the out-of-pocket expense 500 € per month, rather than 1,700 (Kresge, 2013).

This movement is not isolated to only Germany. In Switzerland, the cost of elderly care has become so high that some young-families have started sending their elderly to Thailand (Lacey & Foulkes, 2014).

The cost and quality of nursing homes (or surgery/hospital care) abroad would be an interesting research study. This approach has its benefits. After 2050, the proportion of elderly to the working class stabilizes. This could mean that if Norway was to build as many institutions or nursing homes that they needed for pre-2050 impacts, they may be left with a number of unfilled nursing homes post-2050. This could make these nursing homes abroad more attractive. However, this idea does have its drawbacks. There are concerns from the international community about the effects of such policy for localities where the elderly is being sent.

The international community, especially those countries that have affordable care and educated workers are concerned about more wealth countries brain draining them. One method of brain draining is that so many foreign-elderly travel abroad for their nursing care that their once affordable (Polish or Thai) care is no longer affordable for the local Polish or Thai people. The concern is that the demand for their foreign services (Polish or Thai) becomes so high that it will only be available for wealthy foreigners. The other form of brain draining that has not been discussed is countries in high need of educated workers. The countries needing high-educated workers are willing to pay higher salaries than were the workers were originally educated in, thus draining that country of their educated workforce.

7. Conclusion

This study has produced new knowledge increasing the understanding of managing innovation processes in eldercare. The main advancements from this thesis are: the emergence of eldercare theory in developing local and international strategy, formal innovation training improved group- and organizational-level innovativeness, and group climate had a significant impact on the success of an innovative initiative.

Eldercare theory emerged from this thesis as a necessary tool for municipal-managers in improving the strategic direction of their municipality. Rather than allowing development to occur randomly, now managers can identify where they need improvements and likely anticipate where the newly proposed idea will improve their overall infrastructure. Locally, this tool showed that every Norwegian municipality is investing in smart in-home technologies, and no municipality has invested in improving innovation competences. Accordingly, eldercare theory states these municipalities need to invest more in the working environment.

Innovation can be taught. This thesis has shown that innovation can be taught by offering your group or organization formal innovation training. For an organization that is wanting to build a new innovation program, or rebuild a program that has died out, this thesis provides a guideline of how to do exactly that. This is an important outcome because previously formalization was thought of as destructive to innovation or creativity, but this study shows the contrary. This thesis identified formal innovation training as one way that Norwegian municipalities could improve upon their working environment as recommended by eldercare theory.

Group climate is important. This thesis showed that two different and distinguishable group climates existed within the same organization, and that this group climate could be used to predict if either group was ready for innovative change. Furthermore, we believe that the thesis indicates that group climate (positive enthusiasm for innovation) is so strong that it can be contagious to the rest of the organization. The measures were not in place to draw this conclusion accurately, but it was a strong belief of the authors.

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9. Appendix

Supplement 1: Semi-structured interview guide

Interviewees name:
Date interview was conducted: Date transcribed:

I.   Introduction
        a. Name, what I'm studying
        b. Recording device- anonymous, deleted after reviewed and recorded
            *Joe- I introduced myself, program, and process of interview (how
            everything is anonymous). Hereafter, all responses are from the
            interviewee, unless otherwise stated, the interviewer (Joseph Schultz)
            may ask follow-up questions.*

II.   The Interview
        a. Defining Innovation
            i.   How would you define innovation in eldercare?

            ii. How would you distinguish between high performers and low
                 performers?

            iii. Other municipalities I have interviewed have defined innovation
                 based on size... What are thoughts on that view? Gov't has a
                 different spin...?

        b. Innovation Strategy
            i.   What is [x] municipality's innovation strategy = eldercare now? Has
                 this changed from the past (couple of years)? Future (5 years)?

            ii. What do you believe most municipalities "strategy" is towards
                 elderly innovation?

            iii. How does "other municipalities" strategy vary from "[x]
                 municipality"?

        c. Municipality specific (focus on how)
                         [Notes to myself: Research what they have done and ask
                         about decision-making processes (idea generation,
                         selection, development, diffusion)]

            i.   What do you think is the "key factor" that makes [x] municipality
                 unique?

            ii. With these projects above in mind, process to *find/identify*
                 project(s) (variation)?
                 1. Ideas come from intern (%) and extern (%)?

            iii. With these projects above in mind, process to *select* project(s)
                 (selection)?
                 1. Developed intern or extern?

iv. With these projects above in mind, process to *manage* project(s) (retention)?
   1. Determine whether success or failure?

v. What are the most common challenge(s) you face when innovating?
   1. Internal, political, suppliers...?

d. Networks/Knowledge sharing
   i. In your opinion, what role do your networks play (what you get *most* from them)?
      1. To what extent ... do you get new ideas from your networks?

   ii. If you have a successful (or failed) innovation, do channels exist for you to share?
      1. How often is this done?
      2. Do others share their knowledge learned?

e. Future
   i. Ultimately, in your opinion, what is it going to take, to meet upcoming demands?
      1. 2025 (impact felt) and 2030-50 (max)...?

Supplement 2: Questionnaire for participants

1. **Anonymous ID:** _____ (if ID not assigned, please create and remember an anonymous ID for yourself)

2. **Sex:** _____ Male _____ Female (please check one option)

3. **Age:** _____ (in years)

4. **Highest level of education completed:**
   _____ primary school _____ secondary school _____ high school
   _____ additional training (e.g., trade school) _____ undergraduate University
   _____ master's degree at a University _____ post graduate degree (e.g., PhD)

5. **Employment status:** _____ Full-time employee _____ Part-time employment

6. **How long have you worked for your employer (including all roles):** _____ (in years)

7. **What is your current job title:** _____ Manager _____ Nurse _____ Nursing assistant

8. **Did you participate in the innovation course?** _____ Yes _____ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Activity	Phase
1. I understand our organizations innovation goal or strategy.	1	2	3	4	5	Strategy	Low scores indicate your organization may need to improve their innovation strategy(ies) .
2. I understand what it is our organization is going to invest in, in the future.	1	2	3	4	5		
3. In our organization, we easily come up with new ideas because we have available time in our daily/weekly schedules to think differently.	1	2	3	4	5		
4. Our culture makes it easy for people to come forward with novel ideas.	1	2	3	4	5	In-house idea generation	Low scores indicate that your company may need to improve idea-creation in the group or organization .
5. Our organization excels at thinking differently.	1	2	3	4	5		
6. People in our unit (e.g., subunit) come up with many good ideas on their own.	1	2	3	4	5		
7. On our innovation projects, they often involve team members from different units or subsidiaries (e.g., other subunits or organizations).	1	2	3	4	5	In-house cross-pollination	
8. On normal projects, our people typically collaborate across departments, businesses, or subsidiaries.	1	2	3	4	5		
9. Many good ideas for new products and businesses come from outside the company.	1	2	3	4	5	External sourcing of ideas	
10. Ideas from outside firms are considered as valuable as those coming from within.	1	2	3	4	5		
11. I tend to offer many ideas because it's easy to gain support (e.g., funding) for a new idea in our organization.	1	2	3	4	5	Selection	Low scores indicate that your company may need to improve
12. When an idea is chosen, I feel that my opinions are taken	1	2	3	4	5		

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seriously.						their selection or development in the group or organization.
13. When an idea is chosen, I feel that the group's opinions were taken seriously.	1	2	3	4	5	
14. After an idea is chosen, the majority of the group knows why that idea was chosen.	1	2	3	4	5	
15. When an idea is chosen, our organization usually chooses the more risky idea.	1	2	3	4	5	
16. In developing our new ideas, our organization follows a formal process for tracking the progresses of the idea, things don't happen randomly.	1	2	3	4	5	Develop-ment
17. In developing our new ideas, our new ideas tend to finish on time, without delays.	1	2	3	4	5	
18. Managers often have strong support from the group when developing new ideas in our organization.	1	2	3	4	5	
19. After an idea is developed, we're quick to use or bring the idea to the market.	1	2	3	4	5	
20. After an idea is developed, partners (e.g., municipalities) do not tend to copy our ideas.	1	2	3	4	5	Low scores indicate that your company may need to improve their diffusion in the group or organization.
21. After an idea is developed, we penetrate all possible channels, customer groups, and regions with our new idea.	1	2	3	4	5	Diffusion
22. After an idea is developed, the organization usually discusses lessons learned with the development team.	1	2	3	4	5	
23. After an idea is developed, the organization usually discusses lessons learned with the entire organization.	1	2	3	4	5	
24. Overall, I'm enthusiastic about innovation, and anxious for this course.	1	2	3	4	5	Low scores indicate that either: (1) other theories may be more appropriate, (2) an error in the
25. Overall, this innovation education has helped me understand more about innovation, and the course will most likely help me to think new or differently.	1	2	3	4	5	Overall, Innovation attitude

							coursework, OR (3) that your company may likely benefit most from informal innovation processes.

Scale B

Please read through the following questions and explain as briefly as you can. Your answers should be 1-2 words, but can be more if needed. You should explain how you are or how you feel (not how you would like to be or think you should feel). These questions are fill-in-the blanks.

27. What do you think your organization does best or what makes them unique compared to similar organizations (e.g., other municipalities)?

_____
_____
_____

28. What do you think your organization needs to improve the most?

_____
_____
_____

29. Other comments:

_____
_____
_____
_____
_____
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_____
_____
_____
_____
_____

Scale C

Below are 24 descriptions that can be used to describe how a team interacts. For each description reflect on the interaction between you and your organization.

Mark your response using O = RARELY, 1 = SELDOM, and 2 = OFTEN.

You will fill out the column two times. First, rate how you actually think your organization "actually is" (as of today), and fill out the second column based on how you think your organization "ideally should be".

Describe one column at a time. Fill out all 24 questions in that column, before moving on to the next column. This means you will first evaluate all 24 descriptions on how you think your organization actually is, then fill out 24 descriptions on how the ideal organization ought to be.

Look at all the adjectives on each line as a whole, even if this is difficult to do. Do not use too much time on each description. It is your first impression or though that is most important.

	RARELY = 0, SOMETIMES = 1, OFTEN = 2	Actual	Ideal
1	Committed, determined, makes constructive contribution to cooperative efforts		
2	Principled, detail-oriented, stubborn		
3	Non-committal, impulsive, demands attention		
4	Pleasant, sympathetic, adaptable		
5	Disheartened, discouraged, lethargic		
6	Diligent, dutiful, loyal		
7	Caring, supportive, encouraging		
8	Effective, self-confident, dares to take the lead		
9	Closed, self-motivated, a loner		
10	Anxious, tense, doubts own abilities		
11	Self-sacrificing, self-pitying, complaining		
12	Informal, considerate, views everyone as equals		
13	Cooperative, supportive, accommodating		
14	Direct, controlling, demanding		
15	Self-centred, provokes conflict, uncooperative		
16	Thoughtful, trusting, thinks the best of everyone		
17	Withdrawn, obstinate, apathetic		
18	Cautious, reliable, willingly assumes duties		
19	Extroverted, open, acknowledges others		
20	Analytical, unbiased, rational		
21	Persistent, tough, competitive		
22	Emotional, unpredictable, untraditional		
23	Reserved, distant, withdrawn		
24	Faithful, friendly, shows respect to everyone		

Supplement 3: Table 6 enlarged

Innovation Phase	Code	The focus of each question	Participant Group	Nonparticipant Group	T-test	Statistical Significance
Innovation strategy	S1	Understanding of current organizations strategy	2,20	2,10	0,376	
	S2	Long-term strategy	2,60	2,52	0,415	
	S3	Time allocated towards thinking differently	2,47	2,45	0,485	
Idea generation (IG)	IG1	Internally, the openness of the working environment	2,93	3,50	0,030	*
	IG2	Internally, extent the organization can think differently	2,93	3,24	0,180	
	IG3	Internally, quality of the organizations ideas	2,40	2,73	0,113	
	IG4	Internally, the extent we partner with other departments	2,73	2,81	0,390	
	IG5	or other firms on normal and innovative projects	3,29	2,95	0,136	
External IG	eIG1	Importance of external ideas	3,00	3,05	0,390	
	eIG2	Value given to ideas that come from outside the firm	2,64	2,86	0,172	
Selection	Sel1	How easy it is to bring an idea forward to the org	2,53	2,57	0,450	
	Sel2	The importance of each individual's opinion in selection	3,40	3,18	0,246	
	Sel3	The importance of the group's opinion in selection	3,50	3,45	0,433	
	Sel4	The org understands why a particular idea is chosen	3,21	3,41	0,273	
	Sel5	Is the more conservative or risky idea more often chosen	2,13	2,48	0,131	
Development	D1	Using formal innovation processes to measure progress	3,00	3,05	0,433	
	D2	Ideas are generally developed on time, without delays	3,07	2,81	0,123	
	D3	Management generally has strong support in developing	3,21	3,10	0,350	
Diffusion	Diff1	How fast the org is at bringing idea to the market	3,20	2,95	0,169	
	Diff2	How quickly our ideas are copied (e.g., by competitors)	2,92	2,73	0,245	
	Diff3	Extent maximizing value (e.g., markets, customers, etc.)	2,67	2,70	0,447	
	Diff4	Extent org discusses lessons learned with develop team.	2,57	2,57	0,500	
	Diff5	Extent org discusses lessons learned with entire org	3,20	3,19	0,488	
Innovation attitude	A1	Personal enthusiasm towards innovation	4,07	3,45	0,029	*
	A2	Optimistic attitude towards innovation education course	3,75	2,75	0,004	**

$* p < 0.05 \;\; ** p < 0.01 \;\; *** p < .001$

Supplement 4: Table 7 enlarged

Innovation Phase	Code	The focus of each question	Part. Before	Part. After	T-test	Statistical Significance	Nonpart. Before	Nonpart. After	T-test	Statistical Significance
Innovation strategy (S1-S3)	S1	Understanding of current organizations strategy.	2,20	3,78	0,0001	***	2,10	2,91	0,0194	*
	S2	Long-term strategy.	2,60	3,11	0,0414	*	2,52	3,33	0,0230	*
	S3	Time allocated towards thinking differently.	2,47	3,33	0,0045	**	2,45	3,25	0,0165	*
Idea generation (IG1-eIG2)	IG1	Internally, the openness of the working environment.	2,93	3,89	0,0099	**	3,50	3,92	0,0574	
	IG2	Internally, extent the organization can think differently.	2,93	3,89	0,0201	*	3,24	3,67	0,0870	
	IG3	Internally, quality of the organizations ideas.	2,40	3,44	0,0001	***	2,73	3,00	0,1846	
	IG4	Internally, the extent we partner with other departments- or other firms on normal and innovative projects.	2,73	3,22	0,1078		2,81	3,18	0,0535	
	IG5	Importance of external ideas.	3,29	4,11	0,0062	**	2,95	3,33	0,0904	
	eIG1	Value given to ideas that come from outside the firm.	3,00	2,44	0,0592		3,05	3,33	0,0903	
	eIG2	How easy it is to bring an idea forward to the org.	2,64	2,67	0,4169		2,86	2,50	0,0581	
Conversion (Sel1-D3)	Sel1	The importance of each individual's opinion in selection.	2,53	3,44	0,0020	**	2,57	2,75	0,3079	
	Sel2	The importance of the group's opinion in selection	3,40	4,11	0,0715		3,18	3,50	0,1113	
	Sel3	The org understands why a particular idea is chosen.	3,50	4,00	0,1708		3,45	3,75	0,0723	
	Sel4	Is the more conservative or risky idea more often chosen.	3,21	3,78	0,1290		3,41	3,75	0,1045	
	Sel5		2,13	2,00	0,2760		2,48	2,33	0,2643	
	D1	Using formal innovation processes to measure progress.	3,00	3,00	0,4032		3,05	3,18	0,2828	
	D2	Ideas are generally developed on time, without delays.	3,07	3,00	0,3638		2,81	3,00	0,2292	
	D3	Management generally has strong support in developing.	3,21	3,78	0,1068		3,10	3,33	0,1868	
Diffusion (Diff1-Diff5)	Diff1	How fast the org is at bringing idea to the market.	3,20	3,22	0,5000		2,95	3,33	0,0740	
	Diff2	How quickly our ideas are copied (e.g., by competitors).	2,92	2,89	0,3417		2,73	2,83	0,3291	
	Diff3	Extent maximizing value (e.g., markets, customers, etc.).	2,67	2,67	0,2873		2,70	2,91	0,2232	
	Diff4	Extent org discusses lessons learned with develop team.	2,57	3,11	0,2292		2,57	2,92	0,1103	
	Diff5	Extent org discusses lessons learned with entire org.	3,20	3,33	0,3802		3,19	3,42	0,2220	
Innovation attitude (A1-A2)	A1	Personal enthusiasm towards innovation	4,07	4,33	0,4696		3,45	3,17	0,1404	
	A2	Optimistic attitude towards innovation education course	3,75	4,44	0,1087		2,75	2,83	0,3989	
Control question	C	Experim. group has spoken to control group about	2,83	4,33	0,0025	**	2,47	2,00	0,0702	

* p < 0.05   ** p < 0.01   *** p <.001

10. Collection of articles

Article 1: Demystifying eldercare: Managing and innovating from a public-entity's perspective.

Article 2: Managing innovation in eldercare: A glimpse into what and how public organizations are planning to deliver healthcare services for their future elderly.

Article 3: Can work climate explain innovative readiness for change?

Article 4: Can formal innovation training improve group- and organizational-level innovativeness in a healthcare setting?

Article 1

Demystifying eldercare: Managing and innovating from a public-entity's perspective

Schultz, J. S., André, B., & Sjøvold, E. (2015)

Is not included due to copyright

Article 2

Managing innovation in eldercare: A glimpse into what and how public organizations are planning to deliver healthcare services for their future elderly

Schultz, J. S., André, B., & Sjøvold, E. (2016)

Article 3

Can work climate explain innovative readiness for change?

Schultz, J. S., Sjøvold, E. & André, B. (2016)

Is not included due to copyright

Article 4

Can formal innovation training improve group– and organizational– level innovativeness in a healthcare setting?

Schultz, J. S., Sjøvold, E. & André, B. (2017)

This manuscript has been revised and resubmitted, and is currently under consideration for publication at the Journal of Innovation and Entrepreneurship.

Can formal innovation training improve group- and organizational-level innovativeness in a healthcare setting?

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Abstract

Purpose: Does formalization really destroy creative or innovative thinking? What if formal innovation training actually improved firm-level innovativeness, and what if a manager could predict the likelihood of success of such a program, prior to any resources being used? This is the aim of the study, to determine whether formalization has a positive impact on group- and organizational-level innovativeness. Additionally, this study will explore the extent to which success of such a program can be predetermined, prior to the start of training.
Method: An intervention study was conducted in a healthcare setting. Quantitative and qualitative measurements were used in determining the effect of the formal innovation training. There were two groups; a participant group and a nonparticipant group. The intervention's express aim was to improve both group- and organizational-level innovativeness.
Findings: After the innovation intervention was completed, the participant group had a significant improvement in their understanding of innovation strategy and idea initiations, while the nonparticipant group only had a significant improvement in innovation strategy. Additionally, eight innovative ideas emerged as a result of the training; three of those ideas were implemented and diffused within the organization.
Conclusion: First, this study showed that formalization could improve both group- and organizational-level innovativeness, which was contrary to theory. Second, this study indicated that the level of excitement and engagement in a group is essential to the success of this initiative. In this study, the participating group's level of excitement and engagement was so high that it seemed it was contagious to the rest of the organization. Even though the nonparticipant did not part-take in any training, they learnt from it anyways, through the engagement of the participating group. Furthermore, the success of an innovation initiative can be predicted by looking to the innovative readiness of the participants.

Keywords: Cultural characteristics, formalization, innovative readiness, innovation management, process development.

Introduction

Innovation in healthcare is one of the most important developments for any modern society (Christensen, Grossman, & Hwang, 2009), especially when considering the baby boomers that are approaching. It is known amongst healthcare practitioners that most developed countries will be experiencing unprecedented growths in their elderly population from 2020-2050 (Kulik, Ryan, Harper, & George, 2014). However, what remains unclear is how these public organizations are going to meet these upcoming challenges. That is the aim of this study, to empirically test if formalization, by means of formal innovation training, will better prepare public organizations for the challenges to come. This aim will be tested by conducting an innovation intervention at a municipality that provides health care services for their elderly population. This study will measure the innovativeness between two groups within the same organization. One group will be participating in the innovation training, while the other group will be continuing work as usual or maintaining status quo. Each group's innovativeness will be measured, both before and after the innovation training is completed, to determine if the innovation intervention had an impact on either group's innovative capabilities.

The study makes an important contribution to the literature by testing a research question that has been posed and recommended for future research, but has yet to be tested. A comprehensive review of innovation literature has failed to locate a single adequately conducted and reported intervention study (Anderson, Protocnik, & Zhou, 2014, pp. 1321). There is a need for a "fully functional, pre- and postmeasurement designs, preferably with the use of participant and control group designs in real life organizational interventions with the express aim of improving individual-, group-, or organizational-level innovativeness" (Anderson et al., 2014, pp. 1321; see also Pierce & Delbecq, 1977).

Literature review

The need for innovation in eldercare

Globally, the elderly population is expected to more than double, from 841 million people in 2013, to over 2 billion in 2050 (Nations, 2013). Most developed countries, like the US, the UK, Australia, Japan, and Korea, are expecting their elderly population to double from 2013-2050 (Aging, 2014; Kulik et al., 2014). Norway is no different. From 2010-2050, their elderly population is expected to double (Statistics-Norway, 2012, 2014), the workforce is expected to decrease by 5% (Statistics-Norway, 2012), and municipalities have always struggled with filling enough municipal-nursing vacancies due to poor perceptions of their working environment (Mæle, 2014a, 2014b; Nordberg, 2013; Schultz, André, & Sjøvold, 2016; Sundberg & Samdal, 2013; Ulstein, 2006). Thus, the working environment for municipal-nurses in Norway can be characterized by high stress, high absenteeism, little interest from newly educated nurses, high turnover, few educated nurses, and little emphasis on formal innovation training (Schultz, Sjøvold, & André, 2017). In general, Norwegian municipalities providing eldercare are or will be experiencing many infrastructural challenges. As a result, this study has located one Norwegian municipal-manager who decided that the time to think new or differently about how to deliver eldercare services is now. Prior research in the Norwegian eldercare sector has revealed that municipalities have had a clear strategy of improving the quality of care for the elderly using smart in-home technologies, but there has been little to no consideration given to the working environment (Schultz et al., 2016). Municipalities have acknowledged the need to think new or differently about the way they

deliver healthcare services for their elderly, but have yet to provide their employees with training on how to think innovative (Schultz et al., 2016). This was the managers wish, to build a culture or infrastructure for innovation within her department. This study hopes to fill that knowledge gap by providing formal innovation training.

Even though the municipality in this study agreed to participate in the formal innovation training, it is necessary to mention the inherent tension both in literature and in practice, between formalization and innovation. The tension stems from the belief that with formal procedures create rigidity or unnecessary processes within an organization, and these additional loops innovators must jump through actually inhibit innovators in coming forward with their ideas (Pierce & Delbecq, 1977; Thompson, 1965). As a result, many managers have chosen more open, free, autonomous and undefined processes for innovation. This belief is far from uncommon. There is a body of organizational literature supporting this line of thought that, "[R]outine activities are not likely to induce creative problem solving for those who are directed by formalized role prescriptions... [L]ow formalization permits openness in the system and that this openness is a necessary precondition for idea initiation" (Pierce & Delbecq, 1977, pp. 31; see also Hage & Aiken, 1967; Knight, 1967; Shepard, 1967). But what if it was proven that formalization, by means of innovation training, could improve group- and organizational-level innovativeness? Additionally, what if the success of that innovation training could be predicted, prior to the start, merely by looking to the innovative readiness of the participants? Would formalization than be such a bad thing? This study will attempt to challenge the traditional assumption that formalization hinders innovation.

Formalization and its effects

Formalization is a form of bureaucratic control, which "refers to the degree to which a codified body of rules, procedures or behavior prescriptions is developed to handle decisions and work processing" (Pierce & Delbecq, 1977, pp. 31). A common belief about formalization is that with more formalization comes more bureaucracy (Pierce & Delbecq, 1977; Thompson, 1965). The more bureaucracy, the less motivated innovators will be in coming forward with their ideas (Pierce & Delbecq, 1977; Thompson, 1965). This negative association between formalization and innovation has been around for more than half of a century (Thompson, 1965). Later empirical evidence has affirmed Thompson's findings that flexibility and low emphasis on work rules facilitates innovation (Hage & Aiken, 1967; Kaluzny, Veney, & Gentry, 1974), and low formalization permits openness, which encourages new ideas and behaviors (Knight, 1967; Pierce & Delbecq, 1977; Shepard, 1967). A comprehensive review of innovation processes, suggested that the relationship between innovation and formalization is best explained in terms of Thompson's innovation process:

> (a) *Initiation* of an idea or proposal that when adopted and implemented will lead to the enactment of some change within the organization;
> (b) *Adoption* of the idea or proposal represents a decision being made by the organization's appropriate decision-maker(s) providing mandate and resources for the change; and
> (c) *Implementation*, the installation of the adopted idea into a sustained recognizable behavior pattern within the organization. (Pierce & Delbecq, 1977, pp. 29; see also Thompson, 1965; Zaltman, Duncan, & Holbek, 1973, pp. 155)

The authors formulated a series of propositions, relating formalization to each stage of the innovation process: "Formalization will be negatively related to *initiations*, but will have a modest positive relationship to *adoption* and *implementation*" (Pierce & Delbecq, 1977, pp. 31).

However, these suggested propositions representing the relationship between innovation and formalization have their shortfalls. The termed phases have become too traditional. Understanding and applying these terms given modern developments in literature has become difficult. These traditional terms do not distinguish clearly between the selection and development phases of an idea; they merely speak to the selection or financial support from the organization. Since 1977, organizational and innovation literature has grown in both the development (Christensen & Raynor, 2003) and selection phases (Alexiev, Jansen, Van den Bosch, & Volberda, 2010; Smith & Tushman, 2005; West & Anderson, 1996), which has made distinguishing and measuring accurately between these phases all the more important. Hansen and Birkinshaw (2007) have developed the innovation value chain, a modernized conceptualization of Thompson's innovation process. The innovation value chain measures innovation in three phases: idea generation (replaces initiations), idea conversion (replaces adoption/diffusion), and idea diffusion (replaces adoption/implementation). Hansen and Birkinshaw (2007, pp. 3) further explain their modernization of the innovation process:

> The first of the three phases in the chain is to *generate* ideas; this can happen inside a unit, across units in a company, or outside the firm. The second phase is to *convert* ideas, or, more specifically, select ideas for funding and developing them into products or practices. The third is to *diffuse* those products and practices.

Pierce and Delbecq's (1977) suggested that the relationship between innovation and formalization is best explained in terms of Thompson's innovation processes. However, Hansen and Birkinshaw's (2007) conceptualization more clearly distinguishes between the development, the selection, and the diffusion phases. This modernization allows for a more accurate use and measurement of formal innovation processes, given modern developments in the literature. Additionally, their definition uses more modern termed phases, making the application of each phase in the process more intuitive. Unfortunately, there are apparent shortfalls with this model as well. There is a degree of ambiguity in determining where particular organizational or innovation literature should fit in the innovation value chain. For example, if an organization has difficulties in generating good ideas, creativity literature may shed light onto this, which would fit well within the idea generation phase (McAdam & McClelland, 2002). However, what if the issue is more systemic, and a change is needed throughout the entire organization? In this case, organizational culture (Christensen, 2000; Edmondson, 1999; Harrison & Carroll, 1991; Sørensen, 2002), organizational identity (Hannan & Freeman, 1984; Oliver, 1991), or strategic direction in specific industries (Schultz, André, & Sjøvold, 2015) may shed light onto the issue. If the issue is more systemic, it becomes more difficult to determine where those theories or strategies should fit within Hansen and Birkenshaw's model (e.g., organizational culture or organizational identity).

Accordingly, a hybrid model has been adopted. The hybrid model combines the three aforementioned phases (Hansen & Birkinshaw, 2007; Thompson, 1965; Van de Ven, 2007). The main modification to the Hansen and Birkinshaw's model is the addition of one phase; innovation strategy. The addition of innovation strategy properly addresses issues that are more systemic to the organization. For example, if a manager wants to investigate the impact their organizational culture, identity, or strategic decision-making has on the firm's innovativeness. The addition of innovation strategy will accommodate for that.

These previous studies have described the relationships between innovation processes and formalization in depth, and they have made predictions about these relationships, however these predictions have remained untested (Pierce & Delbecq, 1977; Thompson, 1965). The gap this study is going to fill is testing whether formal innovation processes, by means of an innovation intervention, can actually improve group-level, and possibly organizational-level innovativeness. This construct will test whether formalization is

positively related to innovation as first prescribed by Pierce and Delbecq's (1977), but the name of the phases are modified due to the modernization of the terms.

Hypothesis (H) 1: Formalization is positively related to innovation strategy (previously not a classification).
H2: Formalization is positively related to idea generation (previously called initiations).
H3: Formalization is positively related to conversion (previously called adoptions, but did not distinguish between selection and development clearly).
H4: Formalization is positively related to diffusion (previous classification unclear, but likely implementation).

Innovation and its effects
　　　　Hansen and Birkenshaw's (2007) previously developed questionnaire will aid in measuring the intervention's participants' perceived impact that the formal innovation training has on the four defined stages. In addition to measuring the impact that formalization has on the different stages of the innovation process, this study would benefit by having a more objective measure of innovativeness. A measure more free from employee self-efficacy. For this reason, qualitative data will be gathered from management to measure more objectively, if an innovation occurred per se. However, in order to determine if an innovation actually occurred, innovation first needs to be defined.
　　　　There is much ambiguity surrounding innovation; this definition varies dramatically depending on the context (Garcia & Calantone, 2002; Johannessen, Olsen, & Lumpkin, 2001; Ruvio, Shoham, Vigoda-Gadot, & Schwabsky, 2014). This study is not searching for harmony between the various definitions, nor is it distinguishing between innovation and innovativeness (Ruvio et al., 2014), rather this study has adopted a well-recognized definition of innovation. Innovation is the development and implementation of new ideas within the organization (Van de Ven, 1986; Daft, 1982; Damanpour, 1991; Damanpour & Evan, 1984). If other forms of innovation are used, for example, innovativeness or innovative, they are being used in their literal, grammatical sense. Development refers to the generation of new ideas, while implementation refers to the diffusion of the new idea within the organization (Johannessen et al., 2001; Van de Ven, 1986), rather than focusing on commercial success or diffusion into the marketplace (Garcia & Calantone, 2002). This part of the construct will measure whether formalization will lead to innovation(s), irrespective of improvements in innovation processes. Even though the formalization measures may show improvements in particular phases of the innovation process (or innovation potential) that does not necessarily mean the firm will be more innovative per se. To be innovative per se, the firm will have needed to develop a new idea(s) and implement and diffuse that idea within (and maybe even outside) the organization. This will be measured by gathering qualitative data from management.

H5: Formalization will be positively related to innovativeness.

Innovative readiness for change
Predetermining the success of any organizational initiative, prior to its implementation, is no easy task. Organizational readiness is one body of literature that seems to explore this issue. Organizational readiness refers to how an organization attempts to influence the beliefs, attitudes, intentions, and behavior of their organizational members (Armenakis & Bedeian, 1999; Armenakis, Harris, & Mossholder, 1993; Walker, Armenakis, & Bernerth, 2007; Weiner, 2009; Weiner, Amick, & Lee, 2008). At the core of readiness is the two-part message for change: (a) the need for change, which explains the discrepancy between the current state

and the desired end-state; and (b) the individual and collective efficacy (or perceived ability to change) of the parties affected by the change (Armenakis et al., 1993). This concept was further operationalized by using group climate to explain part (b) of the 2-part message for change test (Caliskan & Isik, 2016; Eby, Adams, Russell, & Gaby, 2000; Ingersoll, Kirsch, Merk, & Lightfoot, 2000; Jones, Jimmieson, & Griffiths, 2005). Subsequent research proposed that, in theory, managers could predetermine the likelihood of success of an innovation initiative merely by looking to group climate, which should describe the group's innovative readiness for change (Schultz et al., 2017). Specifically, for an intervention study, it was hypothesized that the experimental group (those participating in formal innovation training) displayed group climate characteristics of innovative readiness for change, while the nonparticipant group (those that didn't participate) did not (Schultz et al., 2017). To date, this theory has remained untested. This is an additional gap the study hopes to fill.

H6: Innovative readiness can be used as an indicator for predetermining the success of an innovative initiative?

Methodology

Mixed methods were used in conducting this formal innovation intervention (Brewer & Hunter, 1989). Quantitative methods were used for gathering data relating to the relationship between formalization and innovation. The quantitative data was gathered twice; once prior to the innovation intervention, and again after the intervention was completed. Lastly, qualitative data was gathered both from the ideas that surfaced during the workshop and from management to more objectively determine if the formalization of innovation processes improved group- or organizational-level innovativeness.

Study design

After negotiations with management, it was determined that the municipality would allow 20 of their employees to participate in four, two-hour formal innovation training sessions. Management explained that this was all that was economically possible. If their employees are participating in the program, their wages need to be paid for that time, additionally, the municipality will need to find and pay for replacements for those shifts. The municipality solicited interest from their employees. For this reason, the study was broken into two groups; the participant group and the nonparticipant group. The participant group included those that volunteered to participate in the study, while the nonparticipant group included those employees that chose not to participate. It is important to note that the nonparticipant group is not a control group. The nonparticipant group did not know the content of the intervention, but they knew of the interventions existence, and willingly chose not to participate; thus shaping their attitudes prior to any measurements being taken. In actuality, we have two participant groups. One (the participant) group that chose to participate in the study, and the other (the nonparticipant) group that chose not to participate. Prior to the intervention, both groups differed in their attitude towards the treatment. In this study, the organization as a whole is the combination of these two groups.

The participant group was exposed to four, two-hour formal training sessions. All four of the training sessions had a similar format. Each training session alternated between a lecture and group work approximately every 20 minutes throughout the two-hour session. Each small group was asked to apply the theories they learned from that day's lecture to different work-life scenarios. Each small group would come up with new ideas, based on that day's lecture (theory) and the task given to them. Each small group would than present their idea(s) to the others. After all ideas were identified and discussed, the participant group as a whole would decide which idea(s) should be further developed.

The formalization of the training sessions lies in the structure (the process and measuring). First, prior to any innovation training, we identified the participants level of innovation competence in four separate phases, based on a previously validated questionnaire (Hansen & Birkinshaw, 2007). This provided the anchor or reference points for later measuring the impact that the four training sessions had on innovative outcomes. Second, we identified the weakest innovation phase, based on the participants' evaluation. The weakest phase for this group of participants was previously identified as the innovation strategy phase (Schultz et al., 2017). This will aid in determining which academic theories the participant group will benefit most from. Third, the formal innovation training conducted, incorporating the academic theories that should improve the previously identified, weakest phase (Table 1). Fourth, after the training was completed, the impact of the training was measured using the same questionnaire as mentioned in step 1. Fifth, the results from before and after the training were compared using t-tests to identify significant changes. Sixth, gather qualitative data from management to more objectively determine if an innovation has occurred. Lastly, repeat the aforementioned steps as frequently as desired or needed, there should always be a phase in the process that can be improved. This structure needs to be strictly adhered to or this formalization will not have occurred properly.

Table 1. Innovation theories related to each innovation phase

Academic Theory	Activity	Innovation Phase
Introduction (mapping the journey), organizational culture, organizational identity (organizational theory), slack resources, stretch goals, absorptive capacity/vicarious learning, disruptive innovation, transactional cost theory, the end of competitive advantage. *Additional*: Eldercare theory, design thinking, blue ocean strategy.	Firm/individual strategy	Innovation Strategy
Open Innovation, user-driven/lead innovation, service innovation (SDL), motivation (individual, group, and organizational), psychological safety, slack resources, team composition/re-organizing the team, generating movement in discussions, and networks/propinquity (regional and relational).	In-house idea generation	Idea generation
	In-house cross-pollination	
	External sourcing of ideas	
Ambidexterity (exploitation and exploration), impact of management on innovation, and architectural/modular innovation. *Additional*: Eldercare theory	Selection	Conversion
	Development	
Open Innovation, organizational periphery, organizational learning, networks/propinquity (regional and relational), motivation (individual, groups, and organizations), and roles of managers.	Diffusion	Diffusion

Table 1 was originally developed in conjunction with the innovation value chain (Hansen & Birkinshaw, 2007, pp. 6). However, for the aforementioned reasons, the authors have amended the table so that it includes the newly added phase (innovation strategy), and the additional applicable academic theories. In Table 1, innovation and organizational theories were classified into one of the four innovation phases. The inclusion of the academic theories developed over time. Originally, the academic theories included in Table 1 were based on PhD courses that had innovation strategy and innovation management at the core. Additional theories were added if they were industry specific, emerging, and relevant for this study. Thus, Table 1's academic theories will vary and evolve over time due to different environments and industries. Theories can be added, omitted, or repeated in each of the

phases, but a competent researcher in the field of innovation or organizational literature should do this carefully.

This study, in effect, has two measures explaining the relationship between formalization and innovation. Hansen and Birkinshaw's modified questionnaire quantitatively measures the impact that formalization had on each of the four phases in the innovation process based on the participants' perception of their organization. Hansen and Birkinshaw's questionnaire does not determine if an innovation actually occurred, rather it explains the extent to which phases within the innovation process have been improved (or innovation potential). The qualitative interview attempted to measure innovation more objectively and concretely. The review with management did not measure improvements in each innovation phase; it merely measured the result, whether an innovation per se occurred.

Quantitative data

It can be difficult to quantitatively measure an organizations innovative culture, values, beliefs or capabilities, as these concepts tend to be abstract or intangible in nature (Christensen, 2000; Gershon, Stone, Bakken, & Larson, 2004; O'Reilly & Tushman, 2004). It has been suggested that its simpler to quantitatively measure innovative climate, rather than culture (Gershon et al., 2004). Innovative climate refers to the employees' perception or attitude of their organizations culture (Gershon et al., 2004). Accordingly, this study gathered quantitative data based on a previously developed questionnaire (Hansen & Birkinshaw, 2007) that measured the participants perception of their organizations innovative culture. The original questionnaire was modified due to the shortfalls mentioned in the theoretical section above. This resulted in the questionnaire containing 25-items, rather than the original 13-items. Additionally, the scale was widened, from a 3-point to a 5-point Likert scale. Likert scales can range from a 2-point to 10-point scale (Preston & Colman, 2000). There has been a growing trend to scale up when using Likert scales (Preston & Colman, 2000). However, a 10-point scale has been shown to produce slightly lower scores in general as compared with 5- to 7-point scales (Preston & Colman, 2000). This can mean that 10-point scales have too much variability for the respondent. For these reasons, this study chose to use a 5-point Likert scale. The last modification was made to the style in which the question was prompted. Originally, the questions were prompted in the negative form. For example, "Your firm does not assign value to ideas that come from outside the firm (1= disagree and 3= agree). Many of these questions were difficult to understand, especially when the question was asked in the negative, and the first evaluation response was in the negative (1= disagree). There is a prevailing conventional wisdom that a mixture of positively and negatively worded items can counteract acquiescence response bias in surveys (Schriesheim & Hill, 1981). However, empirical evidence shows that negatively worded items may not be an appropriate control for acquiescence response bias (Schriesheim & Hill, 1981). Furthermore, negatively worded questions have been show to impair response accuracy, or in other words lead to respondent confusion (Schriesheim & Hill, 1981). Consequently, the survey questions in this study were re-structured so that they were posed in the positive form. The questionnaire measured the participants' individual perception of their organization's innovation competence in four different phases of innovation; innovation strategy, idea generation, conversion, and diffusion. The participants were unaware of these classifications or phases; however, our guide measured which questions corresponded with each innovation phase. The participants evaluated whether they strongly disagree (1), or strongly agree (5), with each posited innovation question. The data was collected twice; once prior to any formal training, and again, after the training was completed. The first questionnaire was given to both groups to determine which phase was evaluated as the weakest. The weakest phase was identified as innovation strategy (Schultz et al., 2017). The thought is that, if an organization formalizes

their innovation process, they will know which phase of the innovation needs the most improvement. After the weakest phase was identified (from the first questionnaire), the participant group received four, two-hour formal innovation training sessions on that phase. Attendance was taken at the beginning of each session. The second questionnaire was than administered to both groups, after the formal training was completed to determine if the training had any impact on either group or the organization as a whole. The questionnaire as administered in-person, during the workshop for the participant group, while the questionnaire was sent electronically from the manager to the nonparticipating group. After the nonparticipating group's questionnaires were received. The data from the first and second questionnaire were compared, to better understand the relationship that formalization had on the innovation process, both before and after formalization.

This study compared each group's correlation significance (Cohen, Cohen, West, & Aiken, 2013). Prior to any formal innovation training, both groups (the participant and nonparticipant group) completed the questionnaire to determine each group's initial level of innovation understanding. It is suggested that a t-test is an appropriate measure when distinguishing between two groups innovative climate, or perception of their innovative activity (André, Ringdal, Skjong, Rannestad, & Sjøvold, 2016). Accordingly, a t-test was conducted to determine if there was any significant difference between either groups innovation understanding prior to any training. After the formal innovation training was completed for the participant group, both groups completed the questionnaire once again. From the data gathered after the formal training, two additional correlation analyses were conducted. A correlation of each group's responses, both before and after the training, was conducted to determine if the formal training had any effect on either group's innovative climate. As suggested, t-tests were conducted to test the correlation significance (Sjøvold, 2007). This tested how each group member in the participant group perceived their innovation understanding before and after the training. We conducted the same t-test for the nonparticipant group, but the nonparticipant group never received any formal training, thus it was expected that their responses for both the first and second questionnaire should remain relatively similar. This type of study, using a 5-point Likert scale to capture differences between two groups innovative climate, using a t-test as the statistical analysis, has been previously validated (Schultz et al., 2017).

Qualitative data

Two different types of qualitative data were collected. First, data was collected from the ideas that surfaced during the training sessions. The training sessions consisted of both lectures and group work. During the lectures, the participants learned about various relevant academic theories (Table 1). During the group work, the participants applied the theory they were taught to work-life scenarios. Its recommended to have other researchers review qualitative data that's been gathered in relation to research interpretations for quality assurance (Brinkman & Kvale, 2015; Kvale, 1996). Obtaining other perspectives of the same qualitative data helps validate that the interpretations that were accurate (Kvale, 1996). However, in this study, no interpretations were needed. Transcription of the group work was conducted with substantial attention given to preserving the meaning the participants gave to the ideas (Brinkman & Kvale, 2015; Kvale, 1996). The ideas that surfaced from this group work, in all four training sessions were the ideas that were transcribed (Table 3). The second form of qualitative data was gathered from an interview with management; after all formal training was completed. Each idea in Table 3 was analyzed to determine the extent of its development. First, management was asked if the idea was new and originated from this training session. Additionally, management was asked to determine the extent of the idea's development in the organization; 1) only discussed, 2) discussed, selected, and development

in progress, and 3) discussed, selected, developed, implemented, and diffused within the organization. If an idea made it through step three, then an innovation occurred, and the formalization had a positive impact on innovation, irrespective of the participating group's self-efficacy. It was difficult to control for reliability and validity of this data (Brinkman & Kvale, 2015; Kvale, 1996), as the information that was transcribed was based solely on the manager's knowledge.

Subjects and data collection

An innovation intervention was conducted. Data was collected from 40 health care practitioners (N= 40), from a publicly owned retirement home located in a rural part of Trøndelag, in Norway. The practitioners were divided into two groups, the participant group (N=15) and the nonparticipant group (N=25). The participant group will be participating in a formal innovation education, while the nonparticipant group will be conducting business as usual or maintaining status quo. Both groups are comprised of a unit leader, registered nurses, nursing assistants, and others. Participation in the formal innovation training was voluntary, meaning the nonparticipant group members chose not to join.

Prior to any formal training, both groups completed the first questionnaire. From the participant group, 15 of 15 (100%) responded to the questionnaire sufficiently. The response rate was likely so high as the questionnaire was completed at the start of the first innovation-training course. From the nonparticipant group, 22 of 25 (88%) were sufficiently completed. The response rate could have been lower because the questionnaire was sent electronically, from the manager to the employees, and the questionnaire was completed on their own time. At the conclusion of the innovation course, 10 of 15 (67%) questionnaires were sufficiently completed from the participant group, while the nonparticipant group completed 12 of 25 (48%) sufficiently. The second questionnaire for each group was completed in the same manner as the first questionnaire. The participant group completed their second questionnaire at the conclusion of the last innovation-training course, while the nonparticipant group completed an electronic questionnaire on their own time.

Participation in this study was voluntary and the participants could withdraw from the study at any point. Participants were informed about what their participation in the innovation training entailed, that their participation was going to be measured, and the results might be published as research. All data was registered anonymously to preserve the confidentiality of the participants. Management from both the unit and municipality approved the study.

Results

The results from this study, as illustrated in Table 2, show that both the participant group and nonparticipant group had statistical significance in innovation strategy (S1-S3). The participant group had significance for all the innovation strategy questions; (S1) ($p<0.001$), (S2) ($p<0.05$), and (S3) ($p<0.01$). The nonparticipant group also had significance for all the innovation strategy questions; (S1-S3) ($p<0.05$).

The participant group had significance in four of seven idea generation questions (IG1-eIG2); (IG1) ($p<0.01$), (IG2) ($p<0.05$), (IG3) ($p<0.001$), and (IG5) ($p<0.01$). Additionally, the participant group had significance for one conversion question (Sel1) ($p<0.01$), and the control question (C) ($p<0.01$).

Table 2. The participant and nonparticipant group's innovation understanding, before and after the formal innovation training

Innovation Phase	Code	The focus of each question	Part. Before	Part. After	T-test	Statistical Significance	Nonpart. Before	Nonpart. After	T-test	Statistical Significance
Innovation strategy (S1-S3)	S1	Understanding of current organizations strategy.	2,20	3,78	0,0001	***	2,10	2,91	0,0194	*
	S2	Long-term strategy.	2,60	3,11	0,0414	*	2,52	3,33	0,0230	*
	S3	Time allocated towards thinking differently.	2,47	3,33	0,0045	**	2,45	3,25	0,0165	*
Idea generation (IG1-eIG2)	IG1	Internally; the openness of the working environment	2,93	3,89	0,0099	**	3,50	3,92	0,0574	
	IG2	Internally; extent the organization can think differently.	2,93	3,89	0,0201	*	3,24	3,67	0,0870	
	IG3	Internally; quality of the organizations ideas	2,40	3,44	0,0001	***	2,73	3,00	0,1846	
	IG4	Internally; the extent we partner with other departments-	2,73	3,22	0,1073		2,81	3,18	0,0535	
	IG5	or other firms on normal and innovative projects.	3,29	4,11	0,0062	**	2,95	3,33	0,0904	
	eIG1	Importance of external ideas.	3,00	2,44	0,0592		3,05	3,33	0,0903	
	eIG2	Value given to ideas that come from outside the firm.	2,64	2,67	0,4169		2,86	2,50	0,0581	
Conversion (Sel1-D3)	Sel1	How easy it is to bring an idea forward to the org.	2,53	3,44	0,0020	**	2,57	2,75	0,3079	
	Sel2	The importance of each individual's opinion in selection.	3,40	4,11	0,0715		3,18	3,50	0,1113	
	Sel3	The importance of the group's opinion in selection.	3,50	4,00	0,1708		3,45	3,75	0,0723	
	Sel4	The org understands why a particular idea is chosen.	3,21	3,78	0,1290		3,41	3,75	0,1045	
	Sel5	Is the more conservative or risky idea more often chosen	2,13	2,00	0,2760		2,48	2,33	0,2643	
	D1	Using formal innovation processes to measure progress.	3,00	3,00	0,4032		3,05	3,18	0,2328	
	D2	Ideas are generally developed on time, without delays.	3,07	3,00	0,3638		2,81	3,00	0,2292	
	D3	Management generally has strong support in developing	3,21	3,78	0,1068		3,10	3,33	0,1868	
Diffusion (Diff1-Diff5)	Diff1	How fast the org is at bringing idea to the market.	3,20	3,22	0,5000		2,95	3,33	0,0740	
	Diff2	How quickly our ideas are copied (e.g., by competitors).	2,92	2,89	0,3417		2,73	2,83	0,3291	
	Diff3	Extent maximising value (e.g., markets, customers, etc.).	2,67	2,67	0,2873		2,70	2,91	0,2232	
	Diff4	Extent org discusses lessons learned with develop team.	2,57	3,11	0,2292		2,57	2,92	0,1103	
	Diff5	Extent org discusses lessons learned with entire org	3,20	3,33	0,3802		3,19	3,42	0,2220	
Innovation attitude (A1-A2)	A1	Personal enthusiasm towards innovation	4,07	4,33	0,4696		3,45	3,17	0,1404	
	A2	Optimistic attitude towards innovation education course	3,75	4,44	0,1087		2,75	2,83	0,3989	
Control question	C	Experim. group has spoken to control group about	2,83	4,33	0,0025	**	2,47	2,00	0,0702	

* p < 0.05   ** p < 0.01   *** p < 001

Table 3 lists the innovative ideas that emerged as a result of the formal innovation training, and the extent to which each innovative idea was implemented within the Norwegian municipality. Eight ideas emerged from the innovation training; all ideas were discussed, seven ideas were selected and/or were being further developed (Ideas 1-3 and 5-8), and three ideas were implemented and diffused within the organization (Ideas 2, 5, and 7).

Table 3. Innovation ideas that derived from the formal innovation training

Idea	Description of the idea	Extent implemented
1.	Smaller units for elderly with dementia (with shielding/protection needs) – Units are too large now.	**
2.	Changes in planning daily routines and tasks between day and nighttime nurses.	***
3.	Have open dinner hours for 1-2 hours to improve patients' appetites and less chaos in the dining room.	**
4.	Facilitate the receipt of patients with different backgrounds, today we're not prepared for more.	*
5.	Better estimates of food needs, waste less food.	***
6.	A more active use of PPS	**
7.	Patient summary or overview completed in advance	***
8.	Improve interdisciplinary (across department) collaboration	**

* Discussed ** Selected and development in progress *** Implemented and diffused

Discussion

This study has explored the relationship between formalization and innovation, the impact group dynamics can have on the organization, and predicting the success of formalization initiatives. The most significant finding was that formalization improves both group- and organizational-level innovativeness, which is contrary to theory. Additionally, we found that if the group participating in the formalization has a dominant group characteristic of excitement and engagement, this characteristic was contagious to the rest of the organization's nonparticipants. The results are summarized in Table 4.

Table 4. Innovation ideas that derived from the formal innovation training

Hypotheses		Status
H1.	Formalization is positively related to innovation strategy.	Supported
H2.	Formalization is positively related to idea generation	Supported, in part
H3.	Formalization is positively related to conversion	Inconclusive
H4.	Formalization is positively related to diffusion	Inconclusive
H5.	Formalization is positively related to innovativeness	Supported
H6.	Innovative readiness can be used as an indicator for predetermining the success of an innovative initiative.	Supported

First, formalization has a positive effect on group-level innovativeness. Prior to any innovation training, both the participant group and nonparticipant group had a relatively similar understanding of innovation (Schultz et al., 2017). This meant that neither group had statistical significance or an advantage in their understanding of innovation prior to any training. However, after the participant group completed their formal training on innovation strategy, both the participant group and the nonparticipant group improved their understanding of innovation strategy significantly, thus supporting H1 (Table 4). The impact this had for at the group-level will be further discussed.

At first glance, the positive relationship between formal innovation training and an improved understanding of innovation strategy for the *participating group* may not be that surprising. It seems logical that those who are interested and willingly chose to participate in innovation training will likely learn from it. Even if this is true, that the participant group was biased prior to training, the results still show that innovation (strategy) can be taught using formal training. This is an important finding as prior research has argued for 50 years that flexibility and low emphasis on work rules facilitate innovation (Hage & Aiken, 1967; Kaluzny et al., 1974), and low formalization permits openness, which encourages new ideas and behaviors (Knight, 1967; Pierce & Delbecq, 1977; Shepard, 1967). Contrary to the formalization theory, the statistical significance in Table 2 and results in Table 3 show that the (high) formalization, in the form of innovation training, has facilitated innovation for the participant group. The formal training has improved their understanding of both innovation strategy and idea generation (Table 2), and that improvement in innovation understanding has led to an emergence of eight new ideas (Table 3), three of which were implemented and diffused within the organization. This supported H1 and H2 for the participant group (Table 4).

Are there alternative explanations for this significance? What if the participating group merely believed they were more innovative because they participated in innovation training? Could that account for their significance? Table 2 dismisses these claims. If that were the case, that the participating group believed they were more innovative after having completed the course, they would have had similar statistical significance in all or many of the innovation phases. However, they did not. Neither group could identify which questions on the survey were related to which innovation phases. After the training was completed, the participating group was statistically significant in only two of the four phases; innovation strategy (the phase they were given training in) and idea generation ($p<0.001$). The significance in idea generation can be explained by looking to the nature of the courses. Innovation strategy can be tied closely with idea generation phase depending on which theories were discussed. There are some innovation strategy theories that could influence and overlap with idea generation.

Additionally, the study showed that the formal innovation training had a positive impact on the *nonparticipant group's* understanding of innovation strategy ($p<0.05$), thus supporting H1, but not H2 (Table 4). This was odd. Members from this group were given the opportunity to join the innovation training, but they willingly chose not to participate. This group prioritized status quo or continuing business as usual, rather than participating in the training. Despite this lack of interest in the innovation training, their statistical significance in innovation strategy, illustrated in Table 2, indicated they learned from the training anyways. The nonparticipant group's significance was difficult to understand when looking solely to their group's data. However, when the nonparticipant group's data was viewed in light of the participating group's data and work climate, an explanation emerged.

Second, formalization has a positive effect on organizational-level innovativeness. There were two indications that formalization affected the organizational-level innovativeness. First, Table 2, shows that the nonparticipant group has statistical significance

(p<0.05) in the innovation strategy phase, the same phase the participant group was taught. Here both groups, the participant and nonparticipant group, experienced statistical significance in the same phase. The combination of these two groups comprised the organization in this study. Meaning, learning reached the organizational-level. This is fairly convincing evidence, as the nonparticipant group had no idea, which phase the participant group was participating in, could not determine which questions were associated with each phase on the questionnaire, and still, the nonparticipant group was only significant in one of the four phases on the questionnaire. If either group (the participant group or the nonparticipant group) really did not learn, and merely thought they were more innovative, more phases would have had significance. It is possible that this significance for both groups is a coincidence. However, when the evidence from Table 2, is viewed together with Table 3, the findings support the positive relationship for organizational-level innovativeness. Table 3 is an illustration of the qualitative data gathered from management. Table 3 explains the ideas that emerged as a result of the formalization, and the extent to which each idea was implemented within the organization. Table 3 shows that due to the formal training that eight ideas emerged as a result of the training; seven ideas were further developed, and Ideas 2, 5, and 7 were discussed, implemented and diffused within the organization. Thus, formalization was positively related to organizational-level innovation as three new ideas were developed, implemented, and diffused within the organization, which supported H5 (Table 4).

Third, the results revealed that the group participating in the formalization had a dominant attitude of excitement and engagement towards the formalization, this attitude was contagious to the rest of the organization's nonparticipants. Prior to any training, the participant group was clearly more enthusiastic about innovation than the nonparticipant group (Schultz et al., 2017). On average, each group member in the participant group was personally more enthusiastic, and had a more optimistic attitude of the potential impact the formal innovation training course could have on their organization (Schultz et al., 2017). Thus, the participating group's work climate was clearly fostering an atmosphere of enthusiasm for innovation. Additionally, the participant group had a significant difference to the control question in Table 2. This question prompted the participant group to evaluate how often they spoke to the nonparticipant group about the innovation education that they received, the participant group responded significantly (p<0.01).

One possible explanation for the nonparticipant group's significance is that the participant group members contacted a number of nonparticipant group members, and were able to educate them on innovation strategy. Participation in the formal innovation training was voluntary; the nonparticipant group members chose not to join. However, in the end, they learned anyways. It is difficult to understand how this learning came about. Whether it was the nonparticipant group that eventually decided for themselves that they were ready to learn, or whether the participant group had such a strong influence on the organization or nonparticipant group that they prevailed. Alternatively, the nonparticipant group members could have experienced a feeling of being "left out", and thus became competitive and tried to do well on the assessments. According to this study's measures, it seems most likely that the participant group's engagement or enthusiasm for innovation was contagious to the nonparticipant group. There is a body of organizational literature that supports the proposition that engagement is highly contagious and transferrable to other members of an organization (Barrick, Thurgood, Smith, & Courtright, 2015; Pugh, 2001). However, this current study did not have these express measures in place to measure this issue accurately. For the aforementioned reasons, this phenomenon of an engaged or enthusiastic group influencing other nonparticipating members with their positive attitude to improve group- or organizational- innovativeness should be further explored.

Fourth, innovative readiness can be used to predict or predetermine if a group of participants is ready for innovative change. Prior to the intervention, both the participant group and nonparticipant group were classified in terms of their innovative readiness, based on their group climate (Schultz et al., 2017). It was determined that the participant group showed signs of innovative readiness for change, while the nonparticipant group did not (Schultz et al., 2017). This study confirmed this prediction for the participant group in Table 2. Table 2 shows that the participating group significantly improved their understanding of innovation (p<0.001) in the innovation phase they were taught, and this lead to organization-wide innovations in Table 3. When Tables 2 and 3 are viewed together, they confirm that the participating group's innovative readiness was in-fact a positive indicator of their successful participation in the innovation initiative. However, it was also predicted that the nonparticipating group was not ready for innovative change, but Table 2 presumably shows that this group did in-fact change. This study did not have the appropriate measures in place to determine accurately how the nonparticipant group did in-fact learn, even though they did not participate in any training. It seems plausible from Table 2, that the control question (C), the extent to which the participant group interacted with nonparticipant group about what they learned from the intervention, could have triggered this change for the nonparticipant group. If this were the case, it would not contradict the validity of innovative readiness. It would merely provide an explanation for an unexpected outcome. In this case, that one group's positive attitude was so strong that it convinced a group to be ready for innovation, even though they previously were not. Looking to group climate to predetermine innovative readiness for change was supported H6 for the participant group, but H6 was inconclusive for nonparticipant group (Table 4).

Lastly, formalization focusing on one innovation phase can have a spillover effect to the other innovation phases. The relationship between 'formalization and conversion' and 'formalization and diffusion' was inconclusive as neither group received formalized training on either respective phase. Prior research identified innovation strategy as the weakest phase for this organization (Schultz et al., 2017). Accordingly, this organization received formal training only on innovation strategy. For this reason, the study's focus was on testing the impact that the formal training had on that phase of innovation. Even though the focus was on innovation strategy, all phases in the innovation process needed to be tested to account for possible spillover effects. This is one possible explanation for why the participant group had a significant improvement in their understanding of the idea generation phase. For these reasons, H3 and H4 were inconclusive (Table 4).

Conclusions

With the elderly population expected to nearly double in many developed countries from 2020-2050, health care practitioners have stated they must think new or differently about how they deliver their healthcare services, both in terms of technology they use and method they implore. This study has offered one proven method that will aid health practitioners in thinking new or differently about how they deliver their services. The most important outcome from this study showed that innovation or innovative thinking could actually be taught by means of formalization. Contrary to formalization theory, formal innovation training had a positive relationship to both group- and organizational-level innovativeness.

Additionally, this study showed the impact that a group of engaged or enthusiastic employees can have on the organization. The participant group in this study had a dominant group characteristic of interest in innovation. This study indicates that the participating group's excitement and engagement for innovation was contagious to the nonparticipating group. Even though the nonparticipant group chose to not participate in the formal training, in the end, they learned from it anyways by means of the participant group.

Furthermore, this study showed that managers could predetermine the likelihood of success of an innovative initiative merely by looking to group climate, which will shed light onto their innovative readiness for change.

The outcomes from this study have important implications to both theory and practice. *Theoretically*, the study provides quantitative and qualitative data in an area where data has previously been lacking (intervention studies developed specifically to improve both group- and organizational-level innovativeness) (Anderson et al., 2014; Pierce & Delbecq, 1977; Schultz et al., 2016). Equally as important, the data from the study contradicts traditional formalization theory. Lastly, this study validates the determination of a group's innovative readiness by looking to their group climate. For *managers*, in the simplest terms, the study shows managers how they can start to think new or differently by implementing formal innovation training or a new innovation process within their organization. Interpreting the outcome one-step further, the study could cause a shift in how organizations evaluate their workforce or hiring practices. This study shows that managers do not necessarily need to hire the most attractive or innovative employees available, rather firms should try to first attempt to foster innovative growth from within the firm. Additionally, prior to putting time and money into a new innovation program, managers could now predetermine the likelihood of success of an innovative initiative merely by looking to their participating group's climate. These implications can have a significant impact on innovative development within organizations, but also could shift hiring practices among firms attempting to become more innovative.

Limitations

The sample size is a limitation. There are not that many participants in this study (N=40). Additionally, it may be a bit problematic to split the same department into two groups, one participating in the intervention, the other not, and having both evaluate their perception of the same organization's understanding of different phases of innovation. Ideally, there would have been two groups from two different organizations, one participating in the study, and the other being the control group. However, this was not practically possible; this study only had access to one institution.

An additional limitation was the relationships that were tested. The only relationships that were tested were the improvement in innovation understanding between the participant and nonparticipants, both before and after formal training was completed. There should have been a two more groups participating. One group should have been required to join, even though they did not want, to empirically test that impact. Another group, and perhaps the most interesting, group that should have been included in the study was a combination of both the participant group and the nonparticipant group. It would have been interesting to see the impact on both innovation understanding and group cultural dynamics. If the nonparticipants passiveness or negativity towards innovation would have been destructive for the participant members. Alternatively, maybe the participant members could convince nonparticipants to be more active or engaged.

Future research

Innovation literature could benefit significantly by increasing the sample size, monitoring a longer duration, study three groups (participant group, nonparticipant group, and a group combining participant and nonparticipant members), and expanding the study to different industries. This would likely shed more light unto the impact and transferability that formal innovation training has on both group- and organizational-level innovativeness.

Additionally, the idea that innovation is contagious should further explored. It was quite unexpected and surprising to think that the participating group's excitement and

engagement for innovation was contagious to the nonparticipant group. This study was designed and structured more for measuring changes in group-level innovativeness, rather than the psychological factors influencing a nonparticipant group. It would be an interesting study to measure more precisely how the nonparticipant group learned what they did. There are many explanations; maybe the nonparticipant group merely learned how they wanted (from their colleagues), or that the participant group has so much influence over the organization that the nonparticipant group did not have a choice. Regardless, the finding was surprising, and definitely worth exploring further.

Lastly, innovative readiness needs to be further developed. It was accurate in predicting the success for the participating group, but the theory was inconclusive for the nonparticipating group, possibly due to the engagement from the participating group being contagious to the nonparticipant group. Before this theory can be validated, it needs to be further developed.

Competing Interests

We (the authors) declare, to our knowledge, that we have no competing interests.

Authors Contribution

Joseph Schultz is the corresponding or main author on this manuscript. He led the project in its initiation, writing, and gathering data. Beate André contributed significantly in developing the paper, in terms of developing concepts/theory, having better structure/organizing the content, and analyzing the data. Endre Sjøvold established the contacts for us in setting up our intervention by attending important meetings with the local mayor and managers of the municipality where the intervention was conducted. He also assisted in strategic direction with concepts and advising which methods he thought was appropriate for analyzing our data. Without the authors named in this manuscript, this research could not have been conducted in the way it was.

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